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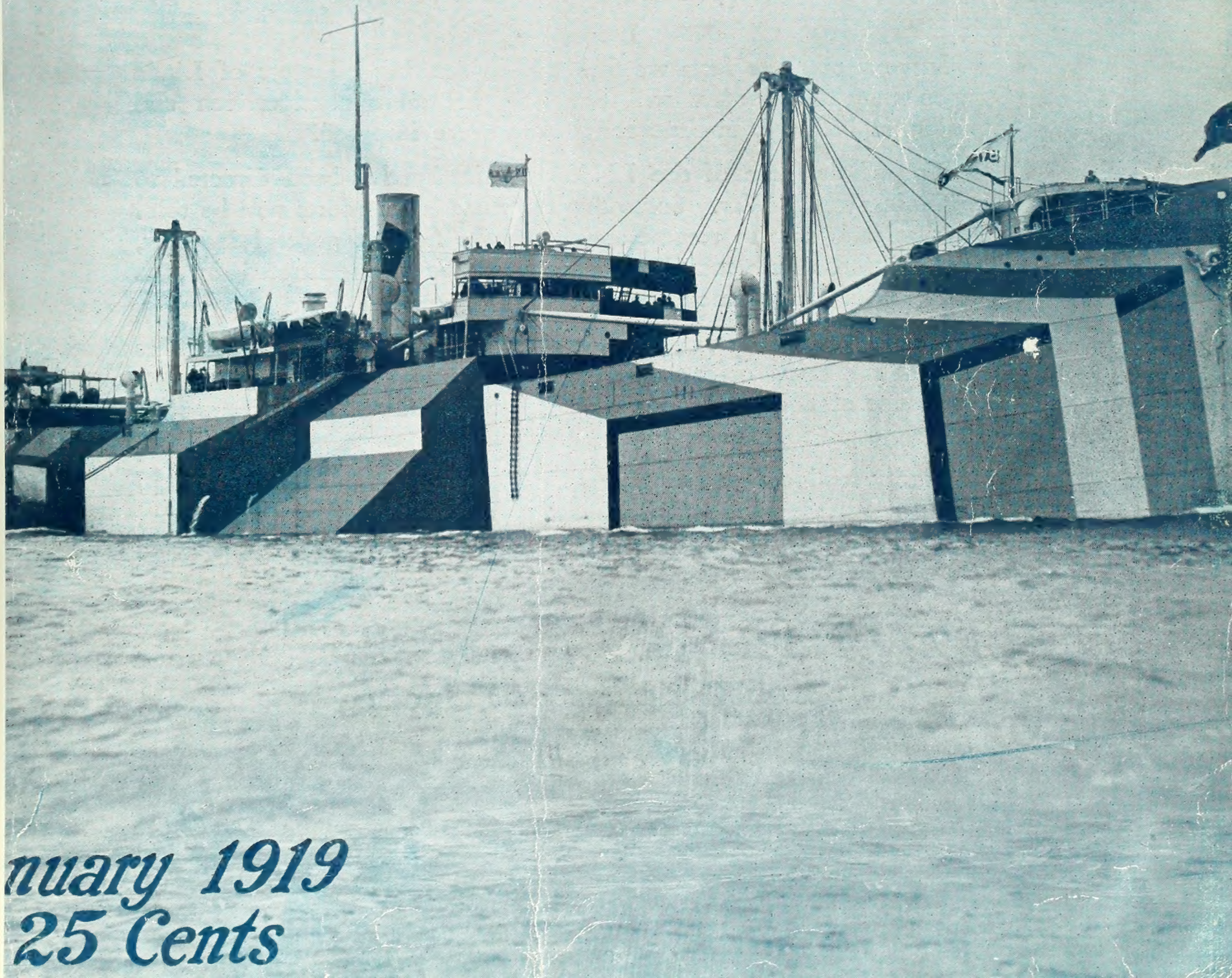
Pacific Marine Review



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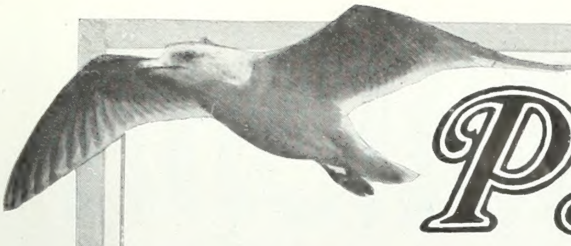

Pacific Marine Review

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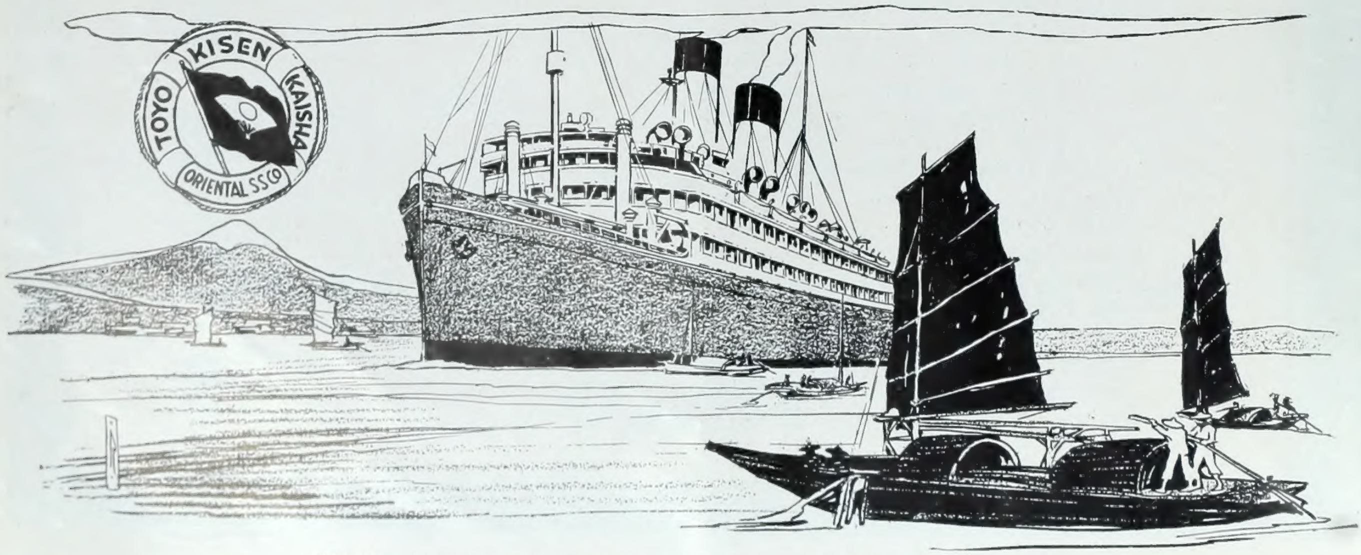

PACIFIC MARINE REVIEW

January, 1919

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Genesis of American Wooden Shipbuilding

Here's to the sailor of the sail, breed of the oaken heart,
Who drew the world together and spread our race apart,
Whose conquests are the measure of thrice the ocean's girth,
Whose trophies are the nations that necklace half the earth,
Lord of the bunt and gasket, and master of the yard
To whom no land was distant, to whom no sea was barred.

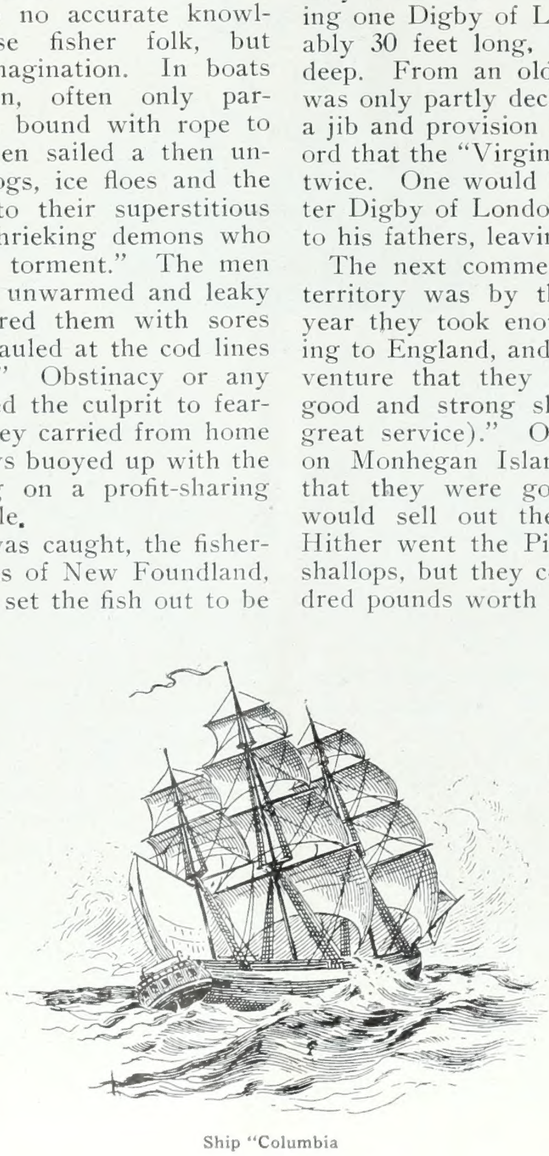
EARLY in the sixteenth century the wonderful cod fishing on the New Foundland banks began to lure the stout-hearted mariners from Spain, Portugal, France and the British Isles. So lucrative and so important was this trade that in 1577 the records show 350 vessels to have crossed the "roaring forties," fished the Banks and returned well satisfied with their gains. We have no accurate knowledge of the life of these fisher folk, but we can glimpse them in imagination. In boats of the crudest construction, often only partially decked, and sometimes bound with rope to hold them together, these men sailed a then uncharted sea, braving black fogs, ice floes and the great northeast gales that to their superstitious minds "seemed laden with shrieking demons who came to carry their souls to torment." The men slept on the open deck or in unwarmed and leaky forecastles. The brine covered them with sores called "sea boils," and they hauled at the cod lines with hands "dripping blood." Obstinacy or any fracture of discipline subjected the culprit to fearful tortures. Such food as they carried from home spoiled. But they were always buoyed up with the hope of large reward, being on a profit-sharing basis and not on a wage scale.

When the harvest of fish was caught, the fishermen would land on the shores of New Foundland, build flakes on the beach and set the fish out to be cured. Life on shore was much pleasanter and good food and game would soon restore the spirit of these men. The catch was almost invariably good, and on arrival at the home port the fisherman had enough in his wallet so that he could live comfortably through the winter, sitting around the hearthstone relating wonderful tales of adventure to his admiring but less venturesome friends.

In May, 1607, the Plymouth Company sent two vessels to establish a fishing colony on the coast of what is now Maine. One, a "fly boat" called "The Gift of God," and the other a good ship named the "Mary and John." On August 18 this settlement was located at the mouth of the Kennebee River. Here, after erecting suitable buildings for their convenience, and surrounding them with a fortress wall, "the carpenters framed a pretty pinnance of about 30 tons, which they called the 'Virginia,' the chief shipwright being one Digby of London." This vessel was probably 30 feet long, 14 feet wide, and some 7 feet deep. From an old drawing we surmise that she was only partly decked and carried a sprit sail and a jib and provision for oars. It is a matter of record that the "Virginia" crossed the Atlantic at least twice. One would like to have a portrait of Master Digby of London, but that gentleman has gone to his fathers, leaving no trace.

The next commercial shipbuilding in American territory was by the Pilgrims in 1624. In that year they took enough cod to load a ship returning to England, and the profit was so good on this venture that they forthwith launched "two very good and strong shallops (which after did them great service)." One year later some merchants on Monhegan Island sent word down the coast that they were going to give up business and would sell out their stock at a great bargain. Hither went the Pilgrim mariners in one of their shallops, but they could only carry home five hundred pounds worth of the goods. As soon as they reached home they cut the shallop in two and lengthened her so that the next time an opportunity offered they would have a larger capacity for profitable buying.

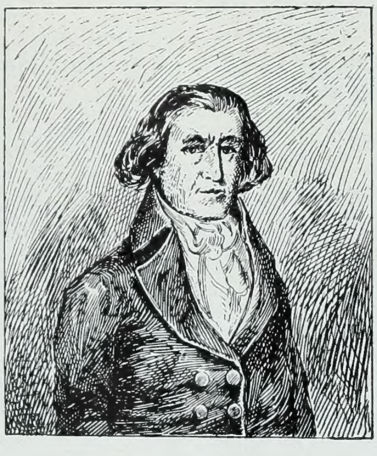
Among two hundred Puritan colonies who arrived at what is now Charlestown, Mass., there were "wheelwrights, carpenters and shipbuilders." These shipbuilders established, on the Mystic River near the present site of Medford, the first shipyard on the American continent. On July fourth (blessed coincidence), 1631, they launched their first seagoing vessel. Their "bark"



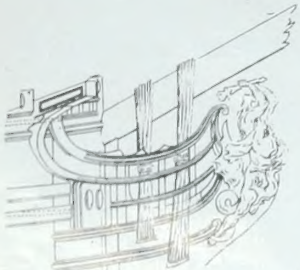
Ship "Columbia

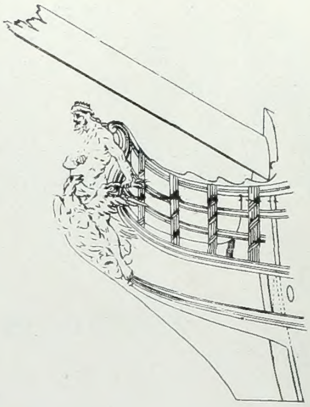
was of 30 tons burden and was called the "Blessing of the Bay." In the same year one John Winter established a shipyard on Richmond Island, near the site of what is now Portland, Maine, and in December began the construction of a ship for merchants of Plymouth, England. This was the first ship built for export in the American colonies. In 1638 the records show that sixty men were at work in this yard, but soon thereafter, for unknown reasons, it disappears from the records.

The cod fishing soon grew to enormous proportions, so that by 1636 the Marblehead fisher folk built the "Desire," a ship of 120 tons, and four years later Boston launched the "Trial," of 160 tons, and Salem took the record with a "goodly shipe" of 300 tons. These ships almost from the beginning showed a radical change from the accepted ideas of naval architects. The ships of Europe were highly ornamented structures, with great cabins at the stern. But the New Englanders had no time or money to waste on non-essentials, and so to the American wooden shipbuilder comes the honor of the first commonsense ideas in shipbuilding. He built the first ship shape (as we now know the term) hulls, and for the same economical reasonsdeveloped the modern fore and aft rigging. It soon became evident to European merchants that this new style was safer, of greater carrying capacity, swifter and handier, and they all followed suit. This fact of simplified construction, together with the tremendous and easily accessible resources of timber, led to quite an industry in building ships. Although New England labor in those days received much higher pay than labor in Britain, the cost per tion was about $20.00 in the former against $30.00 to $40.00 in the latter. So that when they began to build ships of any size, the New England shipyards were busy with British orders the year round.


Captain Robert Gray

During the next one hundred and fifty years, notwithstanding the British legislation adverse to Colonial marine, and armed pirates infesting the Southern Atlantic, shipbuilding in New England and the operation of ships from her ports continued to grow. The whale trade developed, and in 1770 Nantucket alone owned 125 whalers of 93 tons burden average. In 1767, fifty New England whalers crossed the line "by way of experiment, and Captain Shields, a New England whaler, in a wooden ship, led the way around the Horn." The slave trade also developed during this period and grew to a highly profitable but very infamous phase of American merchant marine operation. We have no space to treat of this at length, but wish here to set down one story from letters of a certain Captain David Lindsay, who commanded the 40-ton brigatine "Sanderson" in a voyage from Newport to the African Coast and return via Barbadoes. She sailed on August 22nd, 1752, for the "Black Coast." The chief cargo consisted of "80 hhds., 6 bbls. and 3 taining 8220 gallons." A note on sailing says she was "tite" as yet." In a letter dated "Anamaboe, 28th February, 1753," the captain reports progress: "I have got thirteen or fourteen hogsheads of rum yet left aboard, and God knows when I shall get clear of it. Ye traid is so dull it is actually anoof to make a man crazy. I should be very glad to come rite home with my slaves for my vesial will not last to proceed farr. We can see day lite al round her bow under deck." Yet after a stormy passage of ten weeks, during which "I met on my passage twenty-two days of very squaly winds and continued rains so that it beat my sails alto pieces," they arrived safe at Barbadoes with "56 slaves and in helth and fatt." After arrival at Newport the consignees of the cargo credited the owners of the ship with £1,324. As the cost of the "Sanderson" to the owners was £450, the profits can be seen to be enormous. And in addition to this the captain had a privateventure and a percentage on all cargo sales.





When the colonies had broken away from Great Britain and established these United States of America, there were few merchant vessels in commission. The war had taken heavy toll. But the vessels that were left were the best merchantmen on the sea at that time.

In 1789 nineteen shipbuilders of Philadelphia, and also those of Charleston, Baltimore and Boston, "memorialized" Congress asking relief. Said they: "From the diminished state of shipbuilding in America and the ruinous restrictions to which our vessels are subject in foreign ports, from the distressed condition of our commerce, languishing under the most disgraceful irregularities, its benefits transferred to strangers — who neither have treaties with us—nor are friendly to our commerce, it therefore seemed necessary to ask Congress what ought to be done in the matter." The hostility of Great Britain and her absolute enforcement of the embargo on American trade with any of her colonies threw American marine trade circles into great gloom and depression. But the shrewd traders of New York began to reach out in another direction, and we find in the Congressional Record for 1784 reference to the granting of "sea letters" to one Captain John Green, master of a ship called "Empress of China," which is to sail from New York to Canton. This vessel measured 360 tons burden. Sailing from New York on February 22, 1784, she arrived at Canton Roads

Launch of schooner "Northwest America," at Nootka Sound, September, 1788

August 23, and reached home May 11, 1785. The voyage was successful and soon others followed.

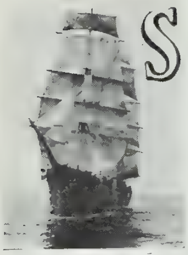
We have not the space here to describe in detail the development of the wonderful chapters that followed in the maritime history of America. Let us take in detail one voyage that shows the kind of stuff that is in properly built American wooden ships, manned by proper seamen.

On October 1, 1787, the ship "Columbia," 240 tons burden, Captain John Kendrick, with the sloop "Washington," Captain Robert Gray, as a "tender," sailed away from New York to round Cape Horn and explore the northwest coast of the continent for fur trading. They arrived at Nootka Sound in September, 1788, just in time to witness the launching by Captain John Meares of the schooner "Northwest American," the first ship built on the Pacific Coast of North America. Captain Gray thoroughly explored the Straits of Juan De Fuca and adjoining waters, discovered the Columbia River, and explored it as far as navigable, while Captain Kendrick purchased land from the Indians and built a vessel of 40 tons burden, called the "Adventure," which they sold to the Spaniards. On July 3, 1789, Captain Gray sailed for home in the "Columbia" via China and the Cape of Good Hope, a wooden ship thus becoming the first vessel to carry the American flag around the world. It is recorded that these voyages did not pay the owners of the "Columbia" any profit. But consider the debt of gratitude owed these worthy captains and their little ships by the long procession of merchant mariners who followed in their wake, by the commonwealths of Oregon and Washington, and by all the shipbuilders of this coast. By the year 1800 the Stars and Stripes were seen in every port and the foundation of many of the best fortunes in America was laid in wooden bottoms.

The sea-faring life gave such opportunities in those days that, notwithstanding its great hardships, it drew to itself the best young manhood of the nation. To quote "The Story of the American Merchant Marine," by John R. Spears, from which much of the data in this article is taken: "Although all ships of the day were, by modern standards, dangerous in size and rig; though scurvy plagued the crews on long voyages; though vast breadths of the sea had never been explored, and the wild coasts visited had never been charted; although the first voyages were made when the American people were financially prostrate and the symbol of the American Government was utterly powerless, not only in home affairs, but in the face of the open and covert enmity of the leading commercial nations of the world—in spite of all this, the American 'wooden ships reached out for the commerce of all the world, and young men having ambition and ability worked their way to the command of ships before they were old enough to vote.' The picture of one of those boyish sea captains flinging the Stars and Stripes to the breeze on the far side of the earth portrays better than anything ever said, written or done, the spirit of America."

Clipper Ship Era

"Build me straight, O worthy master,
Staunch and strong, a goodly vessel,
That shall laugh at all disaster
And with wave and whirlwind wrestle."



SHIPBUILDING in wood on the Atlantic Coast of the United States of America reached its climax from the year 1800 to the time of the Civil War, and in the ten years from 1850 to 1860 American-built wooden ships were the marvels of the maritime world. During that period the American sailing packets were regularly winning races across the Atlantic from steamers on the same route, and American clippers taking the honors from all comers in the great China tea races. These ships were built for speed as well as carrying capacity, and no more beautiful creations were ever put upon the water.

It will be noted that 1849-1852, the beginning of this greatest decade in American wooden shipbuilding, saw an emergency need for bottoms in the Gold Rush to California. Every Down East shipyard was worked to the limit. Speed, not price, was the first consideration. Every fishing village began to build ships of 1000 tons and over. In some places hulls were built in the woods and hauled to the water's edge by oxen. "The very infants learned their knots and grew as conversant with grease and tar as the oldest shellback, whilst every Down East girl sang 'Round Cape Horn.' "

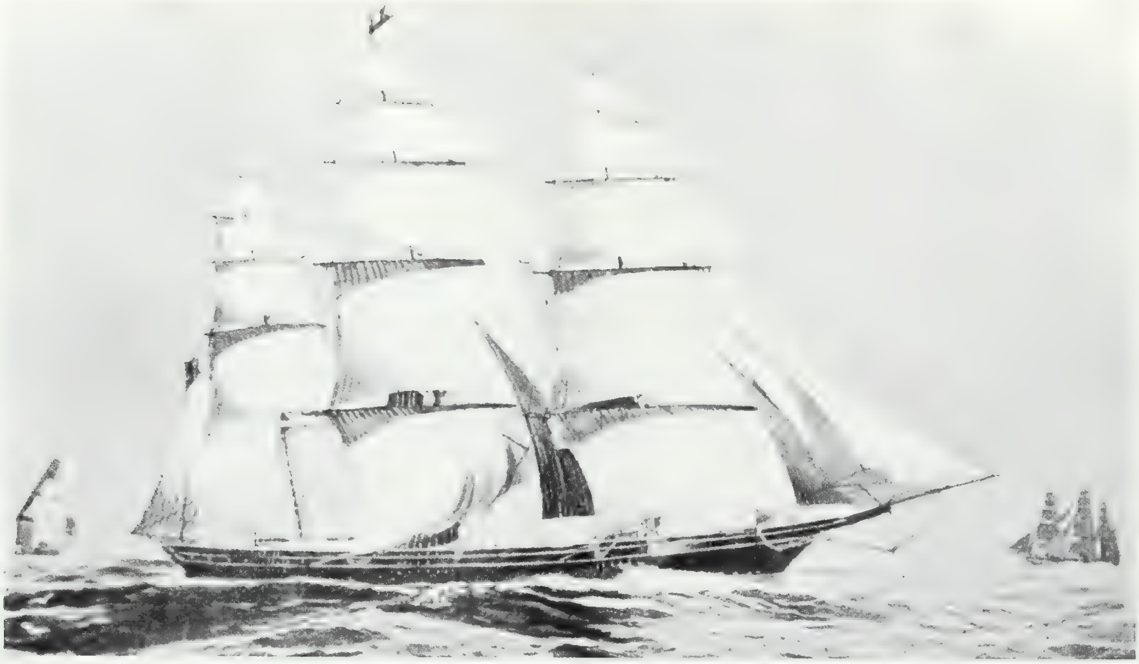
New York and Boston were the center of this boom in shipbuilding. In New York over 10,000 men were working in the yards. The principal firms were William H. Webb, Smith & Dinon, Jacob Bell, Jacob A. Westervelt, and Roosevelt & Joyce. Of these William H. Webb had perhaps the finest record. In all he built 138 vessels, totaling 177,872 tons.

Boston's famous "shipmasters" were: Sam Hall, Paul Curtis, R. E. Jackson and Donald Mackay. The last was a peculiar genius, in a class by himself, and reckoned by some authorities as the greatest wooden shipbuilder the world has even known. Certainly no vessels propelled by wind alone have ever travelled so fast through the water as the crack Mackay clippers. His masterpieces were: "Staghound," "Flying Cloud," "Sovereign of the Seas," "Flying Fish," "Westward Ho," "Great Republic," and the four ships built for the English Black Ball Line, namely, "Lightning," "James Baines," "Champion of the Seas," and "Donald Mackay."

On page 75 is shown a list of American clippers built at this time with their dimensions and names of captains and builders. Hall's yard at Boston was the scene of many a famous launching, notably that of the clipper "Surprise," which went down the ways under full sail, and probably inspired that wonderful poem of Longfellow's, the "Building of the Ship." Right here we wish to make a statement that was formerly a truism in shipbuilding, but which has almost been forgotten by the modern ship fabricator—"Every ship should have its own personality and should in a certain very real sense be a thing of 'life and beauty,' into whose form and substance has been built the very life and character of her maker."

Space will not permit us to give in detail the records of these wonderful clipper ships, nor the methods of operation and construction. The maiden voyage of the "Surprise" will serve for an example. When ready for sea she was towed around to New York by the Boston tug "R. B. Forbes." There she loaded a cargo of 1800 tons, valued at $200,000, for San Francisco. Her manifest was said to be 25 feet long. She made the run out in ninety-six days, crossed to Canton and loaded with tea for the English market at $6.00 per ton freight charge. Her whole voyage was so successful financially that after paying for her entire cost and running expenses there was left a clear $50,000 profit. She was continuously in operation till the fourth of February, 1876, when she struck an uncharted sunken rock beating into Yokohama and became a total loss.

Just about the middle of the "fifties" English yards began turning out wonderful clipper ships, and a close analysis of the shipbuilding situation in those days compels us to admit that it was not so much the coming of the steam navigation that enabled England to retrieve her maritime prosperity, as the waning of interest in overseas trade on the American side of the Atlantic, and the fact that the Civil War and the great interior development of the United States demanded all the energies of her people.



The "Flying Cloud," Donald Mackay's greatest clipper

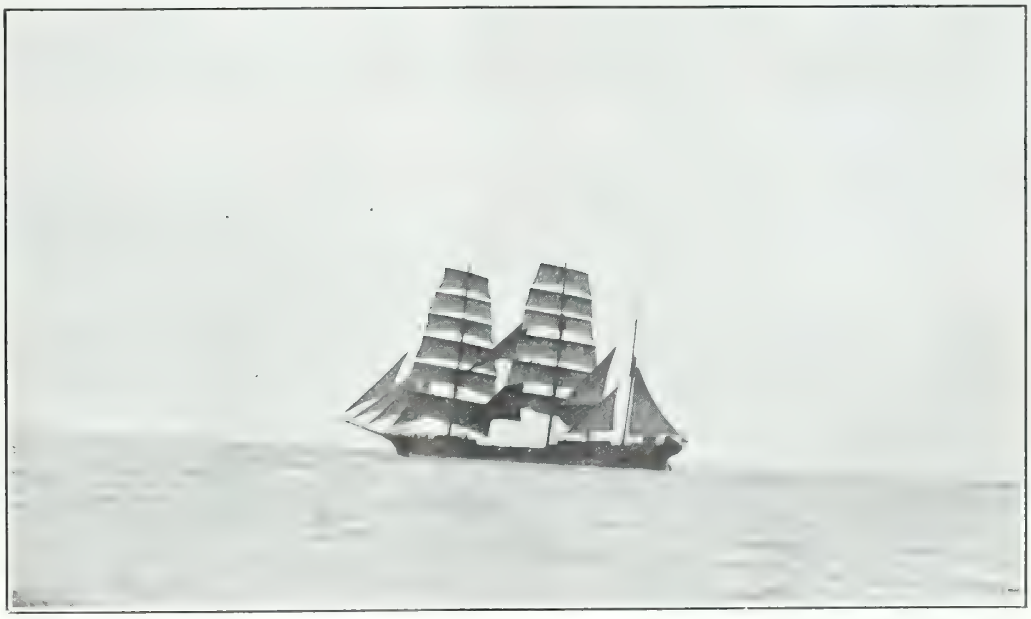
O fair she was to look on as some spirit of the sea
When she raced from China, homeward, with her freight
of fragrant tea.
And the shining, swift bonita and the wide-winged albatross
Claimed kinship with the clipper beneath the Southern
Cross.

From the haven of the present she has cleared and
slipped away
Loaded deep and running free for the port of yesterday.
And the cargo that she carried, ah! it was not China tea;
She took with her all the glamour and romance of life
at sea.

K. Tardif.

American Clipper Ships Launched 1850-1851

Ship	Tons	Length	Beam	Depth	First Captain	Builders	Owners
Celestial	860	158	34.6	....	E. C. Gardner	Wm. H. Webb	Bucklin & Crane
Surprise	1361	190	39	22	P. Dumaresq	Sam Hall	A. A. Low
Staghound	1535	215	40	21	J. Richardson	D. Mackay	Sampson & Tappan
Witchcraft	1310	......	....	....	W. C. Rogers	Paul Curtis	S. Rogers
Sea Serpent	1337	......	....	....	W. Howland	Geo. Raynes	Grinnell, Minturn & Co.
N. B. Palmer	1490	214	39	22	Low	J. A. Westervelt	A. A. Low
Flying Cloud	1793	225	41	21½	Creesy	D. Mackay	Grinnell, Minturn & Co.
Challenge	2006	230.6	43.6	27.6	R. H. Waterman	Wm. H. Webb	N. L. & G. Griswold
Comet	1836	229	42	22.8	Gardner	Wm. H. Webb	Bucklin & Crane
Sword Fish	1036	169.6	36.6	20	Babcock	Wm. H. Webb	Barclay & Livingstone
Flying Fish	1505	198.6	38.2	22	Nickels	D. Mackay	Sampson & Tappan
Witch of the Wave	1500	202	40	21	Millett	Geo. Raynes	Glidden & Williams
Nightingale	1066	178	36	20	....	S. Hanscom	Sampson & Tappan



"Loaded deep and running free for the port of yesterday"

Wooden Shipbuilding on the Pacific Coast

LET us go back to the Pacific Northwest, with its inexhaustible forests of Douglas fir crowding down to the water's edge at all its fine harbors. No better natural home for the wooden shipbuilding industry could possibly be imagined So we find that after the building of those two small schooners, the "North West America" and the "Adventure," there came a multitude of craft of all descriptions and for all purposes.

The first builders in this field were the Russians in Alaska, where Alexander Baranof established a shipyard at what is now Resurrection Bay, Prince William Sound. Here, after overcoming incredible difficulties, a vessel named "Phoenix" was launched in 1794. This was probably the first "camouflaged" ship. Her sails and rigging were a crazy patchwork of all sorts of materials, and she was painted with a mixture of tar and whale oil, mixed and boiled in small quantities, and of a new shade for each batch.

A few years later Baranof moved eastward and established a colony at Sitka, where by 1806 he had established a set of building ways, and in 1807 launched the brig named "Sitka," built under the supervision of an American shipwright named Lincoln. A ship and a schooner were built here during the next two years.

In 1812 Baranof sent an expedition down the coast and established a colony and shipyard at Ross, where several schooners and brigs were built for their own use and a number of small craft for the Spanish Missions. The Russians thus have credit for the first shipbuilding in California.

The last sailing vessel built at Alaska was the brig "Promissel," launched in 1839. The Russians were now turning to steam. Between 1839 and 1842 the S. S. "Nikolai I" of 60 horse power, and the steam tug "Muir" were built. The machinery for the "Nikolai I" was imported from Boston, but everything for the "Muir" was built at the Sitka yard under the supervision of a machinist named Muir, for whom the tug was christened.

One of the last vessels built by the Sitka yard was the S. S. "Politkofsky," a side-wheeler launched in 1863. She measured 175 net tonnage, 130 feet in length and 320 horse power. Her original boiler, built in Sitka was of pure copper three-fourths of an inch thick. She was sold to American owners in 1867 and shortly thereafter thoroughly overhauled and put into towing service for the Blakely Mill Company. To those who condemn the wooden steamer as unfit for sea service, it will be somewhat of a surprise to learn that after thirty years of hard service this vessel was sent to St. Michael to be used as a lighter, not on account of any weakness in the wood hull, but because of competitive conditions making imperative the practice of greater fuel economy than her old engines could show. She served faithfully on the Alaska coast until driven ashore in a storm and abandoned in 1902, yet ten years later, in 1912, the hull was practically intact, her stout cedar timbers defying the elements.

In the good old days of '49 San Francisco began to gather to herself the attention of all the world, and shipbuilders were not slow to recognize the advantages of the wonderful harbor. At first the great demand was for small craft of shallow draft to carry miners and their supplies to river points near the mines. Many of these early boats were simply assembled, the knocked down materials having been brought round Cape Horn from Eastern yards. Probably the first real shipbuilder on the bay was Captain John G. North, who established in 1851 a yard at Steamboat Point, where the Third and Townsend streets depot of the Southern Pacific Railroad now stands.

Here North built a number of schooners, barges, and steamers, and in 1860 he bought Potrero Point and moved his equipment there. The first work done at the new yard was the rebuilding of a New York steamer, the "Brother Jonathan." Hauling out ways were built for this vessel, and taking advantage of several high tides, with two hundred Chinamen hauling on the tackle, the ship was landed high and dry to the great relief of all concerned.

In 1862 Captain North launched the famous S. S. "Yosemite," a sixteen-knot boat, and for many years one of the speediest on western waters. This vessel continued in active service

Steamer "Politkofsky"

"Golden Gate," one of the fine side wheeler ocean-going craft of the early days. These big wooden steamers had long and successful careers, which entirely confute present-day arguments that a large wooden ship will not withstand the rigers of off-shore voyages. Many of these ships enjoyed useful lives for a far longer period than the life of a steel ship of today

till July 9, 1909, when she went ashore in Port Orchard Narrows, Puget Sound, and became a total loss. The "Yosemite" measured gross tonnage, 1319; length, 269 feet; breadth of hull, 35 feet, and depth, 11 feet 6 inches. She had a beam engine with cylinder 60 inches bore by 10 feet stroke, which shows the development of foundry and machine shop practice at that date.

In all, Captain North turned out fifty-three bay and river steamers and 273 hulls of all descriptions.

In the meantime Henry Owens had built two stern-wheelers on the Willamette, in 1852-53, started a yard at Steamboat Point, San Francisco, and built several schooners there, and also built at Port Gamble, Puget Sound, a steamer named "Julia Barclay" for the Fraser River trade.

In 1867, George Middlemass began operations on the first graving dock at Hunter's Point. This man was quite a genius in the designing of ships, and had the honor of creating the plans for the full-rigged ship "Olympus," the largest single deck wooden vessel ever built. She was built at Seabeck, Hood's Canal, Puget Sound, by Hiram Doncaster. Her dimensions were 237 feet in length, 44 feet beam, and 18 feet depth of hold, and she had capacity for 1,400,000 feet of lumber.

A report by the Marine Underwriters in 1874 states, "But within the last decade several hundred small vessels have been built on this coast of such model, material, strength, durability and sailing qualities as have completely set at rest all doubts as to our capacity to build sailing vessels of any class in competition with any American port."

In 1882, Dickie Brothers launched at the foot of Sixteenth street the propeller S. S. "Mexico," by far the largest and most elaborate wooden vessel yet built on this Coast. Her dimensions were: 275 feet length, 36 feet beam, 21 feet depth of hold, gross tonnage 1797, and horse power 1500. The "Mexico" continued in service for over twenty-five years.

It may be stated without fear of successful contradiction that the sailing and auxiliary wooden schooners built in the yards of the Pacific Coast during the last twenty years have been amongst the most serviceable carriers that ever sailed the seas, and that they have faithfully carried out their part in keeping the flag of the United States before the maritime world. The auxiliary schooner, steam, gas or Diesel, is the hardest worked vessel that plows the seas. Many of them have had wonderful records in service. For instance, the three-masted schooner "Premier," launched at Hall's yard, Port Ludlow, Wash., in 1876, is still in commission after more than forty years of strenuous service, and still fit for deep water service as is witnessed by recent voyages to Japan and to the west coast of South America.

There will always be room in the world's carrying trade for the comparatively shallow draft, medium capacity freight vessel, and nothing in that class has shown greater economy and adaptability than the wooden auxiliary schooner, and nowhere on the earth can this type of ship be built to better advantage than on the coasts of Oregon, Washington or Northern California.

OUR FEBRUARY ISSUE

Next month we will run a number of special articles on Motorship Operation and Diesel Engine Practice. The historical development of the Diesel idea and the methods by which that idea was given practical application will be reviewed. Much valuable information, compiled by the best operators and engineers, is available, and we hope to make the February issue of real value to all who are interested in the economical propulsion of ocean-going vessels.

The "Great Bear"

An American Shipmaster's Letter

"Esther Bhume," one of Captain Allec Woodside's fleet of schooners

COMPLYING with your request, I herewith submit for your publication, data, and experiences relating to wood vessels, which have come under my own personal observation, extending over a period of fifty years in actual service at sea in all the different capacities from boy up to master and part owner. This experience has been principally confined to sail vessels of all the different types of hull as well as rig. It may be well to state that any assertion which is contained in this article will be absolutely authentic, and if necessary can be proven so.

Although it may be conceded that the wood steamer for ocean-going purposes above the net register of 1500 to 2000 tons is not as efficient as is the steel steamer, yet for steam vessels of the single deck type, to be used as lumber carriers, wood hulls are superior in almost every respect. All practical men are fully aware of this fact. I shall, however, confine my remarks to the merits of the wood, fore and aft sailing schooner, especially the single deck type, of large carrying capacity. Realizing that the Pacific Northwest is practically and generally speaking, the sole region on this globe today which is possessed of large quantities of standing timber, available for export, and owing to the urgent demand for this timber, especially in foreign countries, the leading question confronting those vitally concerned in transporting the surplus arboreal wealth of these Coast States is, "which will be the most efficient and in general the most economical, class and type of vessel to be constructed for the immense trade to be developed?" With the experience back of me which I have noted, I will unequivocally and positively state that the wood (fir) fore and aft schooner of the sailing type, with single deck and five masts, and with a carrying capacity of from one and one-half million feet up to two million feet, has not and never can have either a rival or a competitor, until such time as some motive power is devised which will be cheaper than wind, which is common air in motion, for the propulsion of ships. I will now proceed to enumerate some of the reasons why I believe and know the above assertions to be absolutely true.

First Reason.—This type of vessel, viz.: the wood fore and aft single deck schooner," can be sailed to all parts of the world without one pound of ballast and with perfect safety, which is and must be considered as a most economical feature in her favor. As regards this element of ballast as between these two types, I will cite the case of two vessels of wood and steel construction, respectively, both of which vessels are, or have been till very recently owned on this coast and have been operated in offshore lumber trade from the lumber ports of Washington and Oregon during the past sixteen and eighteen years respectively:

The fore and aft single deck wood schooner "H. K. Hall," built in 1902 by Hall Brothers, Port Blakely, Wash., length over all 225 feet, beam 42.4, depth of hold 18.1, tonnage, net register, 1237, lumber carrying capacity one million five hundred thousand feet.

The single deck (schooner type) steel barkentine "Alta," built in Port Glasgow, Scotland in 1899, length over all 236 feet, depth 18.1, net register 1262 tons, carrying capacity same as Hall, 1500.

Considering cost of operation and maintenance as between these two vessels, they being fair representatives of approved designs at the time of their construction, as up-to-date lumber carriers of wood and steel construction, respectively, it will be readily noted that the schooner "Hall" in proportion to her dimensions, as well as tonnage is a much larger carrier than is the "Alta," and again, as previously stated, the "Hall" sails anywhere or

S. S. "Kaskaskia," sister ship of the "Wonder Ship" "Aberdeen," built by the Grays Harbor Motorship Corporation, Aberdeen, Wash.

"Marie DeRonde," an auxiliary schooner built for private interests by the Grays Harbor Motorship Corporation. This vessel is equipped with twin semi-Diesel engines of 350 horsepower and has a carrying capacity of 2,000,000 feet of lumber

everywhere, and under all conditions while light, without ballast of any kind, whereas the steel vessel, the "Alta," requires as much as 500 tons of ballast, and as a precautionary measure, before leaving port in stormy winter seasons, or in anticipating the passage of cyclonic areas, as high as 600 tons have frequently been carried in this vessel; it will be readily noted when the cost of this ballast is considered the delay to vessel in receiving and discharging it, the cost of ballast, the cost of lighterage to deliver to vessel and also to land it, that this item alone curtails the net earning power of the steel schooner to a great extent.

Second Reason.—Under normal conditions the wood vessel, or rather schooner, can be constructed for very much less money than can the steel vessel, ton for ton. The "Hall" cost at least 20 per cent less than did the "Alta." She was built by a thoroughly skilled and honest shipbuilder who learned his business in New England, who took pride in his product and used seasoned lumber entirely (fir) in the construction of all vessels which he built. The result of efficient construction can be seen in this vessel today, as she is still in the lumber trade and is practically first class after sixteen years' active service. She has always made money for her owners, even in the lean years, and has not laid up one hour since entering commission on account of not being able to make money on account of low freights.

Third Reason.—Considering the cost of operation and maintenance as between these two vessels, I have intimate knowledge regarding both ships, as I have made oversea voyages in both of them, and will state with all candor that as regards sea qualities the "Hall" is infinitely the more stable vessel, is easy in a seaway, light or loaded, consequently is much easier on her hull, sails, gear and rigging, while as regards the "Alta," especially in ballast, or light, she is uncomfortable and stiff to such an extent that she strains heavily in rough weather. During the passage from Sydney to Puget Sound this vessel (the "Alta") slatted one entire new suit of sails to pieces and part of another. In vessels of the "Hall" type this never occurs; one suit of sails lasts about four years if not blown away through carrying sail excessively. The wood vessel requires dry-docking periodically for cleaning and painting, and may run for a period of two years, but the steel vessel must be cleaned each voyage, and frequently each passage, as they foul much more rapidly than does the wood vessel. Furthermore anti-fouling compounds of efficiency for steel ships' bottoms cost very much more money than does ordinary copper as used on wood vessels, and again it is imperative that a steel vessel be kept free of rust everywhere and well covered with paint, if not she will deteriorate very rapidly. This fact alone makes the cost of maintenance very expensive as compared with a wood ship. Salt water and salt sea air are highly conducive to the preservation of wood ships; on the other hand, they are highly destructive of steel vessels.

Fourth Reason.—As regards sailing qualities, all evidence and experience heretofore goes to show that the wood vessel under equal conditions is much the speedier vessel, the passages of the famous Packet and Clipper ships of the decades of the 1840s and 50s stand today as records over all and every trade route of the different oceans, these famous vessels were all of wood construction.

"Commandant De Rose," a type built by the Foundation Company

The writer of this article in the year 1906, while in command of the four-masted schooner "David Evans" of San Francisco, Cal., sailed the above vessel from Port Townsend, Wash., to Manila, Philippine Islands, thence to Hong Kong, China, and return to Port Townsend in 4 mouths and 26 days, the passage to Manila was made in 55 days, and the passage from Hong Kong to Port Townsend was accomplished in 36 days, with a clean swept hold. This vessel was sailed into and out of all ports, not one cent having been paid for towage during entire voyage. It may be in form to state as regards the possibilities of making money with this type of vessel that this vessel's gross freight was $14,880, her monthly cost of maintenance and operation was $850, which totaled for voyage $4,250, which turned in to her owners the sum of $10,630, which can readily be seen was all velvet, and that year was not considered other than a lean year as regarded ocean freights. To accomplish this voyage this vessel sailed over 12,000 nautical miles, and was frequently logged 15 nautical miles while running easting down before heavy westerly gales. This is no exceptional instance of a smart passage and voyage, as many other instances could be mentioned of equally as good accomplishments by these splendid vessels; however, I will state that it is quite a common occurence for these types to make passages coastwise on practically steamship time.

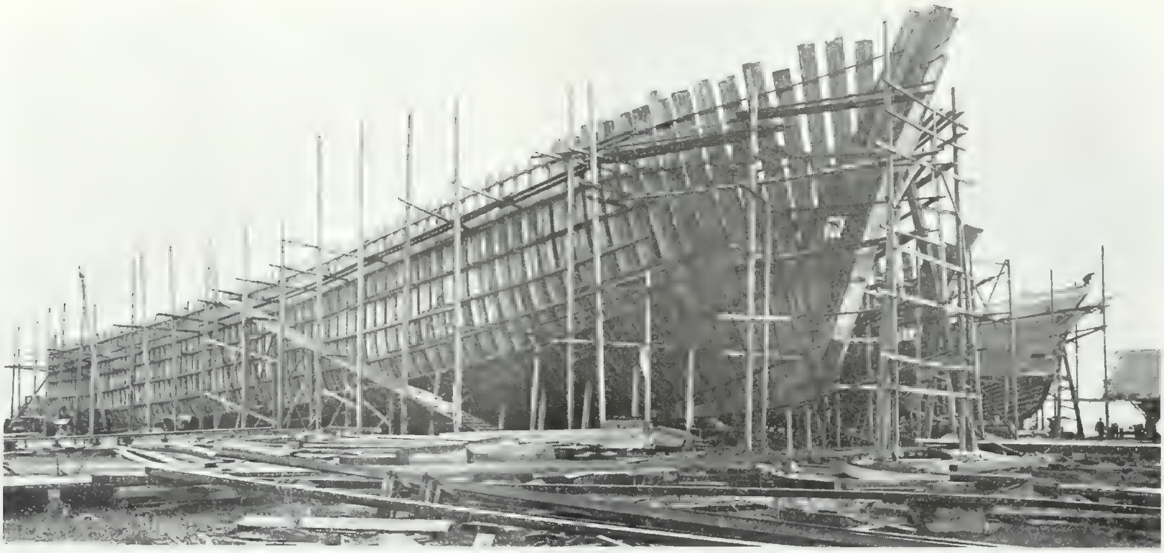
Fifth Reason.—As regards the durability of the wood vessel, given that the vessel is well and honestly constructed by an efficient and skilled master shipbuilder and is constructed of seasoned timber, and properly fastened and is taken reasonable care of while in commission, there is absolutely no reason why the wood ship should not be as enduring as the steel vessel. There are today on this Coast many vessels which have been built here of native fir, of from 30 to 40 years old and over, that have been in commission ever since being built, and are today carrying lumber and making big money for their owners. On the other hand there are many vessels of steel construction owned here, of from 25 to 35 years of age, that are practically rusted out, and it is quite safe to say that underwriters are chary as regards taking risks on many of these hulls. It will be worthy of note to state that no matter how much the owner of a steel vessel may feel inclined to keep his vessel in good condition, the element of deterioration caused by rust and corrosion can not be combatted entirely. Much of a constructed steel hull's interior being for obvious reasons inaccessible after completion for necessary cleaning and painting, this is never accomplished; in fact, is never attempted. As a result the vessel rusts out very quickly in many places, requiring extensive and costly repairs, very frequently. I shall proceed to enumerate some of the vessels in active commission, owned and operated on this Coast, carrying in each case perishable cargo and carrying it dry, all of them going strong and all of them making money for their owners, and all good hulls today:

Ship "St. Nicholas," built in 1869, 49 years old.
Ship "St. Paul," built in 1872, 46 years old.
Ship "Dashing Wave," built in 1854, 64 years old.
Ship "Reuce," built in 1880, 38 years old.
Ship "Two Bros," built in 1867, 51 years old.

Many more instances of the longevity of the wood ship might be noted, but the above will be convincing to an extent. However, I will state in passing, that the "Dashing Wave" as noted above has to her credit the accomplishment of eleven round voyages with lumber cargo between Tacoma, Wash., and San Francisco, Cal., within the period of twelve calendar months. This is a positive fact.

I will cite one instance which will show that the large wood schooner can more than hold her own against all competitors. In the years 1875 and 1876 the late Mr. John Roach of Chester, Pa., who is generally conceded as the father of the American iron and steel shipbuilding industry, built to the order of the Reading Coal & Iron Railroad Company of Philadelphia, Pa., quite a large fleet of steel single deck steamers for exclusive use on the Atlantic Coast and in the coal trade. These vessels were of light draft, although quite large carriers. The fore and aft schooners of those days were seldom of over 300 tons burthen and had previous to the advent of the steamers been receiving as high as $2.50 per ton from the Delaware and Chesapeake coal ports to the manufacturing centers in New England. Freights dropped to 90 cents and $1.00 per ton; the schooners were unable to compete, and as a result the owners of these vessels found themselves with these practically valueless assets on their hands. About the year 1880 builders in Bath, Waldoboro, Searsport and other places in Maine commenced building schooners of 700 tons and larger, ever increasing in size; these vessels were a success from that time till the present day. The steamers have long since disappeared from the Atlantic coastwise coal trade, and the schooner has today no competitor except the tow barge, which is but a negative quantity.

In concluding this letter I will say in general and in regard to the rehabilitation of the American mercantile marine, that there is, underlying this whole proposition, a profoundly moral obligation incumbent on all true Americans who love this greatest of all nations, and it is this—to use their every endeavor to the end that our ships of the future may be built and operated under our own flag, so that our own American boys may be trained in this occupation of seafaring, which, more than



Wooden hull under construction, showing massive timbers used

any other human activity, tends to make of them resourceful, fearless, independent and self-reliant men, and in the close communion which this calling will give them with nature in its sublimest, most magnificent and most terrific aspects, tends to elevate and build up both their moral as well as spiritual characters. Note the splendid specimens of men, principally descendants of Old New England stock, who made this nation famous in the old clipper days; for that matter, men who have commanded and manned the ships of this nation up till within about thirty years since. Many of these men, who abandoned sea life while still possessed of full manly vigor, taking up other businesses on shore, almost invariably were successful principally owing to the advantages which their service at sea had given them.

Then why sell these coming vessels to foreigners? They of course know a good thing and will be ready to give our yards contracts to build for them, and will of course engage in the transportation of our timber, making money thereby which will be drawn from this coast and country, where it rightfully belongs and should be kept, to the enrichment of their own nation and people. We have a monopoly of the best timber on earth with which to build ships; we have the yards and many good builders, and we have the largest quantity of timber on earth to export. Then why hand this splendid heritage over to foreigners who will gladly reach for it?

We are already great as a nation, but we will become much more so as we increase and develop our maritime interests and affairs, as without ships no nation ever approximated its full national expansion politically, industrially, economically, morally or socially.

W. J. EYRES,
Inspector of Hulls, E. F. Corporation, and
American Ship Master.

This is the type that Captain Eyres likes to handle

Pacific Marine Review
The National Magazine of Shipping

SAN FRANCISCO, CALIFORNIA U. S. A.
Official Organ of the Shipowners Association of the Pacific Coast

Subscription Price, per year (Domestic) $3.00
(Foreign) $3.50
Single Copies . . . . 25 cts.

J. S. HINES . . . . Publisher
B. N. DeROCHIE . . . . . Business Manager
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The Pacific Marine Review is sold at all leading News Stands
Entered as second class mail matter at Postoffice
San Francisco, Cal.

Published on the First of Each Month. Copyrighted
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WOODEN SHIPBUILDING

FOR some months past the daily press of the country has printed considerable criticism on the wood shipbuilding programme of the United States Shipping Board Emergency Fleet Corporation, and the use of wood generally for shipbuilding purposes. Almost any man you meet, whether he has seen a ship or not, will tell you that wood ships are a failure. This prejudice is so widespread that it has begun to affect even sober-minded, sensible business men—yea, verily, it hath even gotten into the minds of traffic managers and ship owners. Knowing full well the wonderful records of wooden ships on present and past performances, this attitude on the part of ship operators and owners is somewhat mystifying. The "Pacific Marine Review" wishes to clear up this confusion of ideas and to show that within certain limits there will always be a large field for the wooden cargo carrier on all the seven seas.

The attitude of the traffic manager in this respect is very well illustrated by a little experience which came to the editor while working on this very subject. In an interview with one of the shrewdest ship operators on the Pacific Coast, a man who is operating under charter from the Shipping Board several of the new wood steamers, we asked him if he had any records of good performances of wooden ships. He threw back his head and laughed aloud: "There ain't no such animal," said he. We looked a little surprised. Then he said, "I'll ask the boys to look and see what we have." In five minutes he was back, saying in quite a different tone, "Well, there seems to be a number of good records. I will have the boys get them together and send them up to the office." "Thanks very much," said we.

Now this incident, while very simple, illustrates perfectly the point we wish to make—namely, that the prejudice against the wooden ship is due to ignorance of the **whole** record. We would not for one moment accuse our good friends, the shipowner and the traffic manager of ignorance; but we do say that in these high-pressure times, only those aspects of their work that require their personal attention are ever brought to their notice, so that if a wooden ship hogs on her way down the coast, or drops her rudder, or founders, or does any of the thousand and one things that a ship ought not to do, the traffic manager knows about it because he has to explain and cure the trouble. But if any number of wooden ships perform all that is required of them and function perfectly, why bother the traffic manager? Accounts of accidents make good news copy, but no one, unless especially interested in some particular vessel, cares to wade through all the arivals and departures in the marine section and figure out the amount of good ordinary work done by the wooden vessel.

WOOD CONSTRUCTION PROGRAM OF THE SHIPPING BOARD

DURING the early stages of the development of a programme for the construction of an emergency fleet of merchant marine, a large amount of loose publicity was given to the idea of a wooden bridge across the Atlantic, and the lay citizen, reading only the daily press, had a sort of confused notion of large forests suddenly melting away under the machinery of the lumberman, and as suddenly reappearing in the finished hulls of a great armada of wooden ships that would soon be commissioned in sufficient numbers to make a continuous stream from New York to French ports. Experienced shipbuilders, both in the wooden and steel types of construction, warned the Shipping Board that it was very unpractical to expect any speed of deliveries on a wood construction basis, because of the scarcity of ship carpenters.

A wooden ship to be right must be built on the ways. She cannot to any extent be fabricated, and much of the excellence attained in wood ship construction depends entirely on the skill of the hand worker. This is particularly true of those types of wooden vessels built on wave steam lines that have always been the most successful. The Shipping Board, in order to make more simple the art of ship carpentering and at the same time speed up construction, evolved through their naval architects some new designs of hulls. We have not the space to describe in detail the merits or demerits of these designs, but in a general way they all more or less sacrifice some of the elements of the strength of the ship considered as a truss, and so are liable in heavy weather, or when bucking head seas, or from engine vibrations, to develop faults which make them unpopular with ship operators. If the U. S. Shipping Board had put all of its energies on the steel program and allowed shipowners to develop the wooden shipbuilding game, there would probably now be in existence a nice fleet of motor-driven wooden ships suitable for coastwise and over-seas carrying trade along normal lines. However, it is safe to say that a majority of such new wooden steamships as we now have are giving a good account of themselves, notwithstanding the handicaps under which they were built and are working.

It is worthy of comment in this connection that when the United States Shipping Board decided to place on the market several of the 3500 deadweight ton wooden vessels built for them under the supervision of the Emergency Fleet Corporation, the published price was $700,000, or $200 per deadweight ton. Whether there were any takers at that price is not known by us, but the price itself would imply that the experts of the Shipping Board consider the wooden ships built on this coast to be very fine cargo carriers. Either that or—but the alternative is so unworthy of all those ideals which lead us to hope for a successful League of Nations management of world commerce that we refuse to give it statement.

PLAIN TRUTHS ABOUT WOOD SHIPS

UNDER the above caption the "Oregonian" of Portland, Ore., publishes an editorial, December 19th, 1918, part of which puts the case for the wooden ship so tersely that we are glad to quote it verbatim:

"The wood shipbuilding industry was not established for the war with Government subsidies. It had flourished for many years before the war and had greatly expanded between August, 1914, and April, 1917, when the United States entered the war. It did so purely on the merits of the vessels built, as proved not only in coastwise trade, but in voyages across the Pacific. Its vessels were sold to private ship owners of this and other countries, and when the United States Government entered the market as a buyer, private contracts had filled all ways and were causing more to be built.

"The Shipping Board commandeered all vessels under construction or contract and demanded large additions to plant and building of many more ships. The board provided much of the capital for extensions of plants, but this capital was not a subsidy, for a subsidy is a gift, and all extensions made with Government money remain the property of the Government until paid for by the shipbuilder.

"If the Government has paid 'fabulous prices' and if workmen are 'overpaid', the Shipping Board or other agencies of the Government, not the shipbuilders, are responsible, so far as the high prices and wages are not the unavoidable consequences of war. Wages were raised by the Macy Board, and prices were fixed by the Shipping Board, being in some cases lower than those which private individuals had offered.

"Portland does not 'demand that the Government continue to pay fabulous prices' in the sense of demanding more contracts. It only demands that the Government show good faith by completing the contracts which it has already made and then leave the shipbuilders free to build for all comers, though it would still labor under the handicaps imposed by the Government.

"The wood ships of Oregon are not 'hastily thrown together.' They are built according to designs which the Shipping Board forced on the builders in place of their own designs of proved merit, and they are closely inspected at all stages of construction by inspectors of the Shipping Board, of Lloyd's, of the American Bureau of Shipping, by the United States inspector of hulls and the inspector of boilers. It is not true that 'some of them float, but more of them leak water and damage their cargoes.' Such statements emanate from Eastern builders of steel ships, for whom Senator Calder of New York has become spokesman. They have been refuted by Senator Fletcher of Florida, who stated that out of 76 wood ships put in service down to November 20, only three had been lost. Wood ships are subjected to severe tests at sea before acceptance, and all charges that they leak have been disproved. The wood steamer Aiken made a trial trip in the Pacific Ocean on December 10 and 11 in a 70-mile gale, and Captain H. F. Alstrup, who commanded her, pronounced it 'a very severe trial,' giving this opinion:

"'I consider the Aiken a first-class vessel, and a vessel that will last for many years if properly taken care of.'"

GIVE THE COAST SURVEY A CHANCE

THERE has just come from the press the annual report of the superintendent of the Coast and Geodetic Survey. In this report any fair-minded citizen can read between the lines an exposure of amazing conditions in this very important branch of Government service. There is no work under the direction of the Federal Government where the pay is so poorly proportioned to the quality of the service. No work is so vital to the safety of those who "go down to the sea in ships" as the coast survey work. Read carefully the extracts from the official summary of this report given below, and then picture to yourself the recent wreck of the S. S. "Princess Sophia" and other marine horrors along the Alaskan Coast, the engineers and others grown gray in this service under pay which absolutely precludes all chance of saving against old age, the creators of those wonderful maps and charts which are the admiration of the world, getting less wages per day than the rivet-heating boys in our shipyards. All these and many other conditions would be easily prevented by freeing official Washington from some of her red tape entanglements and getting some co-operation among the different departments of our Government.

Summary of Report

Attention is called to the fact that there are waters of commercial importance along the coasts of Alaska where absolutely no surveys have been made, and that the surveys of the waters of California, Oregon and Washington have never been properly completed. These surveys cannot be prosecuted more vigorously because the vessels of the bureau for making them are not sufficient in number, and those that are available are not stanch enough for all classes of work. By statistical comparison of the areas surveyed in one year by the present fleet of surveying vessels and the areas yet to be surveyed, it is shown how long with the present rate of progress it will take to complete these surveys.

Another need of the bureau that is pointed out in some detail is that of government-owned power launches for propelling wire-drag surveying apparatus. A lay exposition is made of the principles of the wire-drag survey. The power launches used in the past have been rented and it is shown that this is an extravagant process in that the launches are secured at the time when they afford the greatest returns to their owners in carrying on the fishing industry and therefore the government must pay a high rental, besides making alterations to fit the launches for surveying purposes.

Much difficulty has been experienced in the past by the bureau in securing and retaining competent and experienced seamen for the surveying vessels of the bureau. It is asserted that this is due more from the uninviting quarters of the vessels of the bureau and from the fact that the appropriations for the pay of seamen are not sufficient to provide a standard wage than from any other cause. Another difficulty is that, as the surveying vessels are in the field but a portion of each year, this necessitates that the crews be laid off at the conclusion of the surveying season and that new crews be obtained at the opening of the succeeding season. To better these conditions, three remedies are suggested:

1. That surveying vessels be provided of a type sufficiently stanch to make surveys in Alaskan waters during the summer months and in the exposed waters of Washington, Oregon and California during the winter months.
2. That the appropriations for manning the vessels of the Coast and Geodetic Survey be increased so that a standard wage can be paid the seamen on the vessels of that service throughout the year.

Retirement is advocated for the commissioned officers of the bureau. It is declared that the Coast and Geodetic Survey is the oldest scientific bureau of the Federal Government and naturally the evils attendant on superannuation are quite apparent. The work of the engineering corps of the bureau is specialized, and therefore, if followed for any length of time, it develops into a life work, and is more inviting for scientific attainment than for pecuniary gain. It is pointed out that the risks incident to making field surveys are numerous and of many kinds, and it is claimed that it is no more than a fitting reward that retirement should be granted for an engineer whose life has been devoted to the unselfish advancement of the public work and in the interest of the development of commerce.

In connection with the office work of the bureau, attention is called to the need of additional draftsmens, computers, clerks and instrument makers. Emphasis is laid on the fact that the drafting work of the bureau is far above the average in technical requirements and calls for much experience and superior judgment to properly apply the mass of information from all sources that goes to make up a nautical chart.

It is shown that the average pay for computers in the bureau is below the standard in the other branches of the Government service as well as in the commercial world, and that more than one-third of the authorized positions are either vacant or filled by temporary employees.

An even more acute condition is said to exist with respect to the clerical force of the bureau. Quoting from the report, "There are forty-two clerks in the bureau. The statutory salaries of twenty-one is as follows: Six at $720 per annum, ten at $900 per annum, and five at $1000 per annum. The result was that during the fiscal year no less than twenty-seven persons occupied five of the statutory places at $720 per annum and thirty-three persons occupied the ten statutory places for clerks at $900 per annum. The general average has been that these positions have been held by clerks somewhat less than three months, there being many intervals when candidates could not be found willing to accept such salaries. The bare facts are that while the Government has really paid from its salary rolls a minimum price for clerical help, it has lost a large amount of time of highly skilled technical employes who have instructed during one year each of these sixty different incumbents of different clerical positions, and the net result has been a financial loss far in excess of proper salaries that would retain a permanent force of experienced clerks."

The bureau has taken a prominent part in military activities during the present war. Two hundred and forty members, or 30 per cent of the entire membership of the bureau, have gone into the Army or the Navy in one capacity of another. In commissioned officers in the Army the bureau is represented by one colonel, one major, three captains, nineteen first lieutenants, and eight second lieutenants. In the Navy there are five lieutenant commanders, twenty-five lieutenants, and sixteen junior lieutenants. Nearly all of these are commissioned officers in the Coast and Geodetic Survey, and were transferred to the War Department or the Navy Department by executive orders as authorized by legislation enacted shortly after the commencement of the war. In its civil capacity the bureau has contributed materially to the assistance of the Navy Department and the War Department. It has supplied both military branches, the Shipping Board, the merchant marine, etc., with charts of the waters of the United States and possessions, numbering nearly a quarter of a million per year. In its instrument shop the bureau has made and repaired many special instruments for the Navy Department and the War Department.

Recent enabling legislation for the bureau has contributed greatly to the advancement of its work. One item authorizes the payment of not to exceed one dollar a day as extra compensation to employes of the different stations of the lighthouse service while observing tides and currents. Lightships are peculiarly well situated in positions where it is desirable to collect tide and current data, but as such observations are not part of the duties of the bureau of lighthouses, in the past they could not justly be imposed on the light keepers of that bureau without some additional compensation, and the appropriations for the Coast and Geodetic Survey could not be expended to recompense them for such additional duties without this authorization. From the results of data collected by the lightships it is expected that predictions can be made which will be of direct benefit to navigators and go far toward saving many vessels from loss through inadequate knowledge of the direction and strength of ocean currents.

Other legislation authorizes the purchase of supplies or procurement of services without the necessity of formal bids where the amount does not exceed $50. Instances are said to be numerous in the past where the necessity of securing competitive bids for small items has materially delayed the progress of field work and such required procedure has actually cost the Government more than the value of the article purchased.

Certainly it would seem that the great Government of the United States could have been more generous with these faithful men of the transit and tape who have risked their lives many times in the surveys of our borders and coasts, and whose work has been so creditable to themselves and the people they serve.

THE E. N. HURLEY OF JAPAN

Mr. K. Uchida of Tokio is chairman or president of the War Shipping Board of Japan. While in San Francisco recently on his way to Washington, to settle some details of the contracts for shipping which his country has undertaken for the United States Shipping Board, Mr. Uchida very graciously granted an interview to the "Pacific Marine Review" and shed some light on the Japanese shipbuilding industry. No man living is better informed on this subject than is this genial gentleman who for nearly thirty years has been in charge of the plans of the Imperial Japanese Government for promoting Japanese shipbuilding and merchant marine operation. Four times he has journeyed around the world, studying the changes in operating conditions and in legislation affecting the shipbuilder, and each trip has resulted in some beneficial change in the Japanese regulation of foreign and domestic trade, or some added incentive to the program of shipbuilding. When he took charge, there was building one 700-ton steamer; now there are under the Jananese flag 2600 steamers with a total tonnage of 2,400,000 gross register, and 13,000 sailing vessels, principally fishing craft, with a total tonnage of 869,000 gross register.

One hundred and fifty thousand tons of these steamers have been chartered by Japanese owners to the United States Shipping Board for war emergency service at charter rates very much below the present commercial rate in Japan, the ship owners there being partially compensated by the imperial government and induced to stand some personal financial loss by the influence of Mr. Uchida.

Under the spur of high prices paid for tonnage there has been in Japan the same "mushroom" growth of shipbuilding yards as we have seen in the United States. Mr. Uchida thinks that this kind of growth is of no special value and that under normal conditions much of it will naturally disappear, only those yards surviving which are equipped to completely finish the vessel and the installation of machinery.

At present there are in Japan forty-nine shipbuilding yards with 150 ways for the building of steel ships and thirteen yards for the building of wooden vessels. The principal yards are the Asauo, the Kabasaki, the Uranga, and the Ishi Kawa Jimi shipbuilding yards, the Osaka Iron Works, the Mitsubishi Shipbuilding Yard, the Yokohama Docks, the Uchida, the Harima, the Nitta and the Asabi Shipbuilding Yards. Many of these are now building steel vessels for the Emergency Fleet Corporation under the contracts arranged by Mr. Uchida, whereby the Emergency Fleet Corporation releases ship steel to Japan on condition that for every one ton of steel released, the Japanese shipyards agree to build for the Emergency Fleet Corporation one and one-half tons of steel steamer. In the sizes that are being built, one ton of steel will make three tons of ship, so that the Japanese are getting steel in this way for their own building program.

There is under consideration now by the financial interests behind the Japanese shipbuilding program, the installation of huge rolling mills to take care of the problem of supplying steel for the yards. Ore of good quality can be obtained from China and Siberia in vast quantities, and capital is available for financing the mill plant. Given such a supply of steel and her great supply of skilled cheap labor, Japan ought to be able to compete with the world in bidding on shipbuilding contracts. Mr. Uchida very frankly admits that the progressive Japanese shipbuilder is working with this idea in view.

While listening to this Japanese statesman discuss Nipponese plans for maritime supremacy, we were impressed very vividly with the idea that in the near future Japan will not only be the leader in the carrying trade of the Pacific, but unless we wake up and throw off the shackles of legislative restraint which bind the free American shipbuilder and ship operator, she will also take away from us the industry of shipbuilding.

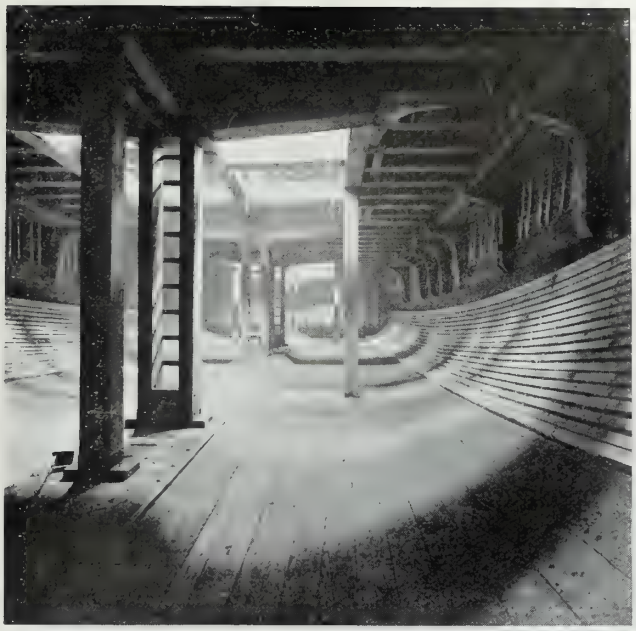
AN OLD YARD REVIVED

Back in the palmy days of 1875, when the Bay was filled with wheat carriers, and ships were in great demand for the whaling industry, Mathew Turner established a yard at Benecia. Here many fine wooden vessels were built and for many years the yard enjoyed an excellent reputation. The climate of Benecia is peculiarly advantageous for the proper seasoning of ship timber, and the location offers fine connection for both rail and water transportation.

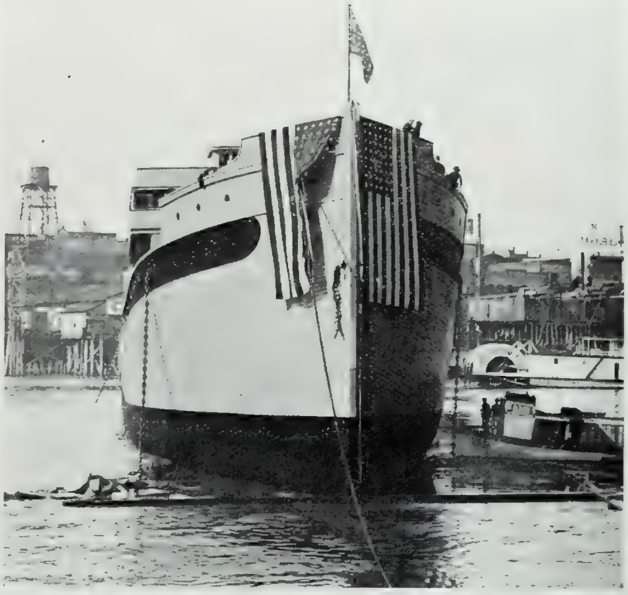
The site of the old Turner yard was taken over late in 1917 by the Benecia Shipbuilding Company, which is controlled by J. D. Mackee and W. S. Davies, both well known business men of San Francisco. Associated with them is W. A. Boole, son of Boole, pioneer shipbuilder of San Francisco Bay. W. A. Boole is by practical experience and by deccent a master shipbuilder. He was associated with his father in an Oakland yard which in the years 1902-1905 built four very fine barkentines for the Hind, Rolph Company, which ships are still in service and earning good money for their owners.

The Benecia Shipbuilding Company owns twenty acres with a water frontage of 2,200 feet, besides a considerable parcel of adjacent tide land which can be developed if it is found necessary. They have a contract from the Emergency Fleet Corporation for four hulls of the Ferris type and are well ahead with work. The first ship of this order, the "Kinta," was launched September 21, 1918, delivery to be made in Uovember. The other three are to be delivered in January, March and April of 1919.

This yard should give a good account for itself on the large orders for auxiliary schooner and larger wooden vessel work that are sure to come to the Pacific Coast from shipowners both foreign and domestic who recognize the value of wooden bottoms for the coastwise freight business.



Hold interior of motorship "Mt. Hood," showing construction used in Ballin type



Launch of the "Wallowa" at the Supple-Ballin Shipyard. Note the steel topsides

A Successful Type of Wooden Ship

By J. B. C. Lockwood

I HAVE been asked by yourselves and others to join in the defense of the wooden ship. Complying with this, I find myself in the anomalous position of having to appear as defendant as well as critic. It goes without saying that if the construction of the wooden ships now built and building for the Emergency Fleet Corporation was considered by us of proper design, we would have no excuse for the ships we are now building from our own plans, and which present a radical departure from the so-called standard type.

The question at issue in my mind is, first, whether the majority of the present wooden ships now building have any right on account of their design to survive the emergency demand of the country, and if they are not of proper design and construction, to lay the blame where it properly belongs, and finally, to determine whether the wooden shipbuilding industry could have been maintained after the emergency had ceased, had builders been allowed to design and to construct different types of ships.

In order to answer these questions to the satisfaction of your readers, let us investigate the principal objections which the opponents to the wooden ship have brought forth. First among them is limitation of size, the claim being made that wooden ships above 4000 tons are impracticable, and could not be built structurally strong enough for ocean service. The second objection raised is that vessels are built hurriedly, from unseasoned lumber, and will soon fall to pieces due to shrinkage and loss of proper fastenings. Third, it is claimed that the wooden ship, on account of excessive hull weights, carries too small a percentage of cargo in proportion to its total displacement, when compared with the steel ship.

These objections are the same as held good against the wooden ship thirty or forty years ago, due to designs then followed, and which eventually resulted in the disappearance of the wooden ship as a factor in ocean commerce, and its displacement by the lighter iron and steel vessels.

More than three years ago Mr. Ballin realized the ever increasing demand for ships in order to make up for the then occurring losses, and the limited capacity of the existing steel yards. He addressed a letter to the American Bureau of Shipping in which he suggested that, owing to the shortage in shipyard capacities for building steel vessels, it would be to the interest of this country to adopt a design of wooden ship free from the shortcomings above mentioned, and having a chance to outlive the emergency conditions. With this letter he enclosed a design embodying his ideas of how such ships could be built, which design the bureau approved.

The motorships "Mt. Hood" and "Mt. Shasta," belonging to the Gaston, Williams & Wigmore Steamship Company, were the first vessels built on this design, and of which we give the following particulars: They were 304 feet long over all, 43 feet molded beam and 26 feet molded depth. On assigned summer freeboard they had a loaded displacement of 6325 tons, and ready for sea they weighed 1669.7 tons, giving them a deadweight capacity of 4655.3 tons. These vessels have now been in operation for a long time and have never shown any structural weakness of hull. The weight of these ships is no more than that of a steel vessel of the same carrying capacity.

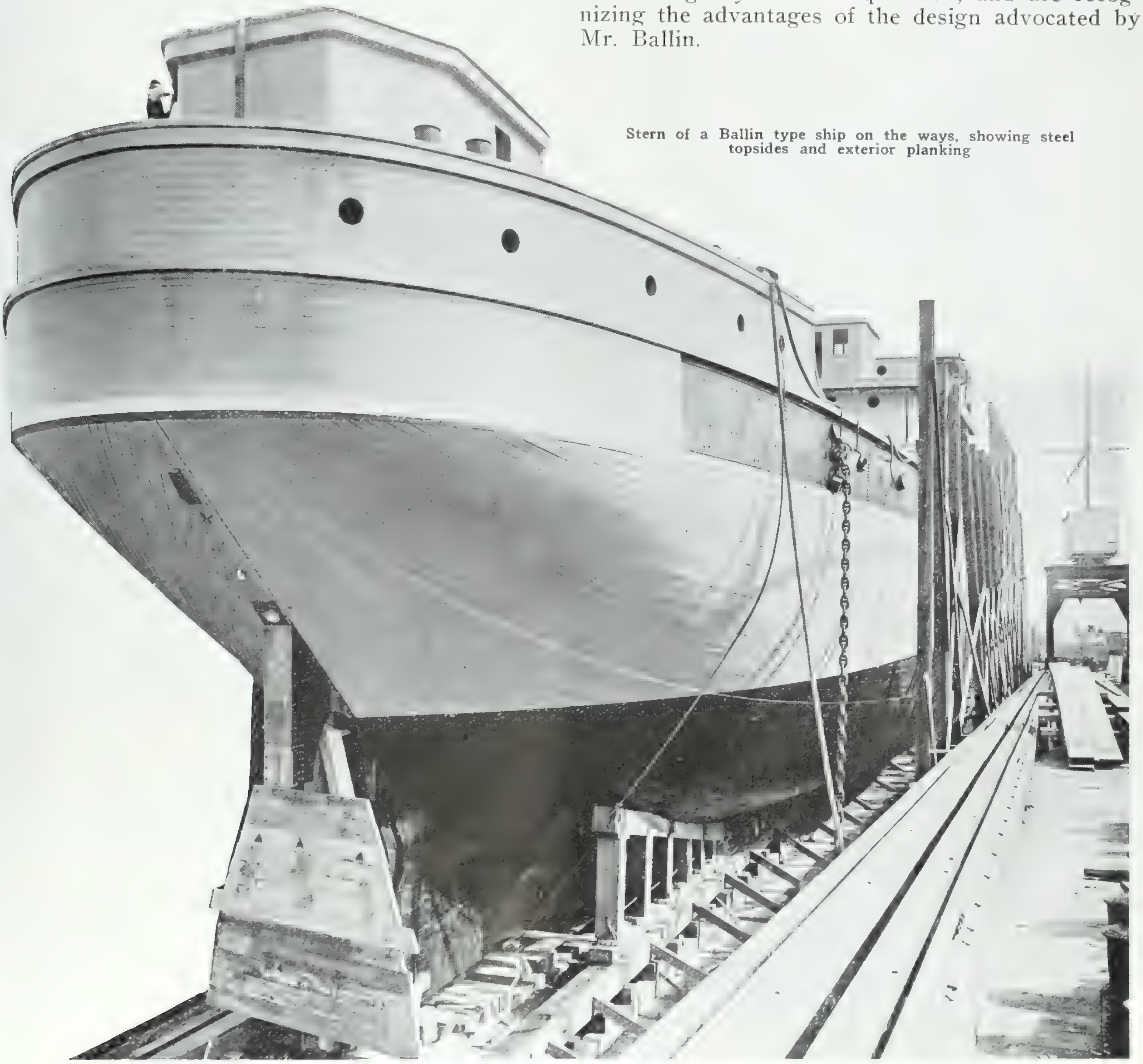
When the Emergency Fleet Corporation was created by the Shipping Board and the wooden shipbuilding program was adopted, Mr. Ferris was instructed to design a standard wooden ship. His attempt to do so is responsible for most of the delays and changes and subsequent poor showing made by the wooden ship. The standard ship idea was a fallacy, which never should have been entertained, and the attempt to build a standard ship with the different materials available on the Pacific Coast, the East Coast and in the South, to suit all kinds of trades, should never have been made. When the Emergency Fleet Corporation was asking for bids on the Ferris design, my firm absolutely refused to submit bids, and as a concession, only, were we permitted, after agreeing to change our type to that of the Ferris type, to follow our own construction. Mr. Ballin used every argument possible, requesting the Emergency Fleet Corporation to permit this firm to build a vessel of 5000 tons capacity, or to permit us to put the machinery further aft in order to insure submerging of propellers without ballast, when vessels were light, but all to no avail.

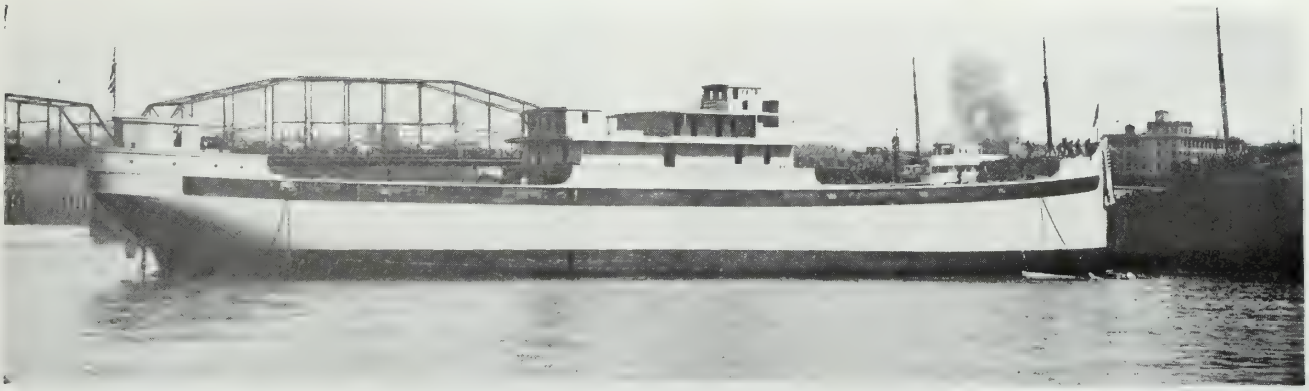
If the present ship is now being pronounced by the operating department of the Shipping Board as unsuitable, the sole and only blame for such unsuitability rests with the United States Shipping Board and not with the builders.

The Ferris ship, so far as construction is concerned, presents no novelty of design or any departure from the construction of ships followed fifty years ago, having all the shortcomings to which the opponents of the wooden ship have a right to point. The question of workmanship and material is only incidental. I am satisfied that even had the type of the ship been changed and had the ships been built of the very best seasoned materials and with the very best obtainable workmanship, they would not have overcome the question of structural weakness and excessive weight.

The opponents to Mr. Ballin's construction conceded his claim for reduction in hull weight, which brought his ships on equality with the steel ships, but they did not concede the structural advantages of strength, durability and tightness. To date we have completed eight ships built from Mr. Ballin's design and we have reports from trips made to Honolulu, South America and to the East Coast, and from all reports not a single weakness has developed in any of them, nor have any complaints been made on account of any leaks through the hull. As these ships have a deadweight capacity of nearly 1000 tons more than the Ferris ship, and as their cost of construction is only slightly in excess, we should be prilieged to make the claim that our ships have overcome most of the objections raised against the wooden ship in general. We are not responsible for the type or rig of ships which we are building, as the same was dictated by the Shipping Board and its agents and adopted over our protests.

The fact that the Standifer Construction Company have under contract twelve and the Kiernan & Kern Shipbuilding Company four Ballin ships, indicates that other builders have lost faith in the orthodox and antiquated design as adopted by the Emergency Fleet Corporation, and are recognizing the advantages of the design advocated by Mr. Ballin.


Stern of a Ballin type ship on the ways, showing steel topsides and exterior planking



Ballin type ship in the stream

The majority of your readers probably have seen the description of the Ballin design in former publications, but as there may be others who have not, I may be permitted to briefly state the cardinal points:

First: The floors are made 30 inches in depth, giving the ship the needed transverse strength, avoiding apparent hogging, permitting elimination of numerous keelsons, and loss in cargo space.

Second: Planking consists of three layers, the first two running diagonally from keel to topsides, crossing each other at right angle, and the third outside layer running fore and aft, containing the caulking. This diagonal planking takes care of the disastrous shearing strains causing leaks and loosening of fastening where planking is in single thickness, and the construction of sides is simply rectangular instead of triangular, as represented by the diagonal planking. The diagonal planking places the strength of the ship outside of frames, and permits the elimination of heavy inside ceiling and edge bolting.

Third: The adoption of steel topsides worked in form of a girder on the top of bulwarks, reaching on outside below sheer line and on inside to top of deck beams, where it connects with the steel deck stringer, the whole structure extending from stem to stern. These steel topsides take care of longitudinal strains and are to a large extent immune against rotting, to which the wooden topsides of ships are subject on account of their exposure to wind and weather. These steel topsides are worked in such fashion that they are always in view and open for inspection and maintenance.

Fourth: A system of diagonal deck strapping and longitudinal steel ties connecting the deck stringers from side to side, strengthening the ship against horizontal wracking stresses.

The above are the main features of Mr. Ballin's design, and, as stated, permit of a construction of wooden hull of extreme lightness, favorably comparing with one built of steel, and of such nature that there is hardly any limitation to size.

Both Lloyd's and the American Bureau of Shipping have now approved a design of the shelter deck ship suitable for general cargo, with large cubic measurement and having a capacity of nearly 6000 tons deadweight.

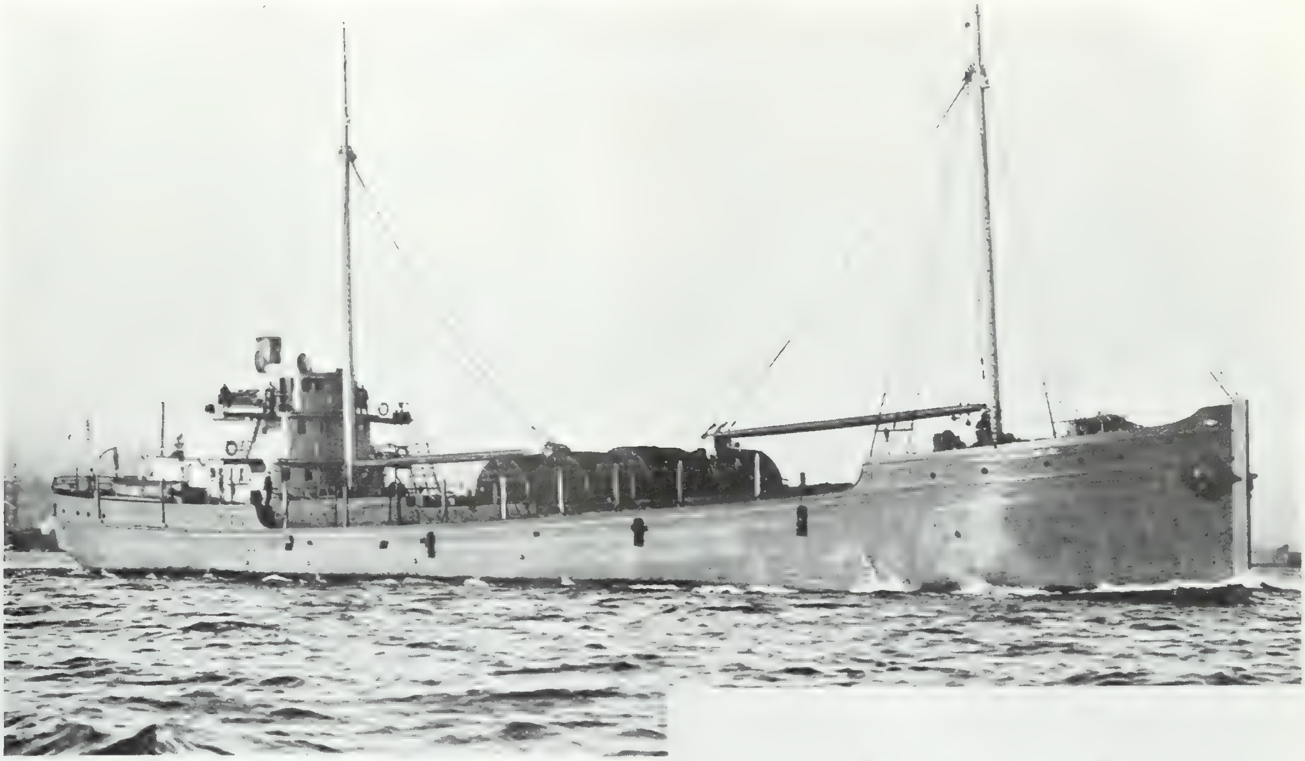
In conclusion, I wish again to reiterate that if any blame exists for construction, design and type of ship which the Shipping Board now has on its hands and finds impracticable, the shipbuilders should be exonerated therefrom, and the public should be apprized of the facts. Wooden ships like steel ships should be built for the trade intended, and constructed in accordance with the material available. As the Northwest Pacific States are the only ones still having unlimited quantities of shipbuilding materials untouched in their forests, the future shipbuilding possibilities of the Pacific Coast solely depends upon the adoption of a design and construction which can successfully compete with a steel vessel in regard to lightness, strength, carrying capacity and durability.

The wooden ship properly built, on account of not being subject to sweating, is admirably adapted for carrying perishable cargoes, such as bulk grain; and on account of its hull insulation against varying temperature, for the carrying of all kinds of food products.

I am a defender of the wooden ship that can be built, but I believe it to be a mistake to defend a construction which in the past has only existed because it was cheap and answered an emergency.

The vessel owner who buys a vessel buys a carrying capacity, and when a wooden ship costs two hundred dollars a ton deadweight, or more than a steel vessel of larger capacity, no argument will induce the owner to buy. On this point I may still state that vessels on our design can be built, even at the present high cost of labor and material, at a profit, for $150 per ton, and at a substantial reduction as soon as the present unnaturally high prices of labor and material find their level. As the Government set these prices arbitrarily, the complaint by members of the Shipping Board regarding the excessive cost of wooden ships is another matter for which builders should not be blamed.

The wood steamship "Oakwood," built by the Pacific American Fisheries Company, at Bellingham, and later sold to French interests, has finally succeeded in getting clearance and has sailed for France. The acquisition of this vessel by the French was accomplished through the agency of Thorndyke-Trenholme & Company, Incorporated, last July, but shipping board regulations and Federal red tape injected innumerable delays into the final transfer of the craft. She lay in the local harbor fully loaded for eleven weeks before getting final clearance.



Motorship "Alabama," equipped with McIntosh & Seymour Diesels. Upper view shows this sturdy freighter with salvaged boilers of S. S. "Bear" on deck en route to Yokohama. Lower view shows "Alabama" and "Johan Poulsen" loading at the dock

A FULL POWERED WOODEN MOTORSHIP

THE wooden motor ship "Alabama" is now en route to Yokohama and Hong Kong under charter by the Overseas Shipping Company. This vessel was built by the Alaska Pacific Construction Company of Seattle, Washington, on designs of Edson B. Shock, and launched in April, 1918. The material used in construction is Douglas fir, and the ship is of the auxiliary schooner type with two decks, machinery, pilot house, etc., aft and crews' quarters in forecastle. Her length over all is 270 feet, beam moulded 46 feet, depth moulded 26 feet 6 inches, draft loaded 24 feet. The weight of the vessel complete is 3028 tons, and she is designed to carry 4000 deadweight tons. Measurement gives her gross register as 2088.54 tons and net register as 1654.91. Twin 8-feet diameter cast-iron propellers are driven by two 500 Brake horsepower McIntosh & Seymour Diesel engines. Each of these engines has six cylinders, 16-inch bore and 24-inch stroke, and the cards indicate 625 horsepower at 185 revolutions per minute. The weight of each engine complete is 146,000 pounds, the over-all dimensions being, length 29 feet 6 inches, width 6 feet 5 inches, height 12 feet 11 inches. Engine room clearance of 16 feet is necessary for removal of piston.

All auxiliary and deck machinery on this ship is driven by direct current electric motors. Power is supplied by two generating sets, one a 75 B. H. P. two-cylinder vertical Fairbanks Morse semi-Diesel oil engine direct, connected to a 40 kilowatt generator. The other, a 37½ B. H. P. single cylinder Fairbanks Morse engine of same type, direct connected to a 26 kilowatt generator. The larger unit is set aft of the main engines between the tail shafts, where it is very accessible and occupies space not otherwise used. An interesting feature of this generating plant is the fact that the 37½ H. P. engine is the exact duplicate of each half of the larger engine, consequently only one set of spares is necessary for these engines. If necessary the smaller engine can be dismantled and every part used on the larger unit.

On her trials the M. S. "Alabama" developed an average speed of 10.3 knots at average 187.5 revolutions. The air injection pressure remained steady at 900 pounds.

Standard Oil Company's "Calol" fuel oil was used on these trials: Baume gravity, 23 degrees; specific gravity, 91; asphaltum percentage, 25; B. T. U., per pound, 19,000; weight per gallon, 7.58 pounds. On this fuel the engines showed a consumption of .41 pound per B. H. P. hour. The main engines are equipped with a Peterson filter for lubricating oils, and the lubricating oil is used over again continuously.

Wooden Ship Operation

The auxiliary schooner "Juana Coste"

THE Charles R. McCormick Company of San Francisco are wholesale dealers in Douglas fir lumber, shipbuilders, and ship owners. When this progressive firm saw the necessity of establishing a distributing center for their lumber on the east coast of the United States, they very thoroughly investigated the relative advantages of building one large steel cargo vessel or several smaller wooden ships for carrying lumber and general freight. They decided on the wooden vessel for several reasons which seemed good to them at the time, and their subsequent experience has proved that they were wise in their choice. As stated by their traffic manager, the reasons for choosing the wooden schooner or auxiliary schooner were as follows:

1st: The McCormick Company had at its command an unlimited supply of timber suitable for shipbuilding, and it had shipyards in which to build.

2nd: It was possible to obtain heavy fuel oil engines at a reasonable price and of proven efficiency in sizes to suit smaller vessels.

3rd: There were on the Atlantic and Pacific seaboards many small ports and shallow harbors where it was possible to obtain smaller shipments of freights for return or intermediate cargoes, and it was entirely practical to get this business with wooden auxiliary schooners and thus make the voyages more profitable.

4th: The wooden hulls were more economical in operation on account of their ability to safely navigate without ballast and thus save time and expense in running coastwise trips to pick up freight at out-of-the-way ports.

The following summary of the log of the M. S. "City of Portland" shows the variety of voyages required of these wooden ships:

Columbia River to Honolulu, T. H.—17 days.
Honolulu to Port Pirie, Australia—36 days.
Port Pirie to Newcastle—7 days.
Newcastle to Sydney—2 days.
Sydney to Honolulu, via Papeete—41 days.
Honolulu to Columbia River—17 days.
Columbia River to Honolulu—14 days.
Honolulu to Port Pirie—45 days.
Port Pirie to Sydney—7 days.
Sydney to Newcastle—1 day.
Newcastle to Rabaul, N. C.—10 days.
Rabaul to Samarai—3 days.
Samarai to San Francisco—39 days.
San Francisco to Seattle—5 days.
Seattle to San Francisco—5 days.
San Francisco to Balboa—17 days.
Passing through Canal—1 day.
Colon to Portland, Me.—14 days.
Portland, Me., to Savannah, Ga.—4 days.
Savannah to New York—4 days.
New York to Norfolk, Va.—2 days.
Norfolk, Va., to Colon, Canal Zone—12 days.
Passing through Canal—1 day.
Balboa to San Diego, Cal.—17 days.
San Diego to San Francisco—3 days.
San Francisco to Columbia River—4 days.
Columbia River to Shanghai, China—35 days.
Now loading return cargo.

Senator Fletcher of Florida in defending the wooden shipbuilding program calls attention to the records, which show that only three out of all the great fleet of wooden vessels built for or requisitioned by the United States Shipping Board have been lost at sea. In fact, the voyages of the great majority of these wooden ships have been so uneventful and smooth that it is hard to find anything unusual in their records. The following extracts from logs of wooden steamers and motor ships, or from the letters of ship masters to owners or builders will throw some light on the behavior of these wooden vessels in hard weather. These few instances could be multiplied many times over if space permitted:

Trial Trip of Wooden Steamship "Aiken"

Excerpt from letter of Pilot H. F. Astrup to Captain E. D. Parsons of Portland:

The weather by that time was blowing a heavy gale from the SSE. I kept the ship off because I could not get her up to the wind, account of the heavy gale and sea the vessel would not come any higher than east. I intended to run the vessel inside, but by that time the weather was getting thick and I was afraid that I would not be able to bring the vessel in without getting in trouble. I then laid her off shore, passing a quarter of a mile under the stern of the light vessel, with a lee helm, engines working under reduced steam to keep the vessel from racing too heavy. The wind at times reached a velocity of close to seventy miles an hour with an enormous sea running. At 6:00 a. m. the wind hauled SW and moderated, enabling us to come back on a southerly course. The weather was still very thick and remained so until about 10:00 a. m., when we sighted North Head. We were then about seven miles south of the light ship, when I kept her off and started for the river and arrived in Astoria about 1:45 p. m.

The vessel during the time she was outside behaved in first-class order. She never showed any weakness and the engines worked perfectly during all the severe weather we were out in, and I wish to especially commend Chief Engineer Thrusby, in charge, for the splendid way the engines were handled. And I also wish to state that I never worried for one moment over any engine trouble, knowing that he was in charge, although the ves-

Motorship "City of Portland"

sel had a very severe trial. I consider the "Aiken" a first-class vessel and a vessel that will last for many years if properly taken care of.

In conclusion, I wish to state that considering the heavy weather and all, she made splendid courses and a whole lot less leeway than I expected under the circumstances, and I consider her a first-class ship in every respect.

Yours truly,
(Signed) H. F. ASTRUP, Pilot.

Wooden Motorship "Carmen"

Letter from E. W. Wright to L. J. Wentworth:

I have just received from Captain Olaf Schilling, of the wooden motorship "Carmen," a report on the maiden trip of this vessel to and from Australia. The Carmen left our yard, where she was built, last April, 1918, going to Grays Harbor, where she loaded 1,400,000 feet of lumber for Sydney. In crossing out April 24, she struck Grays Harbor bar with sufficient force to tear off ten feet of her shoe and a small piece of the keel. Despite the force of the blow, she leaked only about one inch per hour and proceeded on her voyage, it was found that the vessel had "hogged" ing at Sydney to determine the extent of the damage, it was found that the vessel had "hogged" less than one inch, and after repairing the damage to the keel, she loaded a full cargo of wool, peat and chrome ore for San Francisco.

Shortly after leaving Sydney, she encountered a terrific hurricane two hundred miles north of New Zealand. For forty-eight hours this hurricane swept over her with such violence that her average speed was less than two miles per hour, but the "wooden ship" rode out the hurricane and fifty-five days after leaving Sydney reached San Francisco, where she turned out her cargo in perfect condition.

The "Carmen" is now on the way from Eureka for Sydney and will return to this country with another Australian cargo before she is one year old. Incidentally, the gross earnings of this wood ship for her first year will be approximately $250,000.

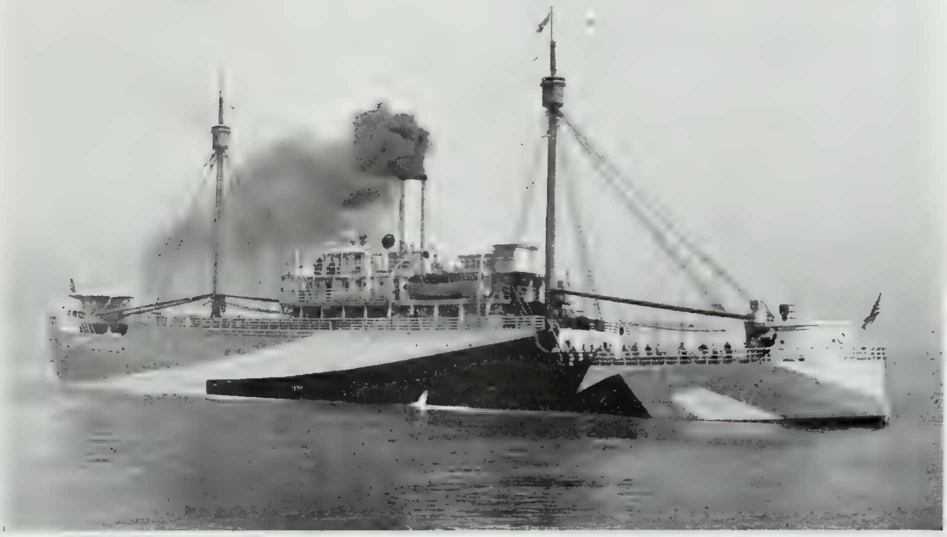
If the people who are so generous with their generalities in attacking the wood ship, would confine themselves to concrete facts, it would be unnecessary to cite cases like the Carmen, which is not at all unusual.

S. S. "Juana Coste"

Letter from her builders, the Columbia Engineering Works:

"After leaving our yard the 'Juana Coste' went to Seattle for her initial cargo. On leaving Seattle she ran aground on some rocks as the tide was falling. The bow of the vessel hung up on the rocks for a matter of some four hours until the tide rose and floated her off the rocks. She then proceeded to Costa Rica. On the way she en-

Emergency Fleet Corporation S. S. "Wasco"



Camouflaged steamer of the Hough type

countered some very heavy weather off the coast of Mexico; in fact, it was the same storm in which the 'Astri' met trouble. The captain personally told the writer that she handled so nicely during this storm that, instead of being worried, he was playing solitaire in his cabin. Upon her arrival at Costa Rica she received a full cargo of manganese ore, leaving her deck some thirteen inches out of the water. She then proceeded to Norfolk, Va. On the way she ran into more heavy weather just off Key West. This storm was so severe that it required two men at the wheel. One man was knocked down by a wave, breaking one or more ribs. Oil bags were hung out fore and aft.

"Upon her arrival at Norfolk, Va., the vessel was put on drydock, at which time the keel was repaired where the vessel ran on the rocks, and a piece of the bulwark was repaired which had been damaged by a heavy ore bucket. Outside of these repairs and some hardening of the caulking there were no repairs to the hull. It was found that the keel was perfectly straight and the vessel showed no signs of weakness of any kind.

"We have other boats in service, but as we have no specific information on them, we believe they will be of little value to you at this time. We wish, however, to call your attention to the fact that manganese ore is one of the hardest cargoes which can be put in a vessel, being practically the same weight as pig iron. It is quite evident that a vessel which will stand up under the strain of a full cargo of manganese ore must be sound in structure."

Letters from ship masters and chieg engineers to Capt. C. W. Saunders:

S. S. "Boilston"

"Enclosed please find my report on my voyage from San Francisco to Baltimore.

"We had a very fine trip, the best of weather and a very good crew, so everything has gone like clockwork. * * * We towed the steamer 'Quoque' 320 miles to off the port of Acapulco and made excellent time * * * The ship worked fine all the way and the steering has improved wonderfully."

S. S. "Moritz"

"We have had a very successful voyage so far, everything worked well. Ship made a good run to Arica considering the head winds we had most of the way. I averaged between twenty-six and twenty-seven tons of coal a day." He used natural draft all the way and records that "she steams very easy." Between Iquique and Balboa she averaged 9.3 miles an hour.

S. S. "North Bend"

"Arrived (New York from San Francisco) 18th. Had fine passage. Nothing happened on voyage worth mention."

This last report is characteristic of the vast majority of the reports coming in from vessels both wood and steel, and it can readily be seen that such reports furnish no interesting copy for the waterfront reported of our great daily news sheets.

So well known to domestic and European shippers is the seaworthy character and economy of operation maintained in the wooden vessels built on this Coast that these vessels find a very ready sale whenever released from United States Shipping Board control.

On the Pacific Coast the tendency is toward steam schooners, carrying upward of 1,000,000 feet of lumber, and both sail and auxiliary schooners able to load in excess of 2,000,000 feet lumber capacity being rated the prime essential for the carriers that must look for cargoes in both directions.

And, regardless of the assumption of some that ships must be turned out for particular trades, the lumber carriers of the Pacific are so designed that they may take their place in any trade, always accepting the transportation of humans as passengers. Their cargoes vary inbound, but have included copra, chrome ore, nitrates, wheat, wool, beans and peas, hardwoods, cocoanut oil in containers, canned goods, coal, flour and, in fact, anything that the stevedore has the ability to properly stow and protect. Big, free holds and plenty of room above for deckloads are held to be the best features of the utility ships and the same reasoning makes that class of tonnage desirable the world over.

Launching of the S. S. "Abrigada" at the yard of the Grays Harbor Motorship Corporation

Douglas Fir Timber on the Pacific Coast

TIMBER resources of the Pacific Coast assure an almost endless supply of lumber for shipbuilding purposes. Douglas fir, of which the coast counties of Oregon and Washington contain nearly 550,000,000,000 feet, has been established for many years as a wood of superior excellence in producing ship timbers.

In the recent war emergency, when the world needed ships and needed them quickly, Douglas fir lumber met every requirement. It was produced not only in the desired volume, but in the necessary proportions to meet all the exacting specifications laid down by the marine architects.

Douglas fir was used exclusively in building the wood ships of the Pacific Coast. It supplied the large timbers for scores of wooden vessels built on the Atlantic and Gulf Coasts. The revival of the wood shipbuilding industry has emphasized the importance of Douglas fir in this capacity, although, as a shipbuilding material, it has been in successful use for more than fifty years. Many vessels on this coast, built of Douglas fir more than fifty years ago, still are giving satisfactory service to the owners and the original timbers are in place.

On account of the exceptionally large proportions of the fir tree, this species of wood is just as useful in building vessels of the size and type specified by the Shipping Board during the recent emergency as in building the smaller vessels of half a century ago.

Another peculiar advantage of Douglas fir in this connection is the comparative lightness of the wood. The weight of Douglas fir per cubic foot, according to government tests as reported in United States Forest Service Bulletin No. 108, is 28.9 pounds per cubic foot of green material and 27.8 pounds per cubic foot of air-seasoned material. At the same time its strength for structural and all other purposes is equal to or greater than that of any other species of soft wood.

"The most important of American woods," is the description given Douglas fir by the United States Forest Service. "Its rapid growth in the Pacific Coast forests, its comparatively wide distribution and the great variety of uses to which it is put, place it first among the woods produced on this continent. As a structural timber it is not surpassed and probably it is most widely used and known in this capacity."

Douglas fir trees are scattered over the hills and plains from the Pacific Coast east as far as the Rocky Mountains, but the Douglas fir of commerce is found exclusively in the comparatively narrow strip of country west of the Cascade Mountains in Oregon, Washington and British Columbia.

This species comprises, it is estimated, more than 25 per cent of the standing timber in the entire United States, including both hard and soft woods. Climatic conditions are extremely favorable to the production of fir lumber at all seasons of the year. Operations can be carried on in the open during the winter. Shipbuilders never need fear a shortage of supply. Natural conditions lend themselves admirably to the practice of cutting the logs in the winter and using them in ship construction in the summer, although in the recent emergency green timbers were used with entirely satisfactory results.

In this connection the following report recently made by the United States Forest Service, is illuminating:

"Douglas fir does not shrink much and for this reason it is possible to use partially dried material in emergencies without fear that the additional drying after the material has been shaped will open the seams or cause undesirable stresses in the members."

The Douglas fir timber resources of the Northwest are, in the most part, convenient to the tidewater mills. No time is lost, therefore, in getting the logs to the saws. The estimated volume of privately owned timber west of the Cascades in Washington is 270,500,000,000 feet, of which 186,100,000,000 feet is Douglas fir; the total volume west of the Cascades in Oregon is 348,500,000,000 feet, of which 269,700,000,000 feet is fir.

Besides this supply there is an aggregate of 88,000,000,000 feet of Douglas fir in the national forests of the two states.. Much of the timber in the forest reserve is in high altitudes and very inaccessible. Generally speaking, all the best timber of the two states is in private hands and is readily available for shipbuilding or for any other legitimate commercial purposes.

The McCormick fleet, which was started in 1915 and was at first of the five-masted auxiliary schooner designs, being followed by straight sailers of the schooner rig, has all been taken by other interests. The auxiliary schooners "City of Portland" and "City of St. Helena" were purchased by the Gulf Mail Steamship Company. All were constructed by the St. Helens Shipbuilding Company, which likewise turned out successful auxiliaries and schooners for owners in the Gulf of Mexico and more on the Pacific Coast.

M. S. "Libby Maine" at dock in Lake Union, Seattle

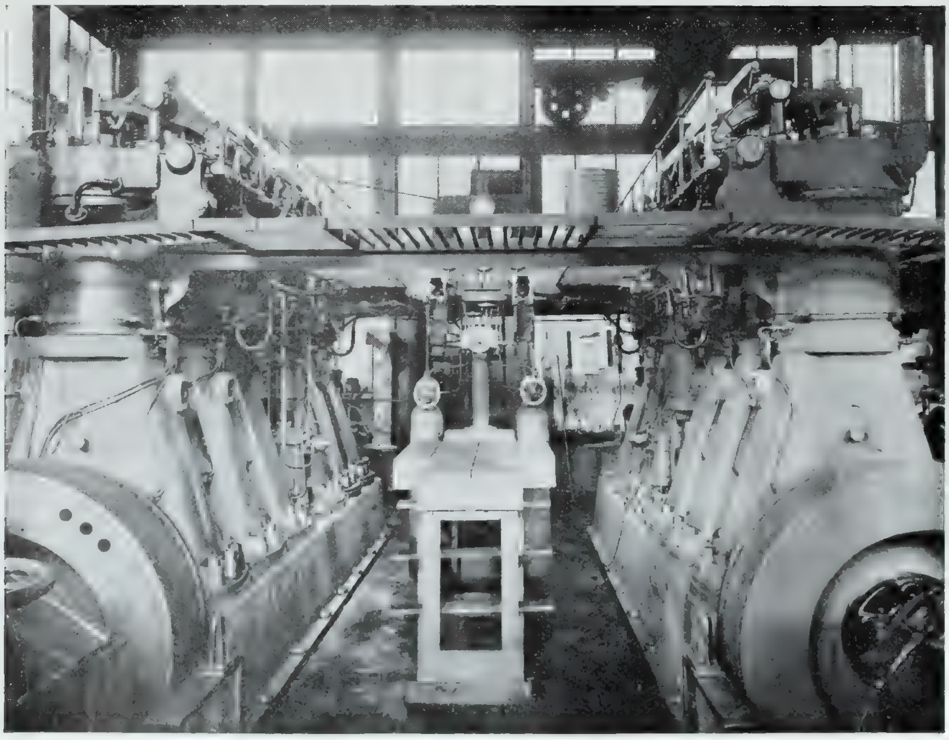
Splendid Record of Wooden Motorship

THE motorship had made a new world's record. She had safely returned from a long and dangerous voyage in Arctic waters. Now she lay securely tied to her dock ready at a moment's notice to proceed to any place her owners may designate.

She had left the shipbuilder's yards at Vancouver, Washington, for Seattle without a trial trip and with scarcely any preliminary tests of her main engines or engine-room equipment. Her engines were the first venture in marine Diesel engines of the pioneer Diesel engine builders of the Pacific Coast, but they brought her into Seattle as though they were old European marine Diesels. Here she loaded and sailed for Bristol Bay, unloaded outside of Libbyville, loaded, performed some difficult stunts in maneuvering, and sailed back to Seattle—the first motorship on record to make a non-stop run into and from Alaskan waters without any engine trouble and with her original pistons and cylinder heads as sound as when installed.

True enough, the chief, first and second assistants and an oiler (men who had never before operated a full Diesel plant) had received a few weeks' training at the plant of the Dow Pump & Diesel Engine Company.

Voyage No. 2 was planned to Honolulu and return by way of San Francisco. Several changes were made in the engine room staff, and new men engaged. Many a motorship had had a fair degree


Main engines of motorship "Libby Maine," built by the Dow Pump & Diesel Engine Company.

of success on a well-nursed first trip, but no oil-engined ship had ever arrived in Honolulu without serious engine trouble. With only two of the original engine room crew aboard, the motorship "Libby Maine" set sail on October 6th for Honolulu. After leaving port, the chief and first assistant came down with the "flu" and for several days were confined to their beds. This left the third assistant as the only remaining man who had had any previous experience with Diesel engines on active duty. The engines plowed along and held their speed as though nothing was amiss.

The official log indicates the following:

Total distance—2440 miles.

Average speed—6.88 knots.

Trip—14 days, 18 hours, 15 minutes.

Fuel oil consumption—259.5 barrels, or 17.58 barrels per 24 hours.

Fuel economy of—4.46 gallons per mile, or .403 pound per B. H. P. hour.

Lubricating oil—13 gallons per 24 hours.

Loaded from stem to stern, from keelson to hatch cover with Hawaiian pineapples, the ship set sail for San Francisco. After only a short distance out, heavy head winds were encountered, which continued for the rest of the trip, but the engines still held their own and lived up to their earned reputation. The vessel arrived in San Francisco on November 14th without a hitch and in excellent condition. Lying in the stream in the harbor, she was a model of cleanliness and the acme of efficiency.

Not at any time in her 15,000 miles of travel had a tow line been drawn from her decks, but the law requires a tow in bringing a vessel up the Oakland estuary, so here the "Libby Maine" suffered her first humiliation. Discharged of her cargo of pineapples at Howard wharf and loaded with general cargo, she sailed for Seattle. On arriving in Seattle the chief engineer wired the following:

"Libby Maine. Arrived Sunday evening, 5 days, 21 hours, 50 minutes. Very hard trip against strong northwest wind. Wheels out of water half the time, but governor worker perfectly."

Thus another record was made—a precedent broken. The engines proved satisfactory in the hands of new engineers. The shipping world has had its experience with hot-head engines and with new experiments. A good many types of American-built Diesel engines have been installed and tried out and have shown up their weak points and their strong points. Marine engineers have had their opportunities to prove their skill in operating them. The time is fast approaching when the fair-minded shipowner can see that after all the American-built internal combustion engine will win for itself a front rank position as a prime mover in ship propulsion.

The "Libby Maine," a 2000-ton wooden motorship of 240 feet length and 43 feet beam, is engined with a pair of 425 I. H. P. Dow direct reversible heavy duty marine full Diesel type oil engines connected to Falk reduction gears through Nutall flexible couplings. Each unit is tied to an engine bedding designed to give the maximum stiffness and the greatest security against deflection. Heavy timbering securely bolted to the ship's frames run in single lengths the entire length of the engine unit. The Nutall flexible coupling is placed between the main engine and reduction gear to relieve any possible strains between these units, as well as to act as a float. The reduction gear and thrust block are bolted to a single heavy cast-iron sub-base. By the use of the reduction gear the most efficient engine speed of 250 R. P. M. is obtained. The Nuttall flexible coupling possesses the particular advantage that in case any or all of the driving springs are broken the coupling still serves its purpose in that the drive may operate through the then engaged spring lugs.

The builders of these engines, the Dow Pump & Diesel Engine Company, are the pioneers of the Pacific Coast in the Diesel engine field. The original Diesel patents were obtained from Willans & Robinson of Rugby, England, together with their fifteen years of manufacturing experience with Diesel engines. Willans & Robinson have justly earned great renown for their excellent designs and skilled workmanship.

For the past six years the Dow Company has been building stationary engines of this type, and have proven them to be a success and well adapted for burning our California crude oil of 16 and 17 gravity as a fuel. In all of the six years of Diesel engine experience of the Dow Pump & Diesel Engine Company, not one single cylinder head nor one single piston has proven defective or given the least trouble.

The engines of the "Libby Maine" are an example of approved European practice adapted to the needs of the Pacific Coast and stand as a milestone of progress in the use of the internal combustion engine as applied to marine propulsion.

REMARKABLE SHIPMENTS OF LUMBER

"To meet the requirements of the United States Shipping Board, lumber shipments had to assume war-need dimensions. More than 40,000 carloads of lumber were moved from the Pacific Coast and Southern territories alone. When the railroads were congested last winter by coal and labor shortage, a fleet of twelve steamers moved lumber from Port Arthur, Texas, and Gulfport, Miss., to Atlantic and Gulf Coast yards. After the lumber department perfected things, lumber was moved at the rate of 2,000,000 feet a day.

"Some remarkable shipments were made.

"On one occasion a Texas passenger train, consisting largely of Pullmans, was held up until two lumber cars could be coupled to the rear and moved toward a destination where the lumber was badly needed. On another occasion a district supervisor commandeered the locomotive of a New York milk train to use it to pull a lumber train.

"In this region (the great yellow pine area running through Texas, Louisiana, Mississippi, Alabama, Georgia and Florida) it was a different proposition to produce the lumber required by the Government from that confronting the lumbermen of the Northwest. It meant going further back for large sizes, but the Southern lumbermen were game. Some of them have gone in three years ahead of the normal cut to get out suitable sizes. This, of course, increased costs, for it involved railroad extensions and other emergency expenses. The rail hauls range form ten to eighty miles. Perhaps twenty miles would represent the average haul by rail."

A Few Records from the Many Successful Wooden Freighters Built on Puget Sound

SINCE May 1st, 1917, the shipyards of the Pacific American Fisheries have built at South Bellingham, Washington, a number of fir steamers. Two or these, the S. S. "Redwood" and S. S. "Firwood," have been in commission since May, 1917. They are 2700-ton deadweight capacity, 235 feet long, 42 feet beam and 25-foot 9-inch moulded depth. Three other steamers, the "Hollywood," "Rosewood" and "Catherine D.," are larger, being 250 feet in length, 42-foot beam and 27-foot 3-inch depth.

The yard is now building seven 3500-ton deadweight steamers of their own design for the Emergency Fleet Corporation, two of which have been completed.

The following records have been compiled by the Pacific American Fisheries, who have operated these steamers in their own service and also let them out on charter for general purposes:

S. S. "Redwood"

This steamer has been in commission since May 1st, 1917; has covered in Alaskan waters for us thirty-five thousand three hundred and twenty-one miles; carried eleven thousand three hundred and thirty-nine tons of general merchandise, eleven thousand eight hundred and ninety-one tons canned salmon; also under charter to W. R. Grace & Company for two voyages to South America; covered twenty-three thousand six hundred and forty-four miles; carried two million one hundred and eighty-six thousand feet of lumber and twenty-five hundreds tons of nitrate and copper ore, making a total mileage covered up to date of fifty-eight thousand six hundred and ninety-five.

S. S. "Firwood"

She has carried for us in Alaskan waters thirteen thousand five hundred and eighty-three tons of general merchandise, nineteen thousand one hundred and forty tons of canned salmon and covered forty-six thousand one hundred and six miles; under charter to the Pacific Steamship Company, covered ten thousand six hundred and sixteen miles, carried twenty-one thousand fifty tons of general merchandise; total mileage covered since going into commission, May 26, 1917, to date, fifty-six thousand seven hundred and twenty-two miles.

Damage to cargo on the above two boats to date, nothing.

They have both been on drydock twice since launching, simply for copper painting, as we aim to dock these boats at least once in every eight months and every six months if we can. These two boats are now under charter to Grace & Company for trips to South America with lumber and back with nitrates and ore.

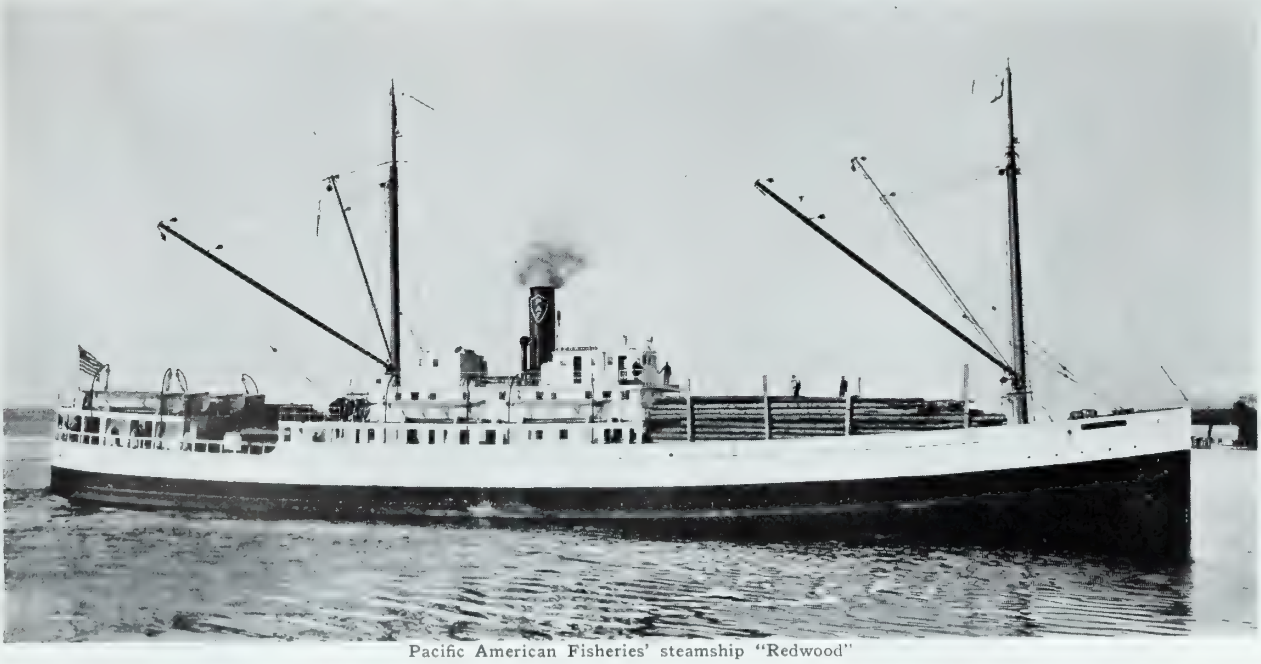
S. S. "Catherine D."

In commission May 27, 1918, up to date; has covered sixteen thousand eight hundred and fifteen miles, carried seven thousand nine tons of general merchandise, eight thousand five hundred and twenty-five tons of canned salmon. Absolutely no damage. Has been on dry dock once at beginning of season for copper painting. Goes under charter to Pacific Steamship Company about the tenth of this month until such time as we will want her next spring.

Pacific Steamship Company want the "Redwood" and "Firwood" as well as the "Catherine D.," claiming that they are the best wooden boats they have seen, but we could not give them the "Redwood" and "Firwood" because Grace & Company had a prior right, having spoken for them since turning back the "Redwood" last spring.

In addition to the above, we have built the "Rosewood" and "Hollywood." The "Rosewood" made a trip from the Pacific Coast to France via China through the Indian Ocean and Red Sea. The captain of this boat is back on Puget Sound and states that she arrived in first-class shape, not a "weep" after passing through all of this hot weather.

The "Hollywood" made a trip to France via the Panama Canal and Atlantic Coast. Reports have come back from France that she arrived there in fine shape, and reported to be an excellent sea boat (as they all are), not a leak or damage of any kind to cargo, and everything about her in first-class shape.



Pacific American Fisheries' steamship "Redwood"

Riverfront of the Grant Smith-Porter Company's shipyard at Portland

Timber, Lumber and Ships

WE have in the three Northwestern States approximately 1,000,000,000,000 feet of standing timber, of which the territory exclusively tributary to the Columbia gateway and Portland possesses more than 550,000,000,000 feet. There is 100,000,000,000 feet additional of this total stand in Northern Idaho which may ship to the Columbia River at the same rate as to any other tidewater point.

In a careful calculation of the process of utilizing this timber, it is found that 6,000,000,000 feet a year could be cut in the territory stated and yet have a supply of raw material that would last approximately 100 years. That from five to six billion feet a year may be cut in the Columbia territory within a very few years is conceded by experts. Six billion feet of lumber is equivalent to 9,000,000 tons of freight on the railways. It would require 15,000,000 deadweight tons of shipping to handle it on the water.

Studying the situation from the land viewpoint and assuming that half of the six billion feet cut might conceivably be forced into what is now termed the railway territory, this movement would be about 4,330,000 tons or 108,222 carloads, or 2164 trains of 50 cars; or, reducing still further, six trainloads of lumber out of the district per day the year through.

In handling the normal and usual percentage of the six billion feet cut of timber in the Columbia district, which must inevitably go by water if it gets to any market, and assigning for the water transportation ships that have an average of 3,000 000 feet capacity, approximately 1800 sailings a year would have to take place from this port. These vessels, in reaching the markets of the Pacific or going through the Panama Canal to European or South American markets, probably would take an average of four months for the voyage. On this basis a fleet of 600 ships would be required to handle the lumber that should, in the normal course of events, move by water from the Columbia District alone in that period of lumber manufacture in the Northwest which is as certain to come as there is a certainty that the world will yet have a demand for soft woods.

No provision has been made for supplying vessels that will be needed for this trade. When the Federal Government decided to build wood ships, the plan adopted was that calculated to meet an emergency on the Atlantic and had no reference whatever to the trade requirements of the Pacific. In fact, the type had no reference to any requirement except that emergency which might arise if the submarines sank steel ships faster than they could possibly be built and the allied nations were forced to the adoption of large fleets of smaller ships built of wood. The general cargo ship resulted. The lumber trade and all the other bulk commodity movements of the Pacific require a different type.

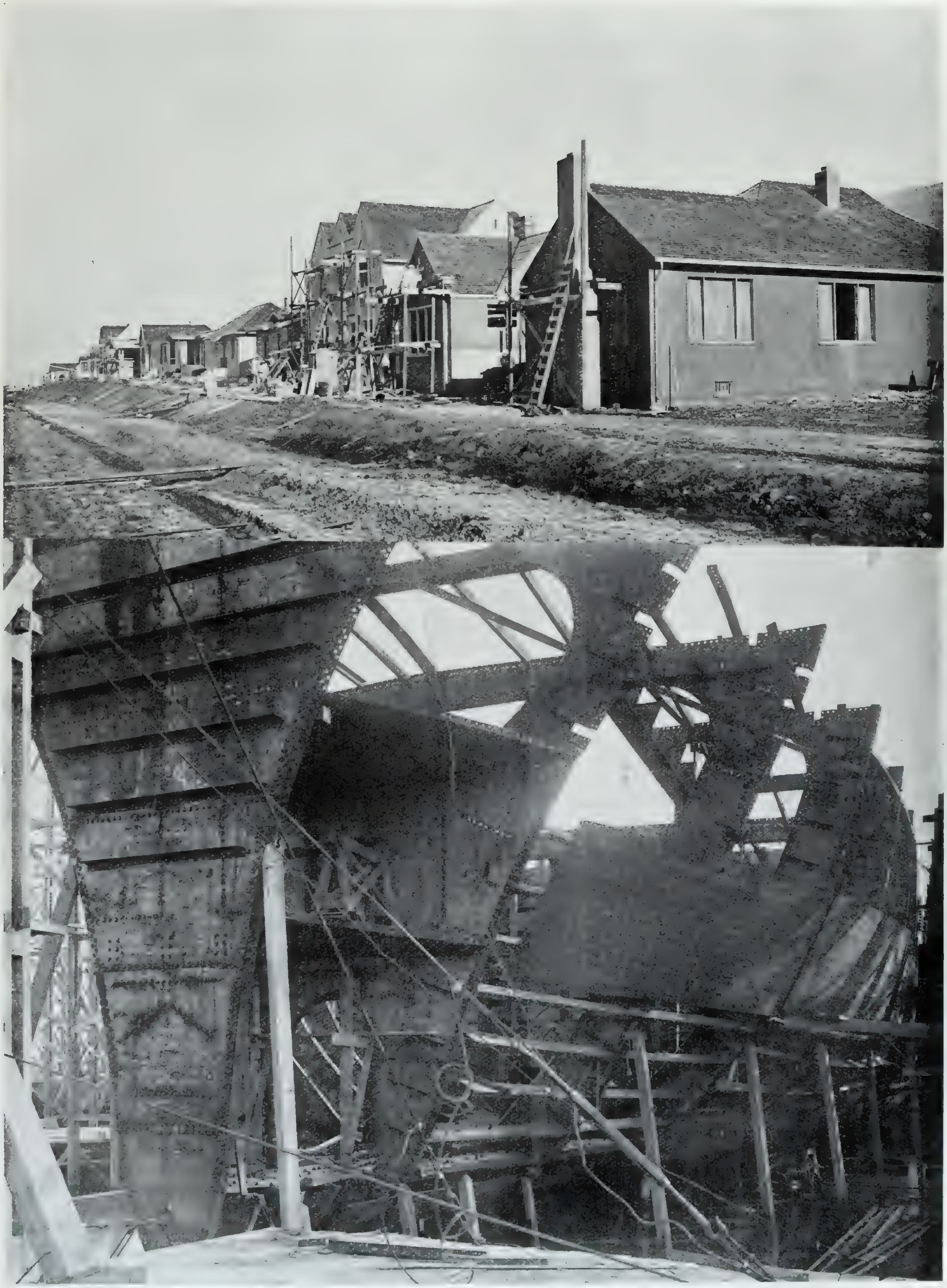
American private interests do not care now to enter the shipbuilding business while the Government has an overwhelming preponderance of ships under the American flag and is promulgating no policies that would indicate that the private operator has any possible field with a prospect of success. Thus we are confronted with the situation that the Government has only partly built the requirements of the trade and the lack of decision as to its future policies prevents the private operator from taking any action of a substantial character.

In the past there was little incentive for American ownership of vessels. The American owner has to meet foreign competition without tariff protections. Revenue laws and the LaFollette Seamen's Bill made this competition impossible without artificial support. There is no assurance that the private operator will get this support in the future. It is inevitable that capital will hesitate in embarking upon a business presenting so many difficulties.

The demands for food and for the marketing of manufactured products for the various countries of the world, especially those lines of manufacture that give different nations an enormous percentage of their payroll, will be so heavy for some time to come that bulk commodities, like lumber, will have little opportunity for a living tonnage rate, unless an extraordinary building program tonnage, probably in wooden ships, is carried out.

The logic of the situation seems to be that we will have to build wood ships to market our lumber in the Northwest or else will not be able to reach the market that takes its lumber supplies by the water routes. This being the case, there is nothing to do but to fight to a finish the issue of the Government building wood ships adapted to the trade of the Pacific and which the trade will take so long as the Government intends to build ships of any type or of any material to meet the trade requirements of the United States under peace conditions. In the event the Government will not carry on such a construction program, it will be necessary to establish conditions which will induce private capital to get into the shipbuilding and operating business on its own account.

There is no cause in the Northwest which is destined to command a more vigorous support from business interests than that of the wood ship until the supply of steel ships takes care of the world tonnage on a lower basis of cost than is possible through wooden construction and operation. Our territory will be found thoroughly marshalled for the struggle. We believe that the right in our cause will ultimately triumph.



Pacific Coast Shipbuilding Company's yard at Bay Point, Cal. Upper view, street in the town of Clyde. Lower view shows hull under construction on ways

Pacific Coast Shipbuilding Company Launches Its First Ship

IT is seldom the launching of a ship, even a big steel cargo carrier, is made such an occasion of public rejoicing as was that of the 9400-ton deadweight steamer "Diablo" at the new yard of the Pacific Coast Shipbuilding Company on Suisun Bay, California, Saturday, November 30.

The affair was of technical interest from more than one point, not the least being that the "Diablo" made a perfect launching, leaving the ways without even smoking them and taking the water with no perceptible dip and never a splash, while a crowd of five thousand cheered.

Less than a year before the "Diablo's" launching, the site of the shipyard was chiefly marsh land. Construction of the plant was begun early in 1918, and six months to a day after the contractor broke ground for the buildings, four keels were down on the ways, a start on ten steamers, all the size of the "Diablo," to be built for the Shipping Board. The construction of the yard set what was a record for speed.

At the launching, high tribute was paid by the speakers to the officers of the company for their conception of the enterprise and the manner in which it had been carried through.

Contra Costa county had an official spokesman in Superior Judge R. H. Latimer of Martinez, and Justice Henry A. Melvin of the California Supreme Court made an address.

R. N. Burgess, president of the company, in his introductory remarks, after referring to the work of John T. Scott, the pioneer shipbuilder who is vice-president of the company, said: "We're here to stay. There's work enough in hand for a solid run of two or three years, and more to follow. We will make this yard fit to compete with any in the world." He also told of the work in the building of Clyde, a town especially for the employes of the shipyard. Clyde, less than three miles from the plant, with which it is to be connected by special electric transportation, is being constructed with the assistance of the United States Shipping Board.

Justice Melvin, quoting the saying that every great enterprise is the outcome of one man's imagination, told of Mr. Burgess' conception of the idea of a shipyard on the site, of how he interested his associates and went to Washington to secure the government contract for the ten 9400-ton vessels.

"The name of John T. Scott was talismanic in Washington," said the speaker. He also paid tribute to Captain George S. Radford, formerly of the navy, who is vice-president of the company, and referred to his work at Annapolis and elsewhere.

Recalling the legend of Mount Diablo which Bret Harte made into a story, Justice Melvin declared the name auspicious, despite its literal meaning in translation from the Spanish, and pointed out that in the legend the mountain was christened not after the devil, but after his defeat when he appeared in the form of a bear before a pious monk.

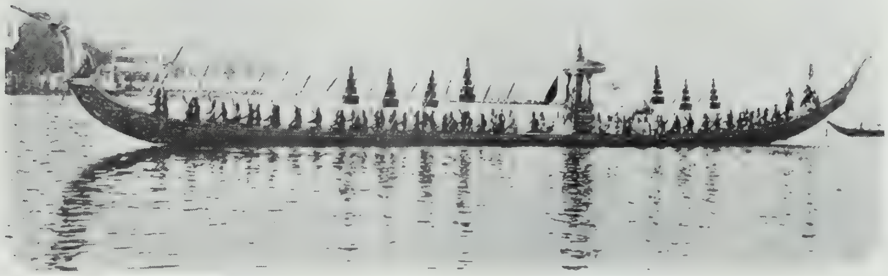
Judge Latimer spoke on the significance of the shipyard's success to Contra Costa county, which has proven its right to a high place among the industrial regions of the Pacific Coast.

The "Diablo" was christened by Mrs. R. N. Burgess, who after the ceremony was presented with a bouquet, on behalf of the company, by its secretary and treasurer, Golden Downing, and also with a pendant from the company by Justice Melvin.

Mrs. Burgess sent a message of thanks to Mrs. Woodrow Wilson for her co-operation in giving the name to the ship, which was originally to have been called the "Apistama." The message follows:

"Citizens of Central California join me in thanks for your kindness in permitting local tradition and interest to be commemorated by giving the name Diablo to the first steel ship launched in Contra Costa county, on Suisun Bay. I feel it an honor to have christened the vessel after the mountain I myself love well and at whose base the ship was constructed. In Indian days the mountain was Kah Woo Koom."

Pacific Coast Shipbuilding Company's S. S. "Diablo" just after launching



Siamese royal canoe

Some Strange Craft

THE above photograph shows the extraordinary canoes used by Royalty in Siam. This barge, one of several of its kind in Siam, is paddled by nearly one hundred men. The boat is made of teak, inlaid with gold leaf, and is the same in design as the royalty of Siam has used for generations. The rowers sit two abreast; their oars, made of teak, are quite long. They are handled much as the Indian paddles of this country. At the beginning of the stroke, the oars are held upright over their heads. Then with a curious cry, uttered by all the crew, the blades are plunged into the water. As the oars are withdrawn from the water, they are held vertically in the air for a few seconds, which with the sunlight or moonlight on them gives a most curious effect.

Every year on the Menam River, on which Bangkok the capital of Siam is situated (the equivalent of the Hudson River to New York City), there is a festival when boats of this kind compete in races. The great speed achieved by them can only be imagined when the number of men manning them is considered.

In the center of the barge, rather nearer the stern, will be a canopy, where the royal passengers sit. Three cone-shaped pyramids behind the canopy and four in front of it can be seen. These are parasols that are opened at times to afford protection from the sun. The only other place in the world that boats such as this are in use is in Cochin-China, especially at the city of Saigon.

With reference to the craft shown in the lower photograph, lying between Peru and Bolivia high in the Andes, at an altitude of 12,545 feet above sea level, is Lake Titicaca, the highest navigable body of water in the world. The length is about 120 miles and its greatest width 41 miles, so that in area it is about equal to Lake Erie.

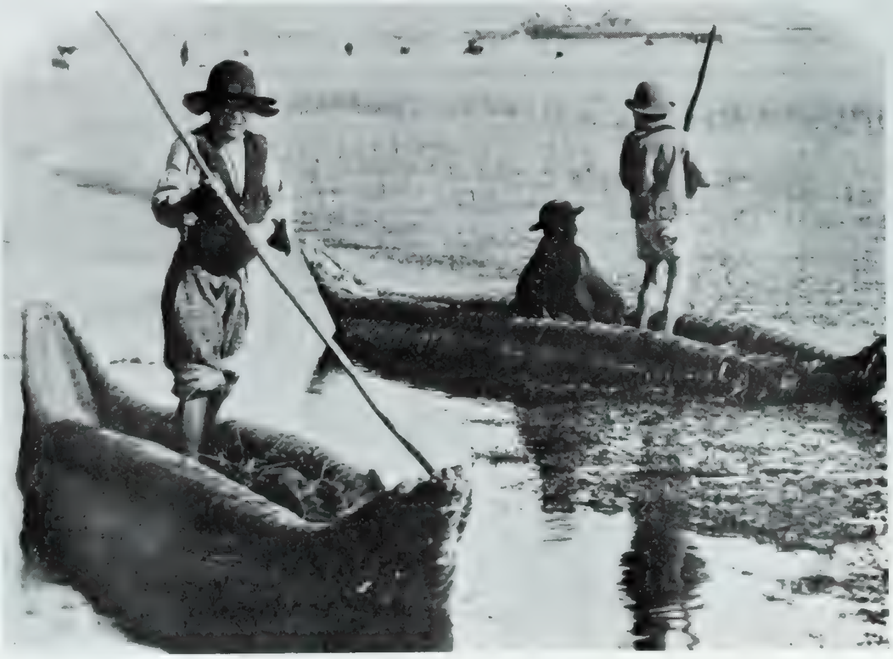
Until a few years ago (when four small steamboats were brought up from the coast piece by piece, and put together with great labor) about the only boats on the lake were balsas like those shown in the photograph.

Among the water plants growing on the shores of the lake, the commonest is something like the British and North American rush, called "tortora." It grows in water about three or four feet deep and rises several feet above the surface. The Indians, having no wood, for vegetation is scarce in this region, construct their boats out of this straw, plaiting it and tying bunches of it together, for it is tough as well as buoyant. In these craft, apparently very frail, with even the sails made of the same straw, they navigate the lake. Each boat of this size carries at least two men, and sometimes a pretty heavy load also. They steer by paddles, and when the wind fails they propel the balsa forward by paddling.

These boats have the merit of being unsinkable, so that if, in rough weather, they are swamped, the occupants may still cling to the rush and drift ashore—if they do not succumb to the cold in the meantime, for, although in the tropics, Lake Titicaca is terribly cold by reason of its great altitude.

Indian Shipbuilding Outlook

Notwithstanding the great efforts which have been made during the past year to place the Indian shipbuilding industry on a sound basis, the Government of India has arrived at the conclusion that local resources cannot, under war conditions, be made use of economically.



Peruvian balsas on Lake Titicaca

Standardization of Ship Steel

TWO conferences of vital importance to shipbuilders and steel makers were held in Philadelphia on Tuesday and Wednesday, November 19 and 20, 1918. The first was a conference of steel makers to take action on modifications in rolls to produce ship channels and shipbuilding bulb angles, and the second was a conference between the steel makers and representatives of the Emergency Fleet Corporation to take action on a revision of the American standard practice and to recommend a selected list of structural shapes most suitable for ship construction.

Representatives were present at these conferences from all the larger mills which manufacture structural steel shapes—Bethlehem Steel Company, Cambria Steel Companyl Carnegie Steel Company, Eastern Steel Company, Illinois Steel Company, Inland Steel Company, Jones & Laughlin Steel Company, Lackawanna Steel Company, Phoenix Iron Company, Tennessee Coal, Iron & Railroad Company—and at the second conference the United States Shipping Board Emergency Fleet Corporation was represented by Mr. Fred T. Llewellyn, in charge of steel standardization, engineering section, Division of Steel Ship Construction, and by Mr. A. J. C. Robertson, chief designer.

The first step in the direction of the standardization of ship steel was taken on July 2, 1917, when representatives of the above mentioned companies, together with representatives of the manufacture of plates, met in Washington and adopted the standard practice recommended by American steel makers and subsequently adopted by the Emergency Fleet Corporation as a guide to the shipyards in placing orders with the mills for ship steel. The effect of the standard practice has been to eliminate minute variations in the thicknesses of plates ordered from the mills and to simplify the transmission of orders from the yards to the mills, and the situation as regards plates has been so greatly improved as compared with pre-existing practice that the plate mills have been able to make some remarkable production records.

At the time the standard practice was adopted it was deemed inadvisable to prepare a selected list of structural sections, but only to recommend that in general the use of sections rolled infrequently be eliminated and that orders be confined so far as possible to American standard beam sections, American standard structural channels and plain angles, provided, however, that ship channels and bulb angles might be rolled if required on shipbuilders' schedules. While it was recognized that the bulb angle and the ship channel were more suitable than other sections for ship construction, the limitation in use of ship channels and bulb angles was due to the lack of adequate facilities for their manufacture, and it was the desire of the steel makers to make as broad as possible the allocation of ship steel to all makers.

It was further considered unnecessary to draft a selected list of structural sections, for the reason that it was believed the Emergency Fleet Corporation's plan for the standardization of the designs of hulls, particularly cargo vessels, would of itself operate to reduce the number of structural shapes required, and, therefore, no further action was necessary. The recommended list, however, did limit the number of plain angles.

The experience of sixteen months has made it clear to American steel makers that the structural channel, by reason of its narrow flanges and steep inner flange slope, is not an entirely satisfactory section for use in hull construction; further, that the bulb angle is in very many respects a most desirable section for ship construction and that its use should be encouraged rather than discouraged, and further, that the introduction of beams and structural channels into the list for ship steel had opened the way to the use of an enormous number of structural sections with relatively limited tonnage per section.

This situation had also come to the attention of the Emergency Fleet Corporation by reason of the difficulties which, due to the use of a great variety of sections, the shipyards had had in securing an adequate supply of all these sections in due sequence as required in construction. In consequence an investigation was inaugurated in the Division of Steel Ship Construction, Daniel H. Cox, manager, with a view to the tabulation by tonnages, shapes and thicknesses of all the sections used at the yards so as to make possible the compilation of a selected list of sections for use in the construction of ships on the basis of which it might be possible to insure the receipt of steel in adequate volume and due sequence, and also to arrange for warehouse stocks of suitable sizes at conveniently located points.

This investigation, which was carried on by Mr. Llewellyn, covered 1508 hulls of 10,302,150 deadweight tonnage, either requisitioned or under construction by the Emergency Fleet Corporation, with a total shape weight of 1,100,651 net tons distributed among 131 different structural shapes in 403 thicknesses (sections). It was noted that in the case of one design for a a 5000-ton boat, with but 1,026,966 pounds of structural shapes, there were 42 different shapes and 118 separate thicknesses (sections), of which nine sections were rolled only at one mill and one tee section only at another mill. Of separate sections there were items as low as eight pounds each and 35 sections less than 500 pounds each. Of one shape only 43 pounds were required. If such tonnage were the only tonnage available at the mills for this particular shape it would require material for 4600 boats to accumulate before considerations of economical production would justify placement of rolls. Of another relatively heavy shape on the same basis, economical production would require tonnage for 1000 boats to accumulate. In the case of another cargo vessel of 9400 tons, requiring 1,800,103 pounds of structural sections, there were only 16 separate shapes and but 44 thicknesses, and of each separate shape the minimum quantity of any one thickness was 2800 pounds, and that of a section in very general use. The next smaller item on that list is three tons of a small angle section which would only require material for 66 boats to accumulate. By the addition of 55 tons to the weight of the steel, the number of shapes in that particular boat might be reduced to eight and the number of different sections to 19.

This investigation also indicated that while a number of steel makers rolled bulb angles and ship channels, those sections represented the growth of years and reflected the individual ideas of the shipyards for which rolls were first turned. There had been no definite endeavor to standardize those sections, with the consequence that American steel makers published different dimensions, weights and properties for sections of the same depth, the use of which at the yards should be interchangeable.

With the completion of his report and its distribution to the shipyards and to the steel makers, Mr. Llewellyn recommended that ship channels and shipbuilding bulb angle sections be adjusted to British standards, that steel makers confer and agree to publish like ranges of weights and dimensions, and that there be prepared for distribution to the yards a selected list of sections recommended as most suitable for ship construction.

The conferences were held in the offices of the Cambria Steel Company, with Mr. George E. Dix, assistant to the general manager of sales, in the chair. Mr. R. B. Woodworth, engineer with Carnegie Steel Company, who had been instrumental in the formulation of the original standard practice, presented detailed written proposals as a basis of discussion for the modification and standardization of ship channels and bulb angles and for the revision of the American standard practice.

It was decided by the steel makers that inasmuch as the British standard sections of ship channels and shipbuilding bulb angles appeared to be better adapted to economical manufacture than the American standards, and inasmuch as the new rolls which had been turned in recent years to produce those sections conformed in general to British standards, hereafter American standards should be discontinued and rolls in hand not to British standards should be redressed at as early a date as possible to roll such sections as closely to British standards as slightly divergent methods of production would allow; particularly in view of the further fact that the adoption of British standard sections would enable American mills to compete on an even basis for ship steel wherever utilized in shipyards either at home or overseas.

It was further agreed that in general ship channel rolls should be dressed so as to produce the Lloyd minimum and maximum thicknesses with one thickness .05 inch less than British standards, and that mills publish but one intermediate thickness in the Lloyd range of ship channels, and that in bulb angles in general where the Lloyd range seems to be too arbitrary and to provide an unnecessary number of thicknesses, the Lloyd range should be aimed at only in the deeper sections, that there should be but one thickness below British standards and that intermediate thicknesses be published to vary by .05 inch; bulb angles to show exact leg dimensions at British standards and at .10 inch intervals above.

Careful consideration was then given to a selected list of structural shapes to be recommended for ship construction, together with those modifications in the standard practice which the experience of sixteen months indicated to be desirable. These were further discussed at the second conference with representatives of the Emergency Fleet Corporation, and it was further recommended to the Emergency Fleet Corporation that as soon as possible a technical order be issued to all shipyards to put these recommendations in effect, and that so far as possible orders for structural sections to be used in ship construction be governed by the recommended list of sections, as follows:

Structural Shapes Recommended for Ships

Dimensions in Inches—Bulb Angle Weights Approximate

Equal Leg Angles

Size	Thickness	Wt. per ft.	Size	Thickness	Wt. per ft.
6x6	.750	28.7	3½x3½	.625	13.6
	.6875	26.5		.5625	12.4
	.625	24.2		.500	11.1
	.5625	21.9		.4375	9.8
	.500	19.6		.375	8.8
	.4375	17.2		.3125	7.2
	.375	14.9		.250	5.8
5x5	.750	23.6	3x3	.500	9.4
	.6875	21.8		.4375	8.3
	.625	20.0		.375	7.2
	.5625	18.1		.3125	6.1
	.500	16.2		.250	4.9
	.4375	14.3			
	.375	12.3	2½x2½	.375	5.9
				.3125	5.0
4x4	.750	18.5		.250	4.1
	.6875	17.1			
	.625	15.7	2x2	.250	3.19
	.5625	14.3		.1875	2.44
	.500	12.8			
	.4375	11.3			
	.375	9.8			

Unequal Leg Angles

Size	Thickness	Wt. per ft.	Size	Thickness	Wt. per ft.
6x3½	.750	22.4	4x3	.500	11.1
	.6875	20.6		.4375	9.8
	.625	18.9		.375	8.5
	.5625	17.1		.3125	7.2
	.500	15.3			
	.4375	13.5	3½x3	.500	10.2
	.375	11.7		.4375	9.1
				.375	7.9
5x3	.500	12.8		.3125	6.6
	.4375	11.3		.250	5.4
	.375	9.8			
	.3125	8.2	3x2½	.375	6.6
				.3125	5.6
				.250	4.5

Bulb Angles

Size	Thickness	Wt. per ft.	Size	Thickness	Wt. per ft.
10x3½	.725	35.2	8x3½	.550	23.2
	.675	33.2		.500	21.6
	.625	31.1		.450	19.6
	.575	29.1		.400	18.0
	.525	26.9			
	.475	24.9	7x3½	.525	20.0
				.475	18.6
9x3½	.625	28.6		.425	16.8
	.575	26.6		.375	15.3
	.525	24.8			
	.475	22.7	6x3	.475	15.6
	.425	20.9		.425	14.1
				.375	12.8
				.350	12.2

Ship Channels

Size	Thickness	Wt. per ft.	Size	Thickness	Wt. per ft.
12x3½	.700	40.8	8x3½	.525	25.3
	.600	36.8		.425	22.6
	.500	32.7		.375	21.2
	.450	30.6			
			7x3½	.500	22.5
10x3½	.675	34.8		.400	20.1
	.575	31.4		.350	18.9
	.475	28.0			
	.425	26.3	6x3½	.475	19.8
	.375	24.6		.375	17.8
				.325	16.8
9x3½ ..	.650	31.3			
	.550	28.3	6x3½	.350	15.2
	.450	25.2			
	.400	23.7			

Tees			**Hatch Zee** (Tyzack)		
6½x6½	.450	19.8	2½	.500	13.6

15" Structural Channels

Thickness	Wt.per ft.	Thickness	Wt.per ft.
.818	55	.524	40
.720	50	.426	35
.622	45	.400	33

27Shapes—115 Sections.

Sections not shown in the above list may be included on shipbuilders' schedules with the proviso that they be specified only when they can be ordered in lots of not less than 40,000 lineal feet per shape at one time, or by special arrangement with the mills. Orders for such shapes should not be divided among mills, but entire quantity of each shape should be placed at one mill with the express stipulation that that mill may at its option roll, ship and invoice all the tonnage at one time, regardless of position in shipyards and fabrication schedules.

It is to be noted in this connection that the same problem of the standardization of ship steel has had the careful attention of the British Admiralty, the steel makers and the shipyards of England where the multiplicity of sections specified on shipyard schedules has also interfered with the progress of ship construction. In consequence, under the auspices of the Admiralty and the Ministry of Munitions, to facilitate regular and frequent rollings and thus avoid delays, a list of standardized sections has been drawn up and published in a pamphlet entitled "Procedure for Obtaining Ship Steel, December, 1917." For cargo vessels (standard ships) this list includes but four sizes of angles—6 x 6, 6 x 3 1-2, 3 1-2 x 3 1-2 and 3 1-2 x 2 1-2; three sizes of bulb angles—10 x 3 1-2, 9 x 3 1-2, and 8 x 3; and but two sizes of ship channels—a 12 x 3 1-2 in. light section and a 12 x 3 1-2 in. heavy section. For Admiralty oilers (tankers) there are shown but four sizes of angles and six sizes of bulb angles.

While the number of shapes in the English list is much smaller than the number of shapes in the recommended American standard practice, English mills are accustomed to roll shapes with much narrower variations in thickness than American mills, and in view of the desirability of the widest possible growth of ship construction in the United States it is inadvisable too narrowly to restrict American shipyards. The American list provides a larger number of shapes with fewer thicknesses.

Fishermen at War

By R. E. Cropley

MY first experience with the fishermen of England during the war was when the ill-fated "Tuscania", on which I was crossing, was approaching the danger zone. We were a hundred miles or so off soundings, and it surprised me when coming on deck one morning to find, way out there, several trawlers, which in times of peace I had seen hugging the coast as they dragged their trawls. They are queer little boats, these English trawlers, with their high bows on which are now mounted a tiny gun, seemingly only serviceable enough to harpoon a whale. They all are blest with a high stack, no doubt a badge of their society, and one would think a good walloping sea would sweep their superstructure clean off.

As the "Tuscania" made her hard advance over a nasty wintry sea,, sometimes I thought a hand were raising from the bottom of the ocean and tossing the trawlers skyward, the next minute dragging them under in the hollows of the waves, till I could but see the tops of their funnels or the tips of their masts. The way those tiny packets were being treated reminded me of a cat torturing a mouse before she killed it. Up they'd come, shaking the water off like a terrier, and then plunge headlong into the next comber. With the aid of a glass I could see a mummy at the wheel, swathed in oilers on which the spray froze as it fell. I could imagine, as I learned later in many similar cases, that the blue nose of that mummy was tipped off by an icicle.

It was a fascinating picture and my heart thanked God for the stamina of these trawler men who have stuck it out and saved so many of us civilians from the death which the U-boats have wished upon us. And well have I cause to thank God for them, as some of them saved the "Tuscania" off the coast of Ireland the next day, as unarmed she staggered about in the delirium of a zizzag, trying to outmaneuver the German bent on her destruction. The tiny trawler guns sputtered and roared and found an echo in my heart. Although the following tale of the trapping of a U-boat is not the incident which occurred when I was on the "Tuscania," still it's about what happened then, as I learned later:

"Four trawlers got between the submarine and her merchant ship prey and their gun-fire forced the Hun to submerge, releasing a couple of mines as he did so. The trawler men called these mines "Fritz's Eggs" and ignored them. With dexterity they engaged the U-boat as it lay on the bottom, by means of cables which were tediously passed under it, until they had it snared like an animal. The German of course tried to free himself and released more mines, but it was to no avail.

"Now the trawler men had no love for Fritz for the lack of sportsmanship he had constantly exhibited, yet that was no reason why they in turn should not play the game of life and death fairly or be unnecessarily cruel. They hung on to him and let him fight to free himself from their net, and when he knew he was caught and could not get away they gave him ample time to come to the surface and save the lives of his crew. (This the German commander did, who was after the 'Tuscania.') A small can of T. N. T. was slipped on one of the taut wires which held him and allowed to slide down to the submarine's hull. A key was depressed and a gray, oily mound of water followed a muffled explosion. It was an awful death for human beings, yet they would have sent to their death women and children on passenger liners if they but had the chance."

Submarines by the score came out from Germany and never returned. Others sallied forth perplexed against a mystery, and these, too, never returned, or returned in mysteriously diminishing numbers. Day and night, summer and winter, till the American destroyers came into the game, the mystery had been the lines of innocent looking fishing smacks strung out from coast to coast across channel and Irish Sea, fishing for U-boats and sweeping for mines. And what Fritz has done to them, bringing his frightfulness to sea as he has exhibited it ashore, I'm afraid will never be duly appreciated. He has taken men on board the submarines with him and made them risk death at the hands of their friends. He has vented his senseless fury on unarmed fishing boats.

The case of the unarmed Granton trawler "Breadalbane" is a good example:

"She was quietly fishing one morning in June, 1917, when a submarine, without warning, opened a terrific fire on her. In a few minutes her funnel, engine-casing and bridge were smashed and a hail of shrapnel fell on the unfortunate crew, who rushed to the deckhouse and tried to protect themselves. They had no means of fighting back and the captain decided to haul down his flag as a sign of surrender. The only response to this was a yell of derision from the Huns and a few moments later they let the "Breadalbane" have another broadside. For ten minutes the U-boat fired shells all over the tiny ship, while her crew were making frantic efforts to get their life-boat launched. The captain's head was blown off by a shell and a moment later, as the engineer was about to climb over the side, he was blown in halves. The dazed survivors pulled away from the doomed ship, towards the German, thinking that they were to be taken prisoners, but the Hun shouted at them that if they came nearer he would blow them out of the water. Then he submerged, as a patrol boat, attracted by the firing, came on the scene."

Then there is the case of the tiny "Achilles Adam," which wasn't either fishing for food or for Fritz, simply crossing from France to England. A U-boat shelled her when she was well out to sea and at the fourth shot the "Adam" hove to. A rain of shells continued to fall about her as her crew endeavored to lower a lifeboat. One boat was struck and destroyed and a man killed and several more casualties occurred before the crew were finally afloat. Fritz ordered the boat alongside of him. Four Germans entered it and were rowed to the "Adam," which they destroyed with a bomb. Returning to the submarine, the Huns broke the lifeboat oars, destroyed the tin of biscuits and the keg of water that the crew had and set the crew adrift in a sea which was rapidly becoming nasty. With no oars or means of helping themselves, no food or water, no sail cloth to keep off the surface spray which the wind whipped along with the cut of a knife, the "Adam's" crew drifted about in the North Sea, all day and all night. Four men died of exposure and the injuries they had received and the others were on the point of collapse when rescued by a passing sailing ship.

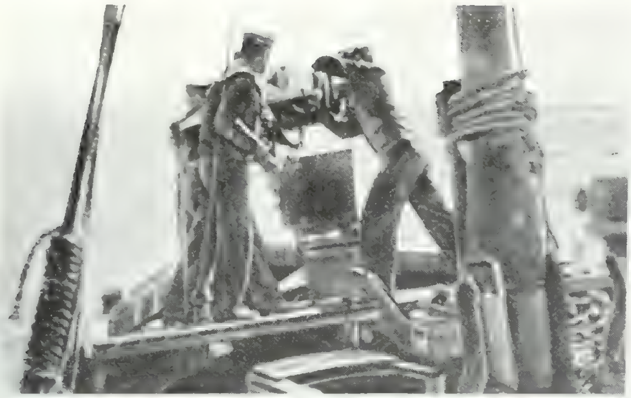
I have taken these incidents of the "Breadalbane" and the "Achilles Adam" from official records. If they show what the peaceful fishermen have had to experience from the senseless fury of an insane beast, it is not hard to imagine what their fellows in the naval reserve have had to experience, even to being tied to a stanchion on the deck of a submarine, saturated with kerosene and set on fire, as an article of mine in the Atlantic Monthly has shown.

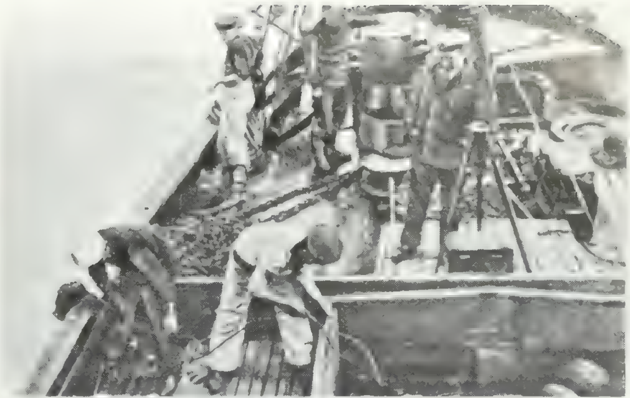
A typical drifter

Without these men of the trawling fleet and their brethren of the merchant marine, both in an out of the Naval Reserve, long ago Germany would have won the war. That's why she tries to terrorize them with her murderous acts. It is only by the untiring efforts of these men of the sea that the soldiers have gotten to the trenches and been kept supplied with munitions and food. These men are the eyes and ears of the navy; they've had more than their share of the burden and horror of war; they've done work which gold or honors cannot pay for and never have thought of themselves—only the great cause which to them, with the light of pure gold in their eyes which a gale of wind wouldn't blink—means the end of cruelty—the punishment of those responsible for the crucifying of little children.

As simple fishermen in times of peace the trawler men never would have kept the seas in the weather they've been out in the past four years. They are a type of men who is an individualist in the matter of personal freedom. "Hard old nuts," as the naval officers call them. Yet these simple fisherfolk realized immediately that the success of their work in the war depended entirely on their being moulded into a unit, and gladly underwent a training which was so monotonous and galling to the individualist.

Day and night the Hun has laid his eggs—for the bottoms of passenger ships and hospital ships


A drifter gun in action


Lowering U-boat nets over the side of a drifter

as well to strike; mines with cunning devices which kept them below the sweeping tackle for several days after being laid, making it necessary to sweep the same area daily to rid the seas of these horned devils of hell with which Germany has broken international law and the laws of God and common decency. There hasn't been a day but some trawler in the mine-sweeping fleet has been blown up. Yet there has always been another to take her place immediately.

Whenever there is a ship in distress the trawlers have somehow seemed to have appeared as if by magic. Though strange to the waters of the Mediterranean they've patrolled and fished for tinfishes and succored the wounded. Though in comparison to the liner they are about as big as a peanut, still they are right there with the goods, and if it hadn't been for them the "Arabia" might have been sunk without leaving a trace. One trawler rescued 166 of her passengers, mostly women and children, and though she was dangerously overloaded, yet in thirty-six hours she made Malta, after a trip which subjected her entire complement of human beings to intense misery.

A British drifter at work in the North Sea

The stuff these men are made of is well exemplified in the case of the "Nelson" and the "Violet-May."

The "Nelson" was a little dinky fishing smack commanded by Thos. Crisp, R. N. R., and his son, Thos. William Crisp, R.N.R., as second mate. In the House of Commons, Lloyd George, in illustrating how British fishermen have faced the perils of the war, said the father had been awarded the Victoria Cross and the son the Distinguished Service medal. The following official account of the action in which the "Nelson" was lost and the father died, giving orders up to the last minute, was kindly furnished me by Mrs. Theodore Roosevelt:

"On an August afternoon, at about a quarter to three, the trawl was shot from the smack "Nelson" and the smack was put on the port tack. The skipper was below packing fish; one hand was on deck cleaning fish for the next morning's breakfast, and then the skipper came on deck, saw an object on the horizon, examined it closely and sent for his glasses. Almost directly he sang out, 'Clear for action! Submarine!' And he had scarcely spoken when a shot fell a hundred yards away from the port bow. The motor man got to his motor, the deckhand dropped his fish and went to the ammunition room, the other hands at the skipper's orders 'Let go your gear,' let go the warp, put a dam on the ond of it. Meanwhile the gunlayer held his fire till the skipper said, 'It is no use waiting any longer, we will let them have it.'

"Away in the distance the submarine sent shell after shell at the smack, and about the fourth shot the shell went through the port bow just below the water line, and then the skipper shoved her around. There was no confusion on board, not even when the seventh shell struck the skipper, passed through his side, through the deck, and cut through the side of the ship. The second hand at once took charge of the tiller and the firing continued. All the time water was pouring into the ship and she was sinking.

"One man, the gunlayer, went to the skipper to see if he could render first aid, but it was obvious that he was mortally wounded. 'It's all right, boy, do your best,' said the skipper, and then, to the second hand, 'Send a message off.' This was the message: 'Nelson being attacked by submarine. Skipper killed. Send assistance at once.'

"And all this time the smack was sinking and only five rounds of ammunition were left, and the second hand went to the skipper lying there on deck and heard him say, 'Abandon ship. Throw books overboard.' He was asked then if they would lift him into the boat, but his answer was, 'Tom, I'm done, throw me overboard.' He was too badly injured to be moved and they left him there on his deck and took to the lifeboat, and about a quarter of an hour afterwards the 'Nelson' went down by the head.

"It was just drawing into dusk then and the crew of the boat pulled all night. Towards morn ing the wind freshened and blew them out of their course. They pulled all that day and had a pair of trousers and a large piece of oilskin fastened to two oars to attract attention. Once a vessel was sighted and once a group of mine-sweepers, but they passed out of sight. At night the weather became finer and through that night they pulled until daybreak, when at 10:30 a. m. they found a buoy and make fast to it. By afternoon they were sighted and rescued. The second hand, who took charge of the tiller after the skipper had been shot down, was his son, and so the great tradition goes on."

As for the case of the "Violet May," the following news item appeared in American newspapers last February. I give first the German version of the glorious battle and then the English:

"Berlin, Feb. 16, 1918.—On the night of February 14th our torpedo boats under the command of Capt. Heinecke made a surprise attack on strong forces guarding the English Channel between Calais and Dover on the north and Cape Gris-nex and Folkestone on the south. A large guardship, numerous armed fishing steamers and several motor vessels were forced to give battle, the largest part of them being destroyed. Our torpedo boats suffered no losses or damages. All returned."

Here is the English version:

"London, Feb. 15, 1918.—Eight British craft which were hunting submarines have been sunk by a flotilla of enemy destroyers, it is announced officially. After having sunk these vessels, seven of which were 'drifters' and one a trawler, the enemy destroyers returned rapidly northward before they could be engaged."

The weather was thick and the night very dark when the German destroyers made a raid on the tiny ex-fishing boats engaged in sweeping up Fritz's eggs and other delectable jobs which the Hun's barbaric warfare has created. The seven drifters were unarmed; the eighth, the trawler, referred to in the German report as "a large guardship", carried a single tiny gun on her forecastle. It was rough and the mine-sweeping tackle kept the "drifters" like a half-tide rock, never clear of the surging seas. Even if they had not been so handicapped, these tiny vessels had no chance of escape, once the German destroyers were amongst them.

As usual, the fishermen exhibited to the world the stuff they are made of. They had the same coolness and courage that their fellow mine-sweepers anywhere about the British Isles have shown in innumerable circumstances of danger and difficulty. The "Violet May", one of the unarmed drifters, was shelled at close quarters by two destroyers, whose heavy shells killed or wounded all the crew except two and set the "Violet May" on fire. These two—men of the engine-room force—Ewing and Noble, succeeded in launching a boat, and finding the mate and a deckhand still lived, though mortally wounded, lowered them into the boat and pulled off. The remainder of the crew, inextricably entangled in the blazing wreckage, lay dead. The two men paddled clear, waited till the enemy had passed on and then approached their little ship again. The fire had hold of her forward, steam was pouring from her wrecked engine-room and German shells were still bursting over her decks. "A doot, she's sinkin'," said Ewing stuotly. Noble said nothing; he was not given overmuch to speech, but he made the painter fast to the "Violet May" and proceeded to climb aboard again, followed by Ewing, and between them they fought and overcame the fire.

"Dinna leave me, Jamie," said the mate, piteously. "Dinna leave me in the little boat!"

"Na, Na," was the reply, "we'll na leave yet."

And presently they brought their wounded back on board and took them below again. The mate was laid on his bunk and Ewing fetched shirts from his bag and tore them up into bandages.

"An' them his dress shirts!" murmured Noble. It was his first and last contribution to the narrative.

They took turn and turn about to attend the wounded and plug the shot holes and quence the smouldering embers of the fire.

"'Tis nae guid," said the mate at last. "Dinna fash about me, lads—A'll gang nae mair on patrol," and so died.

But Ewing and Noble saved their little ship and she came into port to testify to the courage of the British fishermen in war.

Because courage and resource and determination are everywhere on the sea exhibited in the Naval Reserve or Merchant Service, a single glorious deed of two "drifter" men is nowhere elevated above the rest. One story differs from another, but in detail; the valor, not at all. All have done their duty with skill and devotion and all are heroes to whom the public has not as yet done justice.

It may be added that mine fishing is an art, about which it is useless for the curious to display any eagnerness, for till the end of the war the knowledge of how it is done is a closed book. For dealing with these submarines the fishermen have their own methods, sometimes more primitive and courageous than effective, as when the master of a sailing vessel. imagining himself a destroyer, tried to ram a U-boat. Yet one gunless trawler by persistent harassing pursuit so terrified a German commander, who was attacking a merchant ship, that he let his prey escape.

As one naval captain has put it, in speaking of the British fishermen:

"They're it—absolutely it. No weather's too bad for 'em. They're our eyes and our ears. They know every blessed wave in the channel, not merely as passing acquaintances, but they address 'em by their Christian name. They'll do anything and go anywhere and chance the luck. They're just simple fishermen, but they run the whole show and they run it magnificently—guns, semaphores, wireless, everything! They live on kippers and tea and I don't believe they ever go to sleep."

This opinion I have had expressed to me by many naval officers. If they who in times of peace are inclined to be elusive and superior, say these things of the fishermen, then further comment is unnecessary.

Planning Control—Applied to the Building of Duplicated Steel Vessels

By **D. V. Stratton,** Industrial Engineer

IN the days before the German submarine campaign had played havoc with the world's tonnage and thus created the greatest demand in history for the rapid production of steel vessels, single orders for more than two ships of the same design were the exception rather than the rule. Shipbuilding was then a "custom-made" business, requiring a high percentage of skilled tradesmen and executives who were familiar with the mechanical details of many types of vessels and the requirements of many classes of ocean trade.

During the last two years, however, a relatively few types of freighters have been adopted as standard (with minor variations in detail) and contracts have been placed with single yards for such numbers of certain ones of these types as would have kept whole shipbuilding districts busy and happy in the pre-war days.

Under the new order of things, the value of material and the cost of labor involved in single contracts, together with the imperative demand for speed of construction, has made it essential for shipbuilders to adopt every possible means and device for reducing unit costs and shortening the life of boats on the ways and at the outfitting wharf. Many improvements have been made in the design or capacity of shipyard machinery, some new and useful equipment has been invented, and a number of "quantity production" management methods have been adopted which have proven large factors in making the United States supreme in the manufacturing and industrial field.

One of the latter is the application to planning control of the activities of the shipyard. Formerly the time allowed for the completion of a ship was sufficiently long that delays in the travel of parts through the shops or assembly yard were not considered vital. In addition, most of the yards now working on large contracts have many more ways and hence are putting a much greater daily tonnage of material through their plants. Further, the great over-demand for shipbuilders, both tradesmen and supervisors, that has resulted from the sudden vast expansion of this business, has made it necessary to apply the expert knowledge possessed by the executive and technical staffs of an organization in such a manner as to properly direct and control the output of larger and collectively less skilled forces of workmen. The combination of increased volume of work in process and the decrease in percentage of highly skilled mechanics has added materially to the problems of the management in handling multitudes of details that go to make up the daily routine of the average large steel shipyard. It is only by the development of standardized designs and shop methods that high production can be maintained without large wastes of labor or material.

The executives of the Todd Dry Dock & Construction Corporation, of Tacoma, Washington, have been among the first to realize the need for and the possibilities of intensive planning control methods such as are employed in highly successful industrial plants. Due to their decision to make this rather radical departure from former shipyard methods and their courtesy in making public their experience in connection with the development and installation of precise planning control practice, this article is being published. It is hoped that other executives may gather some useful ideas from this description and feel free to publish their experiences in successful development work along management lines in the interest of the shipbuilding industry generally.

This planning scheme was developed as follows: Contracts for a certain number of duplicate vessels stipulated that final deliveries should be made within a specified time. From this basis the amount of time which could be allowed on the ways and for outfitting each boat was computed. Owing to the ultimate saving both in time and cost, it was planned to complete each vessel as far as practicable before launching. The standard production schedule, reproduced below and described in detail, is based upon this building policy.

This production schedule divides the vessel into its various component mechanical groups, listing them approximately in order as the work on the ways should progress. There are many points of erection detail upon which good shipbuilders differ, but in each case of this kind the question was thoroughly discussed with all concerned who were best informed and the course that was adopted as standard represents the concensus of their judgment. The time element is cared for by showing a number of months, by daily subdivisions, across the chart. The time of starting the erection of each group with relation to keel laying and the preceding connecting or limiting groups was agreed upon and the time required for the finishing up of each of these groups is represented by a brown line. The keel laying date was the point from which all times were figured, the time from this date to the end of the last erection lines (at which time the vessel is launched) is that necessary to meet contract requirements.

Working backward from starting erection of the various groups, the assembly work was carefully analyzed, with reference to time and methods, both in order to make the proper allotment of time on the chart for those groups which are handled through the assembly yard and also to determine whether cheaper, faster or better methods could not be devised. The time required for assembled groups was plotted in green, preceding the erection line for those groups.

Prior to the work in the assembly yard on assembled groups and to erection work upon those groups which are placed direct aboard the boat without assembly, the punch shop time was figured. This time was computed by matching the known weight of the groups as indicated in the third column of the chart against the available machine capacity. Special factors, such as anglesmith or slab work, were given consideration in order that ample allowance be made for the completion of such special material in the shop in time that there would be no delay in its subsequent use. The shop time line is plotted in blue, a broken blue line indicating the lead that is given furnaced work over the flat and straight work of the same group which will follow. In the event that material for a certain group is to be assembled, the shop work is started but a sufficient time ahead of beginning assembly that material will flow from the shop to the assembly yard as it is needed, thus eliminating the necessity for storage, with consequent needless rehandling and frequent misplacing of clips or other small parts.

Owing to the difficulty that has been experienced (particularly on the Pacific Coast) in securing deliveries of steel when needed and the necessity for knowing that new templets were being completed in the mold loft in ample time, or old ones were in a proper state of repair, a red line covering seven days previous to any shop operations was drawn.

Knowing the keel laying date of a boat in advance, this standard chart is transferred to a white print approximately three weeks before such date. A similar chart is made up for each vessel on the ways, each governed by its date of putting down the keel. The head of the planning control section each morning runs down the date line of the third day ahead and makes a note of the various operations upon groups that are indicated by the strating of lines of various colors:

Red: Steel stock and templets for group must be checked up.

Blue: Proper tonnage must be ordered into the punch shop.

Green: Assembly operation should start and be followed up.

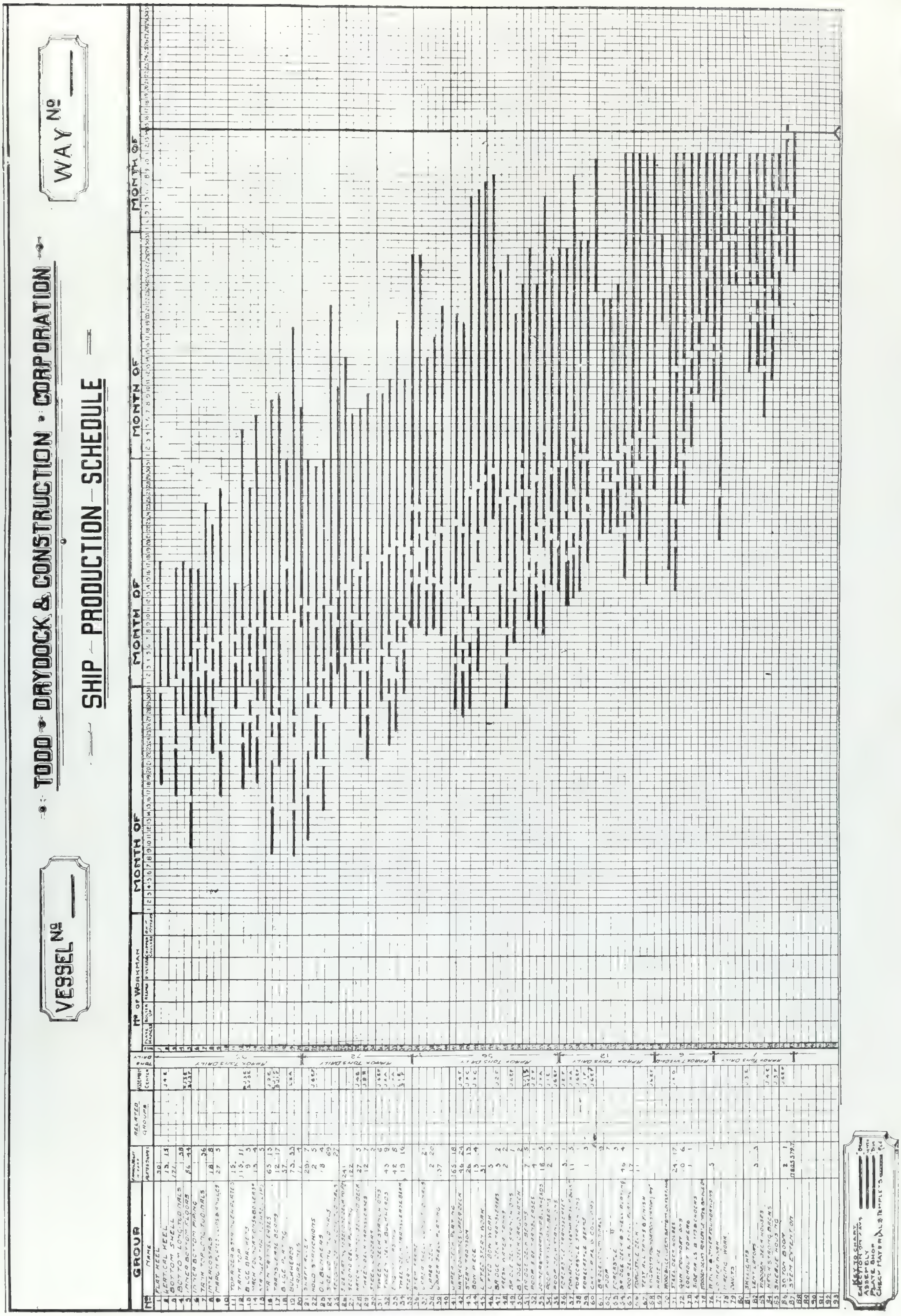
Brown: Erection on ways should begin.

On any given day, if one or more red lines begin, the mold loft or the templet storage is asked if all the templets for the groups in question will be ready for shop use one week from that date. The steel storage office is also questioned regarding steel available, so that emergency action may be taken toward rushing delivery of steel or substitutions made in the event that certain items of stocks are not on hand. This check-up one week before the material is required is in addition to the regular purchasing department tracing and follow-up. If both templets and steel are found to be on hand ready for use, a second red line is drawn just above the one on the schedule to show that they have been checked up and no delay will be experienced when shop work will be started. After a substantial set of templets is completed, the templet storage will be held responsible for the condition as well as the location of all molds; they should be inspected after use to see that any necessary repairs are made before reracking in order to avoid any hold-up when they are next sent to the laying out shop. In the event that either templets or steel for any group are not found to be available, the planning department should follow up such items daily until the matter is adjusted, when the duplicate red line is drawn above the schedule line. A satisfactory adjustment must be had within the week or shop work cannot be completed when material is ordered in.

Should any blue lines start upon that day, a shop order is made out covering the proper tonnage of steel for each of the groups thus indicated.

These orders are typewritten and show the individual or templet mark of each piece of material, its weight, the group number, the hull number, the bay or the shop in which the material is to be placed, the assembly center (if it is to be assembled) to which it is to be sent, and the name and number of the part or class of materials for the guidance of the erection department. The location in the storage rack for fabricated material ahead of the proper way is also shown in the last column. The original of this order is sent to the fabricating shop, and copies are sent to the steel yard office, the templet storage, the layout foreman, the assembly foreman, the fabrication material checker, and to the hull construction department. Each department is thus working from the same detailed written instructions—the steel department pulls the necessary material and places it where wanted in the layout section, the templets for this material are distributed at the same time and to the same locations, and the layout foreman then has only to see that the fitters clean up the day's work in a proper manner. The material then passes through the steel shop in the sequence shown upon the order and is moved either to the designated assembly center or fabricated steel storage rack. These orders are sent into the shop a day in advance in order that all concerned may have an opportunity to see what is coming and make necessary preparations. In order that the planning section may know promptly whether any delays have occurred and apply the proper remedy, and also to make the reporting of progress in each department a simple and accurate matter of routine, special copies of the orders, which are called "returns," are made up on a mimeograph, showing all information up to the point of the number of the vessel. Beyond this point the return sheets are ruled to suit the requirements of the particular department in order that the vital information regarding the activity of that department may be shown completely and easily and thus eliminate all duplication of reports.

Special attention is given to the matter of instructions regarding the routing of material and its physical handling throughout the plant, as the loss of certain pieces is one of the most common causes of delay to assembly and erection. Each location throughout the shops, storage yards and ways is designated by a distinguishing symbol. The material, therefore, is ordered from a known stock location, through a certain bay of the fabricating shop, to its specialized assembly center, which is rigged and organized for handling that particular class of work, and then into a specific storage section in front of the vessel for which it is intended. Wherever possible the material is taken direct from the shop or assembly yard aboard the hull to save duplicate handling. In order to facilitate the correct movement of material in process, all machining instructions are painted on each piece with white paint, the assembly center to which it is to go is painted by the fitters with yellow paint, and the proper storage location is noted in red figures surrounded by a circle. The fact that each production or storage center is plainly marked by a large sign-board bearing its symbol number, that each piece of material is marked with



This chart is drawn with colored lines as denoted in the key to chart, lower left corner of this page. By its use the foreman in any department can tell at a glance just at what stage of completion his work should be on any given date.—See page 108.

complete instructions for movement, and everyone concerned is supplied with a print showing the routing plan, makes the prompt and accurate execution of the instructions a relatively easy matter. In this connection special attention has been given to the development of transportation methods in order to reduce cost and to hasten the movement of material from operation to operation or from department to department. In these days of high labor cost and the scarcity of "bull gang" material, careful study of this problem is certain to net very handsome returns.

When the head of the planning department encounters the start of any green line in running down the chart on a given day, he makes inquiry to learn that the assembly operation on the group of material involved has actually started as per schedule. If it has a duplicate a green line is drawn over the space for the first day to record that fact. If not, an investigation of the cause of delay is made and the necessary steps taken to remove the obstacles to production.

When the beginning of a brown line is noted, an erection memorandum or order is sent to the hull construction department. Such notification in connection with the many operations upon the various vessels removes the necessity of foremen and supervisors constantly checking up the progress of work; if these schedule notifications are lived up to on the ways there will be no question about the launching dates finding the hulls at the proper stage of completion. The fact that all of the material involved has been ordered and checked through all preceding operations guarantee that there will be no delay due to missing parts.

Complete material lists have been prepared from the drawings in the order in which the ships are to be built. These lists are divided in accordance with the schedule groupings and form the basis for the daily shop orders. Spaces are provided for noting the order number and date upon which the various items are requisitioned for the shop, the date upon which they pass out of the punch shop, the date upon which assembly work is completed, the storage rack into which they are put, and, finally, the date upon which they go aboard the hull for erection. These are the important points in the progress of work through the plant; further detailed information at intermediate points can be quickly and easily secured from the "returns" from the various departments along the line. These returns are turned in each morning for the previous day's operations and are carefully checked to locate all production troubles in order that they may be remedied at once. After the "trouble man" has noted all delays, the returns are passed over to the record branch for entry of progress information in the production record books. These books consist of complete sets of material lists just described, properly bound.

In view of the fact that the bottom portion of the vessel requires a large percentage of the total weight of steel, and the tonnage bolted in place constantly decreases towards completion, the life of the hull on the ways is divided into ten-day periods and the average daily allotment of shop capacity made for each of these divisions. By stepping the keel laying of the various boats (and subsequent progress throughout erection) along at equal intervals, these varying tonnage requirements same figure at which the shop output is maintained.

As a positive means of keeping the various divisions of the plant in constant balance, a daily summary is made up, showing the tonnage ordered into the shop, the tonnage fabricated, the tonnage assembled (the percentage of total tonnage handled through the assembly yard being known), and the tonnage erected. Slight fluctuations from day to day are to be expected, but large differences or failures for a number of days in succession by any department to keep pace give an accurate and useful index of a condition which requires attention. In order to provide additional valuable information for the plant and general managers regarding the efficiency of the shop, the assembly and erection branches, the number of men in each, is shown in connection with the daily tonnage and the tons per man computed. Owing to the manner in which material is ordered into the shop to keep all classes or equipment constantly busy, without peak loads, and the regular intervals at which the erection of the vessels is started, these statistics are really comparable from day to day, and indicate with considerable precision any improvement or decline in the performance of the branches in question.

One of the interesting features of this planning control installation which really performs the function which its name indicates, is that the cost of operation of the department is less than is ordinarily spent in maintaining more or less valuable historical operating records. The main purpose of this work is to regulate, control and co-ordinate the activities of the plant according to a predetermined standard which will meet contract requirements; the records of performances are a by-product, but they are correct and up to date. Another interesting fact is that every department affected was directly benefited by the installation, and everyone throughout the plant has been enthusiastic and boosting the new work along from the start. This is a rather novel record in connection with the inauguration of precise control methods in any large plant.

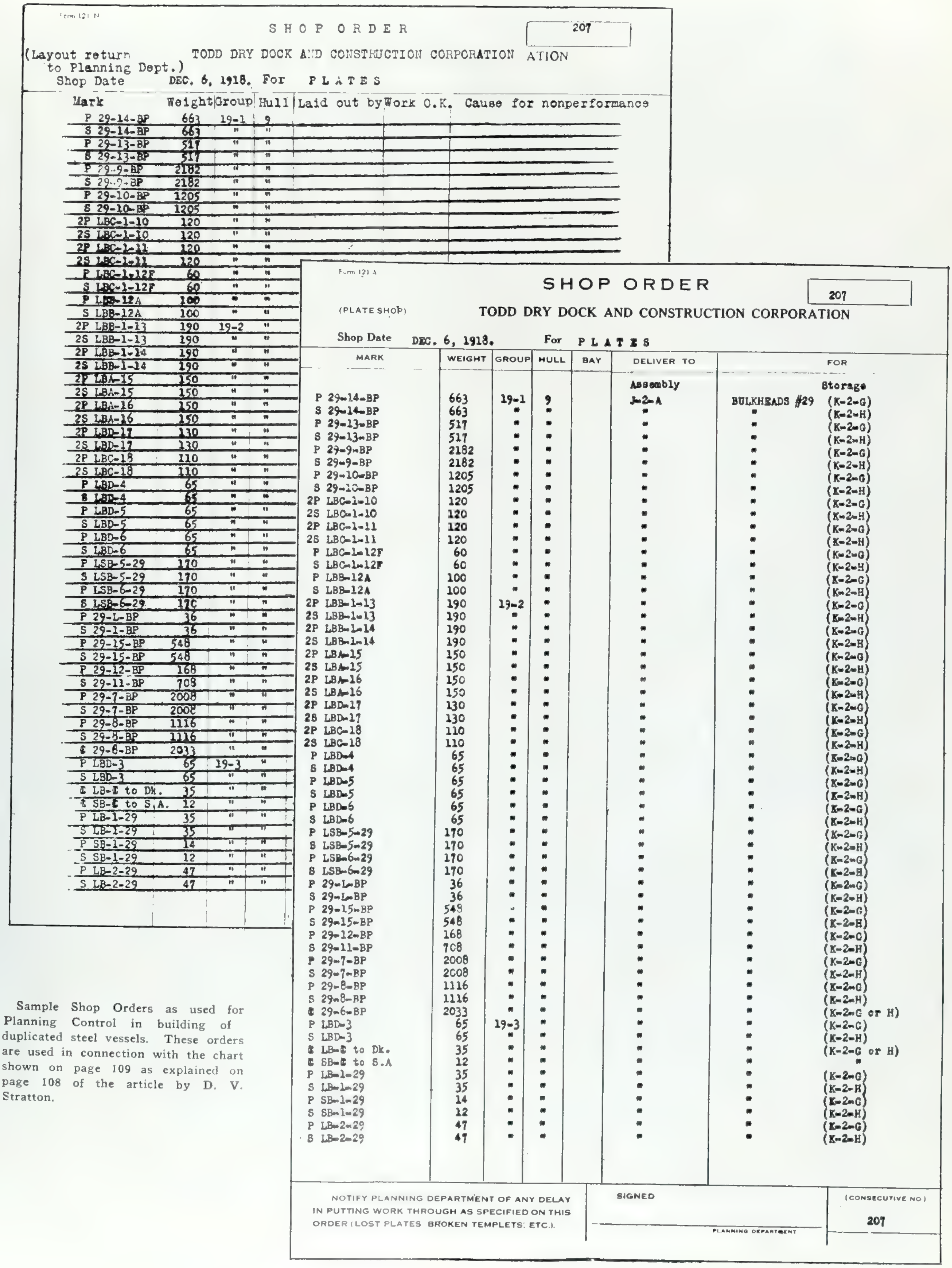
UNDERWATER SAW CUTS PILES FOR TWENTY-FIVE CENTS

A saw, which works under water, will save $7 each on 1,600 piles being driven in the ways extension at the G. M. Standifer steel yard, Vancouver, according to "Over the Top." The piles are to be cut off under water and capped.

The saw enables the piles to be cut and capped for 50 cents each. The price on the same kind of work on the Columbia and Willamette Rivers is $7.50 for each pile.

A 48-inch saw is fixed at the end of a 12-foot shaft and attached to a 25-horsepower motor, with which it makes 250 revolutions per minute under water. The whole is mounted on an overhead carriage, running parallel with the cut. Two rails, one on either side of the ways, carry the rig down the ways.

In all, the rig costs about $600. It costs about $50 to move it from way to way. There is nothing in the construction of the sawing outfit, not even the saw itself, which cannot be salvaged and used about the yard. The expense of the rig, moving the machine, and the sawing, at the outside, is 25 cents per pile, with an added 25 cents for capping each pile.



Form 121 N

SHOP ORDER 207

(Layout return to Planning Dept.) TODD DRY DOCK AND CONSTRUCTION CORPORATION ATION

Shop Date DEC. 6, 1918. For PLATES

Mark	Weight	Group	Hull	Laid out by	Work O.K.	Cause for nonperformance
P 29-14-BP	663	19-1	9			
S 29-14-BP	663	"	"			
P 29-13-BP	517	"	"			
S 29-13-BP	517	"	"			
P 29-9-BP	2182	"	"			
S 29-9-BP	2182	"	"			
P 29-10-BP	1205	"	"			
S 29-10-BP	1205	"	"			
2P LBC-1-10	120	"	"			
2S LBC-1-10	120	"	"			
2P LBC-1-11	120	"	"			
2S LBC-1-11	120	"	"			
P LBC-1-12F	60	"	"			
S LBC-1-12F	60	"	"			
P LBB-12A	100	"	"			
S LBB-12A	100	"	"			
2P LBB-1-13	190	19-2	"			
2S LBB-1-13	190	"	"			
2P LBB-1-14	190	"	"			
2S LBB-1-14	190	"	"			
2P LBA-15	150	"	"			
2S LBA-15	150	"	"			
2P LBA-16	150	"	"			
2S LBA-16	150	"	"			
2P LBD-17	130	"	"			
2S LBD-17	130	"	"			
2P LBC-18	110	"	"			
2S LBC-18	110	"	"			
P LBD-4	65	"	"			
S LBD-4	65	"	"			
P LBD-5	65	"	"			
S LBD-5	65	"	"			
P LBD-6	65	"	"			
S LBD-6	65	"	"			
P LSB-5-29	170	"	"			
S LSB-5-29	170	"	"			
P LSB-6-29	170	"	"			
S LSB-6-29	170	"	"			
P 29-L-BP	36	"	"			
S 29-1-BP	36	"	"			
P 29-15-BP	548	"	"			
S 29-15-BP	548	"	"			
P 29-12-BP	168	"	"			
S 29-11-BP	708	"	"			
P 29-7-BP	2008	"	"			
S 29-7-BP	2008	"	"			
P 29-8-BP	1116	"	"			
S 29-8-BP	1116	"	"			
℄ 29-6-BP	2033	"	"			
P LBD-3	65	19-3	"			
S LBD-3	65	"	"			
℄ LB-℄ to Dk.	35	"	"			
℄ SB-℄ to S.A.	12	"	"			
P LB-1-29	35	"	"			
S LB-1-29	35	"	"			
P SB-1-29	14	"	"			
S SB-1-29	12	"	"			
P LB-2-29	47	"	"			
S LB-2-29	47	"	"			

Form 121 A

SHOP ORDER 207

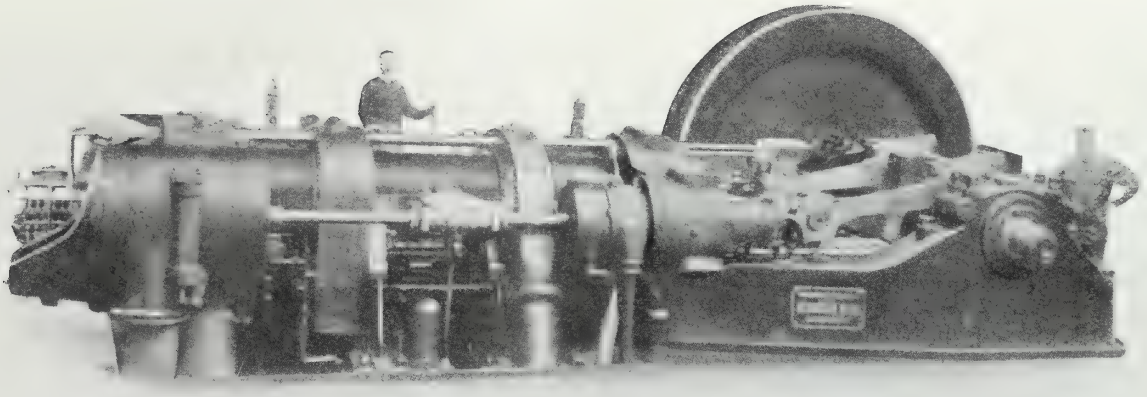
(PLATE SHOP) TODD DRY DOCK AND CONSTRUCTION CORPORATION

Shop Date DEC. 6, 1918. For PLATES

MARK	WEIGHT	GROUP	HULL	BAY	DELIVER TO	FOR	
					Assembly		Storage
P 29-14-BP	663	19-1	9		J-2-A	BULKHEADS #29	(K-2-G)
S 29-14-BP	663	"	"		"	"	(K-2-H)
P 29-13-BP	517	"	"		"	"	(K-2-G)
S 29-13-BP	517	"	"		"	"	(K-2-H)
P 29-9-BP	2182	"	"		"	"	(K-2-G)
S 29-9-BP	2182	"	"		"	"	(K-2-H)
P 29-10-BP	1205	"	"		"	"	(K-2-G)
S 29-10-BP	1205	"	"		"	"	(K-2-H)
2P LBC-1-10	120	"	"		"	"	(K-2-G)
2S LBC-1-10	120	"	"		"	"	(K-2-H)
2P LBC-1-11	120	"	"		"	"	(K-2-G)
2S LBC-1-11	120	"	"		"	"	(K-2-H)
P LBC-1-12F	60	"	"		"	"	(K-2-G)
S LBC-1-12F	60	"	"		"	"	(K-2-H)
P LBB-12A	100	"	"		"	"	(K-2-G)
S LBB-12A	100	"	"		"	"	(K-2-H)
2P LBB-1-13	190	19-2	"		"	"	(K-2-G)
2S LBB-1-13	190	"	"		"	"	(K-2-H)
2P LBB-1-14	190	"	"		"	"	(K-2-G)
2S LBB-1-14	190	"	"		"	"	(K-2-H)
2P LBA-15	150	"	"		"	"	(K-2-G)
2S LBA-15	150	"	"		"	"	(K-2-H)
2P LBA-16	150	"	"		"	"	(K-2-G)
2S LBA-16	150	"	"		"	"	(K-2-H)
2P LBD-17	130	"	"		"	"	(K-2-G)
2S LBD-17	130	"	"		"	"	(K-2-H)
2P LBC-18	110	"	"		"	"	(K-2-G)
2S LBC-18	110	"	"		"	"	(K-2-H)
P LBD-4	65	"	"		"	"	(K-2-G)
S LBD-4	65	"	"		"	"	(K-2-H)
P LBD-5	65	"	"		"	"	(K-2-G)
S LBD-5	65	"	"		"	"	(K-2-H)
P LBD-6	65	"	"		"	"	(K-2-G)
S LBD-6	65	"	"		"	"	(K-2-H)
P LSB-5-29	170	"	"		"	"	(K-2-G)
S LSB-5-29	170	"	"		"	"	(K-2-H)
P LSB-6-29	170	"	"		"	"	(K-2-G)
S LSB-6-29	170	"	"		"	"	(K-2-H)
P 29-L-BP	36	"	"		"	"	(K-2-G)
S 29-L-BP	36	"	"		"	"	(K-2-H)
P 29-15-BP	548	"	"		"	"	(K-2-G)
S 29-15-BP	548	"	"		"	"	(K-2-H)
P 29-12-BP	168	"	"		"	"	(K-2-G)
S 29-11-BP	708	"	"		"	"	(K-2-H)
P 29-7-BP	2008	"	"		"	"	(K-2-G)
S 29-7-BP	2008	"	"		"	"	(K-2-H)
P 29-8-BP	1116	"	"		"	"	(K-2-G)
S 29-8-BP	1116	"	"		"	"	(K-2-H)
℄ 29-6-BP	2033	"	"		"	"	(K-2-G or H)
P LBD-3	65	19-3	"		"	"	(K-2-G)
S LBD-3	65	"	"		"	"	(K-2-H)
℄ LB-℄ to Dk.	35	"	"		"	"	(K-2-G or H)
℄ SB-℄ to S.A	12	"	"		"	"	"
P LB-1-29	35	"	"		"	"	(K-2-G)
S LB-1-29	35	"	"		"	"	(K-2-H)
P SB-1-29	14	"	"		"	"	(K-2-G)
S SB-1-29	12	"	"		"	"	(K-2-H)
P LB-2-29	47	"	"		"	"	(K-2-G)
S LB-2-29	47	"	"		"	"	(K-2-H)

NOTIFY PLANNING DEPARTMENT OF ANY DELAY IN PUTTING WORK THROUGH AS SPECIFIED ON THIS ORDER (LOST PLATES BROKEN TEMPLETS: ETC.).	SIGNED PLANNING DEPARTMENT	(CONSECUTIVE NO.) 207

Sample Shop Orders as used for Planning Control in building of duplicated steel vessels. These orders are used in connection with the chart shown on page 109 as explained on page 108 of the article by D. V. Stratton.



Experimental 1000 H. P. two-cylinder tandem direct reversible Junkers Diesel engine

The Junkers Engine

By Philip Lane Scott

THIS article will be devoted to a description of this interesting type of Diesel engine. There is no restriction placed upon the discussion of German machines, and the writer is in a better position to talk about this engine than about other foreign types, because of personal experience in its construction and operation in Germany during 1915-1916.

Prof. Junkers, the originator of this type of Diesel engine, is perhaps best known as the maker of the calorimeter accepted for a long time as standard. He has devoted himself almost entirely to the study of heat.

In 1893 he began work on an engine having two pistons in one cylinder, to be run on gas. This was a year after Dr. Diesel began his experiments. The Oeschelhauser-Junkers gas engine was unsuccessful, because of the great difficulty in injecting the gas. As a result of the first experiments, Prof. Junkers conceived the idea of operating the engine on the Diesel cycle and using oil as a fuel. He devoted himself to a study of the thermodynamic troubles of the Diesel engine and a mechanical study of the double piston principle. Though both the double piston engine and the Diesel cycle were known, yet the combination of the two was unique and the result of sound scientific deduction. For the most efficient operation of the Diesel engine, high compression, with the attendant high temperatures and extreme heat flow, is necessary. Such compressions, temperatures and heat flow could not be controlled in the single piston engine, but were possible of restraint by the elimination of the cylinder head and valves, substituting a piston for the elements removed. The double piston pessessed the advantages of elimination of cylinder head and valves, perfect balance (even in a single cylinder), perfect operation on the two stroke cycle (because of good scavenging conditions), a long stroke to bore ratio, removal of stress from the frame (since the gas pressure is constrained between the two pistons instead of between piston and cylinder head), lower height for a given bore and stroke, and more flexible cylinder construction, reducing danger of cracking at high compressions. Against this must be charged an extra piston per cylinder, greater length per cylinder with single crank shaft construction, greater number of bearings on the crank shaft and moving parts of large size above the housing. The latter two points can be omitted when two propellers, and therefore two crank shafts, are possible.

The engine operates as follows: Referring to Fig. 1, the cylinder is assumed to be filled with fresh air from the previous scavenging period. The pistons approach each other, compressing the air between them (line F-A in the ideal card). At the end of compression (piston positions as in A) the fuel is injected and the combustion takes place without either a rise or fall in pressure (line A-B in the ideal card). During this period the pistons have moved about twelve per cent of their stroke. The expansion takes place (line B-C in the card) and the pistons reach the position shown in C. At this point one of the pistons opens a row of ports extending around the circumference of the cylinder, permitting the gases to exhaust almost to atmospheric pressure (line C-D in the card). At the point D (position of pistons D) the second piston opens another row of ports at the opposite end of the cylinder, permitting the scavenging air to enter under low pressure, drive the burnt gases out before it and fill the cylinder with a charge of fresh and cool air (line D-E-F in the card, piston position E). By this time the pistons have passed their outer dead center and have returned to the original position (F), ready for a repetition of the cycle.

It will be noted that, with this arrangement, better scavenging is possible than in a four cycle engine, since the clearance space of the latter engine is always filled with bad gases, whereas with two pistons the entire volume of burnt gases is driven out without any tendency toward eddying or mixing. It is impossible with the two-stroke cycle single-piston engine to secure good scavenging, which accounts for the fact that such engines deliver only 50 per cent more power than a four-stroke cycle engine of same bore and stroke. Theoretically, of course, the ratio is two to one in favor of the two-stroke cycle, since there are twice as many power impulses in a given number of revolutions. The double-piston engine attains this ratio because of perfect scavenging.

In the sixteen years of experimental work preceding the building of the first of these engines, much time was devoted to the study of the transfer of heat from a gas to and through a metal wall.

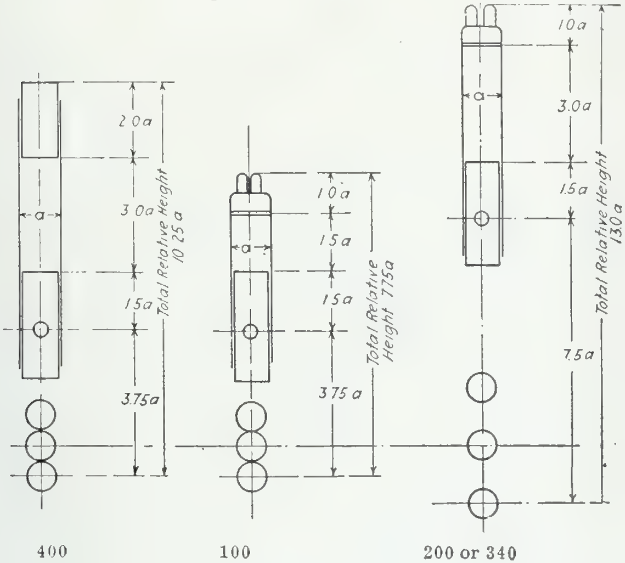
There are four factors affecting this transfer—temperature, pressure, eddying, and the character of the metal surface.

Eddying or motion in the gas itself is one of the most important. By the use of two pistons the eddying factor is greatly reduced. Entrance and exit of gases through valves in the cylinder head, or deflection against baffle plates, sets up heavy initial whirling.

The character of the metal surfaces, so far as Diesel engines are concerned, may be neglected, since machined cast-iron is universally used.

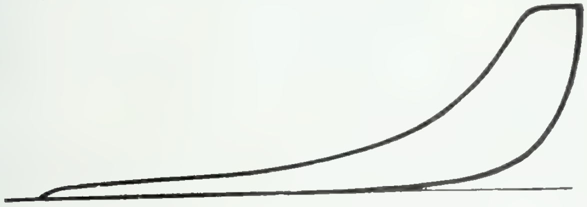
High pressures and temperatures are essential and may be placed at a par for all types.

The previous considerations assumed equal areas of metal wall exposed to the gases. The greatest possibility of saving consists in reducing the surface of the combustion space, and here the double-piston construction has a great advantage. It is during the period when the temperature, pressure and eddying are at the maximum that heat energy must be saved and not toward the end of the stroke shortly before exhaust takes place.



2.0a
3.0a
1.5a
3.75a
a
Total Relative Height 10.25 a
1.0a
1.5a
1.5a
3.75 a
a
Total Relative Height 7.75a
1.0a
3.0a
1.5a
7.5a
a
Total Relative Height 13.0 a
400
100
200 or 340

Relative engine heights and outputs



Characteristic indicator card from Junkers engine

The piston may generally be considered as a poor absorber of heat, since it is either uncooled or only slightly cooled, but the cylinder wall and particularly the cylinder head are responsible for the transfer of almost 35 per cent of the total available heat energy of the fuel to the cooling water. But the double-piston construction permits the elimination of the cylinder head, substituting a poor heat absorber, and, with a large stroke to bore ratio, a considerable reduction of the wall surface as compared with the enclosed volume. Heat is work, and 35 per cent of the heat lost is 35 per cent of the brake horsepower gone. This point is therefore highly important.

Two of the greatest difficulties with the Diesel engines were the cracking of the Cylinder heads and liners. Prof. Junkers, having got rid of the head, had only the liner to consider. High pressure and temperatures are necessary, not only for efficient operation, but particularly for the use of low-grade fuels.

The liner performs two functions in respect to the gases. It restrains the pressures and retains as much heat in the gases as possible. It is not the pressure that causes breakage, but the heat flow. The thicker the cylinder wall the greater the stress induced by the heat flow, but the higher the pressure or the greater the cylinder diameter the thicker must be the wall to stand the total pressure. Therefore, with ordinary construction, the pressure or the cylinder diameter which can be used is limited, and even with low pressures the cylinder diameter is restricted to that point at which the liner is thick enough to carry the load and still not too thick to crack under the temperature stresses induced by the intense heat flow. It must be remembered that the energy transformation in a Diesel engine takes place in a space about one two-hundredth part of that occupied by a steam boiler of equal capacity. Professor Junkers divided these two functions between two different members. In his construction the liner proper is always made thin enough to avoid cracking from the heat flow. Around the liner is shrunk a steel

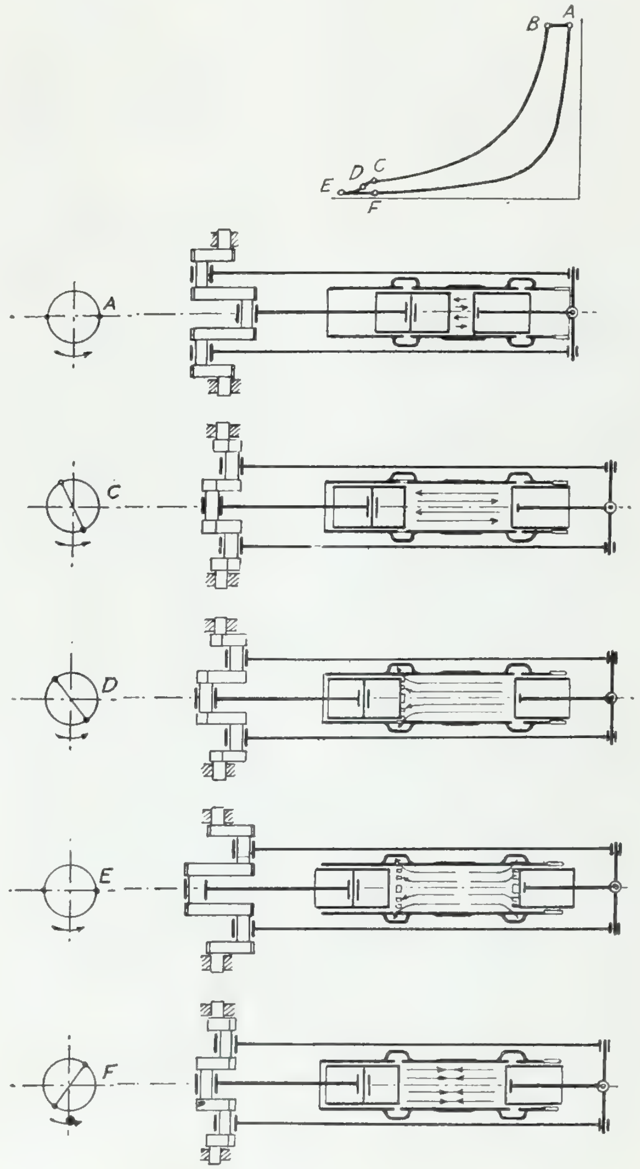


Fig. 1

jacket, ribbed on the inside to permit the circulation of water. This member carries the gas pressure. This makes unlimited pressures and diameters possible. Further the cylinder for a double piston engine is nothing more than a tube, free at both ends to expand or contract. This removes longitudinal strains from this member. Unfortunately this liner and jacket construction is inapplicable to the single piston engine, because it cannot be applied to the cylinder head, a much more complicated and difficult member to construct for high pressures and heat flow. As a practical example of the success of this construction, maximum pressures of 1,278 lbs. per square inch were carried in such a cylinder during continuous runs, with attendant mean effective pressures of 213 lbs. per square inch. The engine on which this was accomplished develops 1,000 horse power in two cylinders each about 17 inches by 34 inches (450 by 900 mm) at 180 r. p. m. The excellent thermal conditions made possible a fuel consumption of 0.36 lbs. brake horse power hour, the heating value of the oil was 10,080 cal/kg. (18,144 T. U./lb.).

The lower height of such an engine, compared to a single piston engine, assuming same bore, stroke and revolutions per minute, is due to the fact that the stroke is divided between two pistons. The crank throw is therefore cut in half and the connecting rod will be half as long. This reduction in the connecting rod more than compensates for the extra piston on top. The average reduction in height is about 20 per cent.

This engine is probably the most interesting Diesel development. A few of them have been built in this country, but, unfortunately for us, the greatest development of the engine has taken place in Germany since the war began and there has not been sufficient technical information available here to make the construction commercially successful.

European Marine Notes

Exclusive Correspondence of Pacific Marine Review

WITH the remarkable change which has come over the aspect of affairs on the battle fronts during the last few months, I find that British shipowners are beginning to look pretty closely into their own prospects after the war. I understand that a series of conferences are being arranged between the industry and the Government respecting the status of the British mercantile marine when the war is over. The boards of the companies will submit, I am told, that the matter is one of extreme urgency owing to their inability, with any degree of certainty, to enter into contracts until the policy of the Government is known. They will claim that an undertaking should be given to free the mercantile marine from all Government control at the earliest possible minute after peace is signed.

Associated with this opinion there come a number of rumors and some statements of fact with regard to current Government intentions. For example, a good deal has been heard lately of a far-reaching Government plan for the absorption of a number of the leading shipping undertakings, and the upward movement in the securities of the companies supposed to be chiefly concerned, which has been proceeding for some time, has made further progress. Whether the authorities have such a scheme in contemplation it is impossible to say, but it would seem that the rise in prices stands in greater need of justification than after-war prospects. For the moment the companies seem mainly concerned with the question of the return of their ships at the earliest moment, but a phrase in a letter which Lord Inchcape has written on this question of Government control was thought to foreshadow new business arrangements among the companies at a later date, more especially in view of the report that the British interests involved in the International Mercantile Marine would return to their original status as purely British concerns.

Further news has been recently circulated to the effect that the Ministry of Shipping is prepared to sell some of its standard ships. It has been known for some time that the authorities were of a mind to dispose of a limited number of vessels in this way, and shipping interests did not seek to deny that from the Ministry's point of view there was a good deal to be said for the proposed proceeding. Shipowners necessarily view the matter from a different angle. The vessels are not the most suitable that could have been evolved for normal trade, and their first cost has been far from low. Moreover, the fact that the use of the vessels during the war emergency is not to be affected by the sales, raises a question of considerable importance to buyers. Still, private shipping interests are in great need of tonnage, and with nothing better than these standard ships available, or likely to be available for some time to come, the responses to the Ministry's invitation to offer may easily be fuller than the whole of the circumstances seem to justify.

Model Fabricated Ship

The first of the national fabricated ships, designed by a committee of shipbuilders, and recently launched by Swan, Hunter & Richardson (Ltd.), is 411 feet 6 inches long, 55 feet 5½ inches broad, 38 feet 1½ inches deep, with a deadweight carrying capacity of 10,500 tons on a draught of 28 feet 3 inches. She is now being fitted with ordinary triple expansion engines, and will have three boilers, each 15 feet 6 inches by 11 feet 6 inches.

She is the pattern for ten others to be fabricated with the aid of bridge-building works, and from her all moulds and templates have been supplied to the bridge-builders for reproduction of the fabricated parts ready for erection in national and other yards. To use the available plant and labor of bridge-builders demanded the simplification of structure and form. As bridge-builders are unable to deal with curved surfaces, a "straight-line" form was evolved. There is not a single bent frame in the ship, and all the plating, except at the fore and after ends, is straight. Thus the bending of frames is rendered unnecessary, and the rolling of plates for "twist" and form appreciably reduced. The duplicated parts will greatly facilitate the building of sister ships. The hull was constructed in five months, in spite of delay due to influenza and annual holidays.

None of the material in this first ship is from the bridge-builders, but now they will come rapidly into production. The material can be accumulated as desired, and construction will proceed more speedily than ever before. The multiple punching machine was used to a greater extent in this vessel than hitherto, and was very successful. All the spacing of the rivets was carefully worked out, so that plans and wood templates could be made and sent to the bridge-building firms, without delay, for reproduction. The broad principle of the design has been worked out so successfully that the pattern is likely to stand.

Concrete Barges

The race for the honor of launching the first 1,000-ton seagoing concrete barge built in this country was won by the Poole Shipyard, which launched its first vessel on August 24th. Next in the series came two other launches on September 21st, when two of these reinforced concrete barges were launched, one at Barrow and the other at Barnstaple. Launches have taken place since at Gloucester and Greenock and others are to take place regularly. All these vessels, with the exception of the one first launched at Poole, form the first instalment of a fleet of eighty-six barges and steam tugs to be constructed in different parts of the country on the Moichel-Hennebique system of ferro-concrete, and in accordance with the general plans and specifications of the Controller-General of Merchant Shipbuilding.

The barges launched at Barnstaple and Barrow are 187 feet 6 inches long by 31 foot 6 inch beam by 20 feet 9 inches deep, and contain three holds for cargo, in addition to adequate accommodation for the captain, crew, machinery and stores. The barge launched at Barrow was the first of ten concrete barges now building for the department of the Controller-General of Merchant Shipbuilding by the Ferro-Concrete Ship Construction Company. The yard, which started late last year, has already on hand or in construction ten barges, as well as a cargo steamer for private owners, the latter vessel being the largest of this kind of craft building in this country. Mr. Staples, Admiralty representative, stated at the proceedings after the launch that he had found no jealousy among the many firms engaged in the construction of these vessels. All were working together with fine spirit for the benefit of the nation, and he believed the industry would be very successful after the war.

The launch at Barnstaple fittingly commemorated the revival of the shipbuilding industry which was carried on for many centuries in that seaport. The site near the mouth of the River Taw of the new concrete shipyard established this year by the British Construction Company of Westminster (London), was occupied from the time of the Spanish Armada down to the middle of last century by a wood shipyard owned by successive generations of the family from which is descended Percy Westacott, the head of the company engaged in the present undertaking. After the closing of the former yard, the site became a grass-grown waste, and remained so until last March, when it was rapidly covered by workshops, storehouses and other buildings, storage yards for timber, steel and other materials, and a range of slipways for the building of seven vessels at a time. The yard has a water front of 1,000 feet and a wharf 300 feet long for fitting out the vessels after launching. Some 357 men are employed in the yard, and, having in mind the statement which has recently been attributed to Lord Pirrie regarding the proportion of skilled labor required in concrete shipbuilding, it is interesting to know that there is not a shipworker of any kind at the yard who has ever worked in a steel shipyard, that the carpenters engaged in erecting shuttering have all been drawn from the building trades, that the men engaged in fixing the reinforcing bars are mainly watchmakers and jewelers, and that all the remaining labor is unskilled. It is evident, therefore, that the establishment does not interfere in any way with the supply of skilled labor to steel shipyards.

In every way the behavior of the vessel was satisfactory, the severe strains necessarily accompanying the launch having been resisted in a manner that left absolutely nothing to be desired. The time occupied in preparing the vessel for launching—namely, four months—was a "record," and the builders will establish another unprecedented performance by having the keel of a second vessel laid within 48 hours of the launching of the first.

A United Kingdom Shipbuilding Point

A point made by Lord Pirrie in describing the work of his department was that if it had not been necessary to go on with certain oil-tankers, meat-carrying vessels, and passenger boats, representing about 724,000 tons gross, the United Kingdom's shipyards could have produced another quarter of a million tons of ordinary cargo vessels this year. Such an addition to the output would have been from almost every point of view highly satisfactory. Still, there is a point of view from which the activity on other mercantile work than cargo vessels may not unnaturally be regarded as fairly satisfactory. The countries which have most strongly developed their shipbuilding industries since the outbreak of war are not yet turning out any special types, except perhaps tankers. The British industry is therefore still to the good in respect of the character of its work, although its output leaves something to be desired.

German Shipping in the War

Some very interesting information reaches me about the German mercantile marine and how it has fared in the war. Its total tonnage on January 1st, 1914, was 5,459,296. Its losses during the war were 2,900,000 tons. The amount of shipping in German ports is 1,559,296 tons, and in neutral ports 674,333 tons, making a total of 2,233,629 tons. The amount of new tonnage launched by Germany during the war was 950,000. The maximum total of Germany's merchant shipping which may be available after the war is thus 3,183,629 tons, showing a deficit as against the pre-war tonnage of 2,275,667 tons. The vessels under construction or on order include the big Hamburg-American liner Bismarck, of 56,000 tons; another big liner of 32,000 tons, and three others, each of 22,000 tons. The Hamburg-American cargo boats include four, each of 18,000 tons, and two, each of 13,000 tons. The Norddeutsche-Lloyd have two passenger boats, each of 35,000 tons, and two others, each of 16,000 tons.

A Composite System of Reinforced Concrete Ship Construction

By A. S. Holmes

AFTER preparation of various designs in co-operation with owners and in consultation with naval architects, we have developed a composite type of hull construction, eliminating entirely the concrete shell while retaining the advantages of a reinforced concrete frame. In general, by careful disposition of timber, concrete and reinforcing metal, a composite ship has been developed wherein each material is utilized to its greatest structural advantage, resulting in a vessel of known structural strength and assured longevity, while at the same time possessing all the advantages relative to the labor and material situation with which the conventional type of concrete ship may be justly credited.

As indicated by the accompanying general plans, the vessel consists primarily of a longitudinal reinforced concrete truss extending the full length of the ship, the end posts of the truss forming the stem and stern posts of the vessel. The truss is proportioned to resist all stresses due to hogging and sagging, as well as all shearing stress. The keel is formed by the bottom cord of the truss, into which member the concrete frames. The bilge and intermediate keelsons are constructed so as to form a monolithic framework. The frames are continuous, and form the deck beams supporting the reinforced concrete deck slabs. Longitudinal web members are located between frames and additional diagonals placed at points of maximum shear. The concrete frame is planked with timber, bolted through and held in place by the timber ceiling. The ceiling is supported by flanges cast at the time of constructing the frames. It will be readily observed that this planking can be repaired when necessary at very small cost and without damage to any portion of the concrete frame. Water-tight joints are assured, as the frame is so designed as to relieve the outer shell of all stresses ordinarily tending to open the seams. The function of the planking being mainly to resist the impact and static pressures developed by the water and cargo.

In comparison with the all-concrete type of vessel, a portion of the reinforcing steel in the outside shell of the latter is utilized in fabrication of the center truss in such a way that every pound of metal has a structural value.

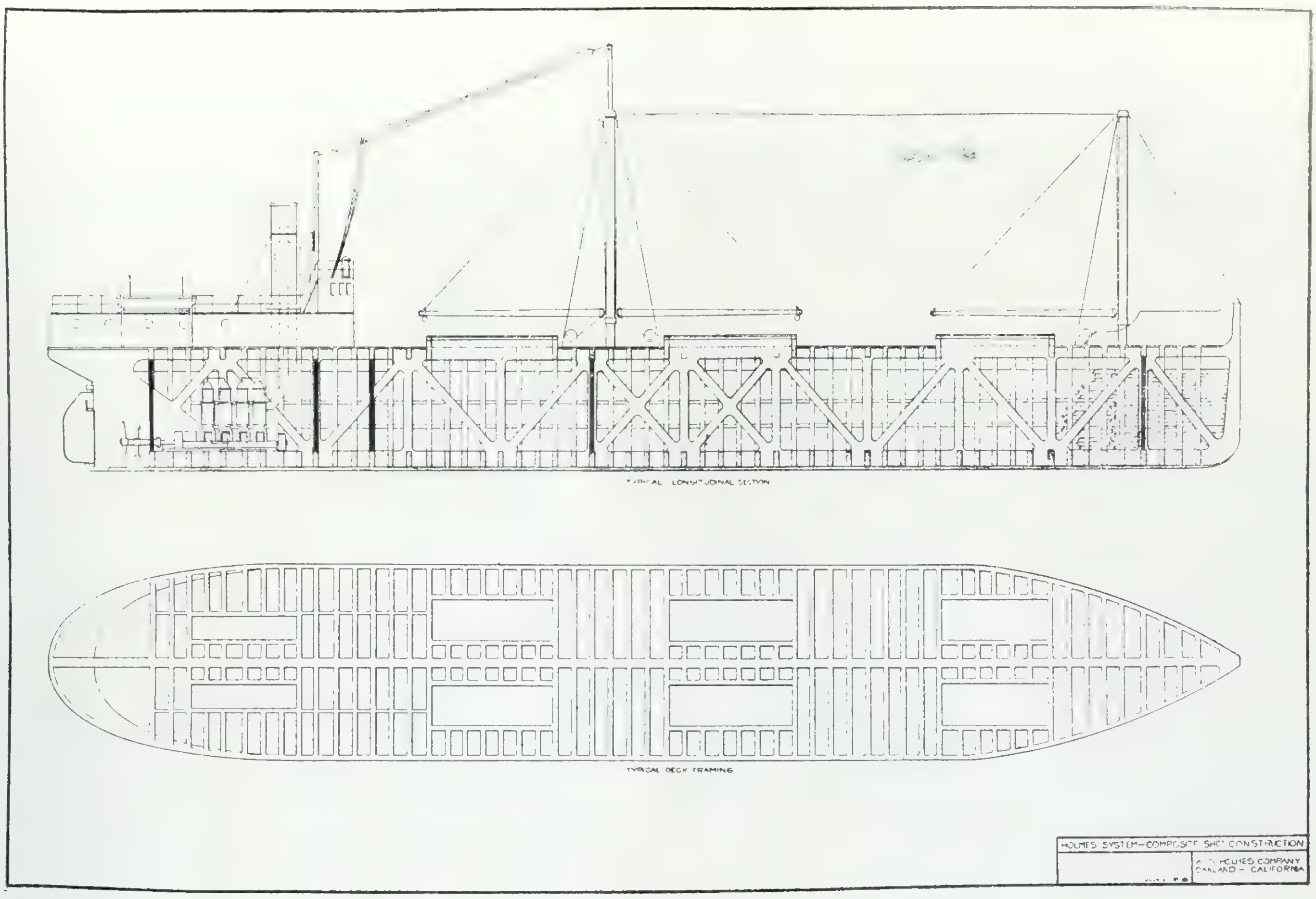
The longitudinal truss is so located as to offer greatest resistance to tendencies of deformation coincident with actual service conditions. The tendency of vertical elongation is amply provided for and the stress due to deck loads and the sudden impact stress resulting when heavy seas are shipped, are opposed in a most efficient manner. These strains have frequently caused considerable sinkage of the deck and ruptured riveted connections and hold stanchions. Transverse strains developed by wave action and inertia of cargo in the hold, tending to produce distortion, are resisted by the rigid monolithic construction of the floors, frames, transverse bulkheads and center truss. A further advantage of the longitudinal truss is the resulant ability of the hull to resist local bulging tendencies and longitudinal bending moments, created by the inequalities of the weight and buoyancy ratio. This latter difference, afforded by the buoyant effect of the water, is frequently of considerable magnitude during pitching movements, and the advantages of the efficient longitudinal truss, the strength of which is maintained from stem to stern, are most obvious. The severity of all local stresses are minimized, as they are distributed over the entire structure. It will be noted that this longitudinal rigidity is not disturbed by the existence of the hatches.

The skeleton of the vessel represents an absolutely rigid frame of reinforced concrete, the members of which are not exposed to the action of the sea water and are such size as to enable all reinforcing metal to be properly placed and maintained in position during construction. Another advantage gained by constructing of concrete—only such members as are sufficient in size for practical construction—is the ability of using aggregate of proper size to produce concrete of the greatest compressive strength and density, and with the assurance that every pound of reinforcing steel has sufficient effective bond to develop its maximum allowable working stress. Both these latter conditions are impossible of attainment when the outer shell of vessel is composed of a thin concrete slab.

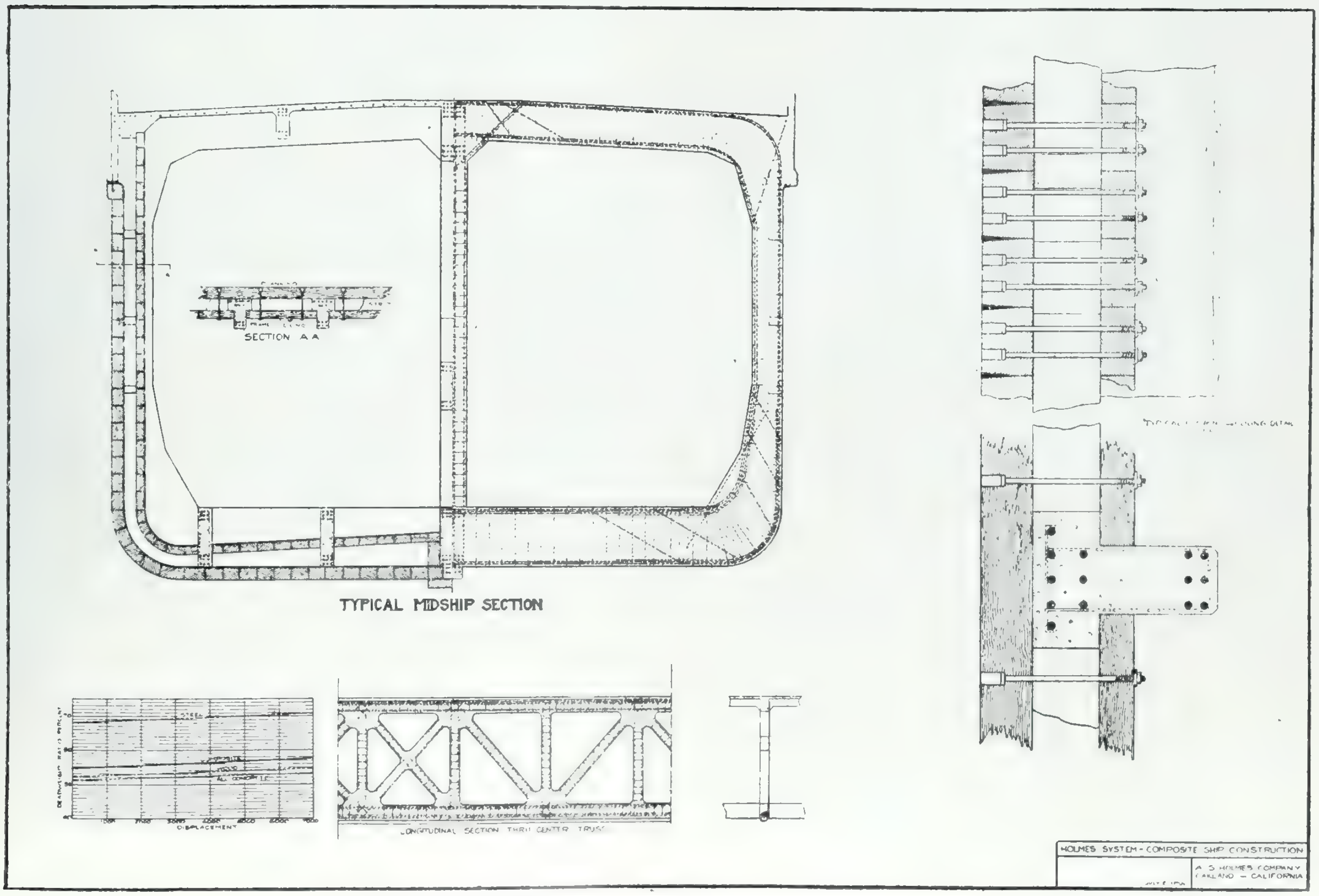
A vessel with a concrete outer shell must remain on the ways a considerable period of time before launching; any attempt to launch the vessel before the outer shell has obtained a thorough and final set is simply to invite and hasten disintegration by salt water. The composite type of hull described may be launched immediately after completion, as by the time the timber planking and ceiling are placed the concrete frame has attained its full strength and inherent stability.

The composite type of hull can be constructed in much shorter time than the ordinary concrete vessel, as the matter of fabricating and constructing the frame members is an operation of considerable ease as compared with the tedious and costly construction of the outer concrete shell. The lighter timber planking and ceiling results in a higher center of gravity with a corresponding less metacentric height, which latter has been found somewhat difficult to properly obtain with an all-concrete structure, the tendency being to exceed the height considered proper for a cargo-carrying vessel.

In our investigations it has been found that a vessel of the type described can be economically designed under all the usual assumptions and with limitations as to unit working stresses imposed by first-class practice, for deadweight carrying capacities of from 1000 to 4000 tons, with an average ratio of deadweight to full load displacement of 56 to 100. It is evident, after consideration of the many details involved, that the composite type of hull construction described herein represents a structure in which all materials involved are utilized to the greatest advantage of their inherent structural properties, in which every pound of material is effective and which will assure the owner of lasting service with a minimum upkeep and maintenance expense.

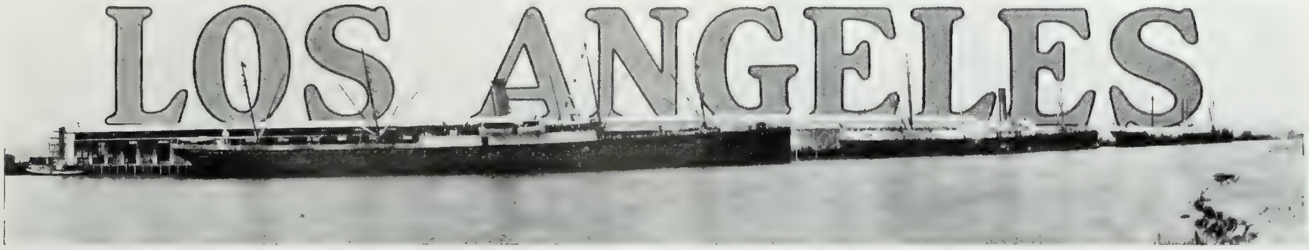

TYPICAL LONGITUDINAL SECTION
TYPICAL DECK FRAMING
HOLMES SYSTEM—COMPOSITE SHIP CONSTRUCTION
A. S. HOLMES COMPANY
OAKLAND — CALIFORNIA

Longitudinal section and deck plan of Holmes System Composite Ship Construction



Structural details of Holmes System Composite Ship Construction

LOS ANGELES



By Special Correspondent

Some five hundred employes of the Los Angeles Shipbuilding & Drydock Company in the last month made a record when they erected a Y. M. C. A. school building for the use of the employes of the company in one day. The lumber for the structure had been assembled in the week, and one Sunday the men reported for work immediately following the launching of the steamer "West Conob" from the yards of the company. L. N. McMackin, shipwright of the company, had planned the work. He had assembled the gangs of workmen and over each twenty had placed a foreman. The workmen were formed into two general divisions, one for the purpose of transforming the raw material (the lumber) into the necessary lengths and forms, and the second division to erect the building.

Shipwrights were turned into house carpenters, ship painters became house painters, ship's electricians became house electricians, and in this manner through the entire personnel of the yards, the crews were selected.

Steel workers were formed into labor gangs and kept the wood workers supplied with material. Joiners from the yards made the window frames and carried them to men on the scaffolds who placed them in position. The carpenters on the scaffold were followed immediately by the painters. Carpenters assembled the roof trusses on the ground. The labor gang carried them to the building and hoisted them in place, where the carpenters, working on the ceiling rafters, made them fast. The entire work had been systematized. There was hurry and there was rush in the work, but there was no confusion.

At noon the men enjoyed a dinner at a near-by restaurant. Arrangements for the dinner had been made by the Los Angeles Y. M. C. A. and prominent men of that organization attended the dinner. There were a few speeches, all short, and then the crowd returned to the lot and resumed work.

The construction of the building was the more remarkable in that it is a large one. Its dimensions are 60 x 115 feet. It contains eight classrooms. All are finished in good taste and there is every convenience. One portion of the building has been reserved for the studies of the women workers. The building cost $5,000.

The need of such a structure has been evident for several months. Late in the fall many employes of the yards requested aid of the school authorities in providing them with accommodations where they could study and advance in their work. A school building was turned over to the shipyard workers. It was found too small, and then a request was made of the Y. M. C. A. for a building. The Y. M. C. A. made the necessary financial arrangements and, when so doing, the men promised to furnish the labor for the structure.

George Greenwood, one of the first men to come here as an officer in the yards of the Los Angeles Shipbuilding Company, is no longer connected with the company. He has been succeeded by W. G. Lind. The change was made at the direction of Thomas Allan, who recently succeeded Fred Gardner as superintendent of the yard.

Better protection of shipping here is assured with the commission of the new fire tug "Chief A. J Eley." This name was selected for the fire tug by the fire commission on the suggestion of San Pedro business men. The boat will be one of the most modern on the coast, and will be of comparatively light draft so that it may reach all parts of the harbor.

Customs Collector L. C. Pardee has issued an announcement that the regulations prohibiting the taking of pictures on the water front have not been lifted. The harbor patrol boat was taken from its moorings at the entrance to the outer harbor recently and other naval regulations lifted owing to the cessation of hostilities.

Plans for the active co-operation of the banks of San Pedro, Wilmington and Long Beach in caring for import and export business at the local harbor were laid before a meeting of bankers of the community held in Long Beach. A committee was appointed to gather data on financing such business. Many of the local bankers expressed themselves as unfamiliar with the transactions necessary, but intended reaching after the business. The movement was one begun by the Allied Chambers of Commerce of the harbor district in order to keep more of the financial end of shipping at the harbor without importers and exporters being compelled to go to Los Angeles for adequate banking facilities. The movement is one of several which local business men have started for the purpose of attracting foreign trade.

Three freight steamers sailed from the local port in the last month for South America. They were Shipping Board steamers diverted here when the board learned that there was sufficient cargo for the vessels. They were loaded with cement at the Outer Harbor Dock & Wharf Company. The vessels were the "Bonnofon," "Mahaska," and the "Wishka." Some 6,000 tons of cement were taken on board the three vessels. Cement is one of the articles of export which Southern California manufacturers have found a market for in Latin America since Germany began the world war. Formerly the greater portion of their cement was procured from Germany and in German bottoms. This trade now has been diverted to Southern California.

Tacoma News Notes

By Special Correspondent

THAT he was highly satisfied with the work as carried out at the plant so far, was the declaration of President W. H. Todd of the Todd Shipbuilding Company, who was in Tacoma recently on a regular trip of inspection of his Puget Sound plants.

Since President Todd was here in July there have been some wonderful changes worked out in the Todd Drydock & Construction Corporation plant here in the way of additions which were authorized last summer. The foundry, boiler shop, hotel and other units are now in ship-shape and work is being carried on in these departments. The keel blocks are down for three scout cruisers to be erected here, and it is expected that the keels on one will be laid within the next few days. While details are not given out, it is said that these vessels will be 580 feet in length.

Launching of S. S. "Jacona"

President H. F. Alexander of the Pacific Steamship Company left the first of the month for California, to be gone ten days. The business situation in regard to the work of the Pacific Steamship Company will be gone over by President Alexander while in the south.

Flour shipments from Tacoma continue good with the setting in of the fall business. There has been a number of cargoes out from here, including business that is going on the French vessels constructed here by the Foundation yards for the French government. One of the last large lots to go was in the West Cape, an Ames ship in command of Captain Ricca. The West Cape took out a trifle over 8,000 tons of flour. The auxiliary schooners are taking out over 2,000 tons each.

The closing down on wood ship contracts by the government proved a hardship to local yards, though work is being carried steadily out on vessels which were already under construction. An effort is being made by Tacoma builders to have the government rescind their order or give the Tacoma builders a chance to bid on work for outside owners. The only firm constructing here for foreign governments is the Martinolich Company, with a yard at Dockton, who have three vessels for Norwegian owners.

The lack of caulkers has held back the wood shipbuilders to a great extent during the past few months. It has been almost impossible to secure men, with the result that in several instances vessels are on the way, ready to be launched if they were caulked. Many of the men have gone to California, while caulkers from East coast yards have returned home.

At the election of officers of the Pacific Steamship Company here, following the purchase of the interests of the Pacific Coast Company by the Pacific Steamship Company, General Manager A. F. Haines of the Pacific Steamship Company was elected vice-president. Other officers elected were: President, H. F. Alexander of Tacoma; vice-president and general manager, A. F. Haines of Seattle; vice-president, E. A. Stuart, Seattle; vice-president, Chester Thorne, Tacoma; treasurer, William Jones, Tacoma; secretary and assistant treasurer, Admiral E. B. Rogers, Tacoma.

Making the seventh 7,500-ton steel ship to be put out at the yards of the Todd Drydock & Construction Corporation, the "Jacona" was launched at 12:30 o'clock the afternoon of November 30. The vessel was sponsored by Miss Elizabeth Roberts, the seventeen-year-old daughter of William Roberts, one of the men in the machine department.

The launch of the "Jacona" was a success in every way and witnessed by a number of shipping men from Seattle and Tacoma. It was expected that President William H. Todd would be here from New York in time to witness the launch, but he was detained on account of sickness. At the time the "Jacona" went into the water, the steamer "Yukon," launched October 26, was leaving on her trial runs.

In a libel in the Federal court here, in which John Williamson was seeking to recover damages as the result of injuries sustained while working cargo on the steam schooner Davenport, Judge E. E. Cushman held for the owners of the vessel. It was alleged that Williamson's injuries were caused by orders given the winchman, who allowed a sling load of lumber to swing and strike him. In his opinion, Judge Cushman declared: "That in any suit to recover damages for any injury sustained on board a vessel or in this service, seaman having command shall not be held to be fellow servants with those under their authority." In a similar case, known as Blaumert versus the schooner Hoquiam, Judge Cushman found for the plaintiff, with the result that he was reversed by the circuit court of appeals on the line taken in the Davenport-Williamson case and in this last case followed out the court of appeals' decision.

Electricity Has Won the War

By Sidney Neu,
Editor of "Contact"

ELECTRICITY has played no unimportant part in the winning of the war. Only on the battlefield has the work of the electrical engineer not been apparent—poison gas, liquid fire, explosive shell, machine guns, rifle bullets, bayonets and men that fought like demons, showed no sign of the presence of electricity. Yet were it not for electricity and man's control of its use, these forces of victory had not been.

Think back to the gunsmith of a century ago. Could he have armed an army of four million men in eighteen months? With four million men withdrawn from production, could any army have been equipped? Electrically-driven machine tools made possible what human sweat and muscle never could have accomplished.

Unheard of tons of steel have been required, and those best able to judge have said that without electric drive to speed production in the mills we should have fallen short.

Uniforms were needed to clothe the men who fought. They could not go naked while weavers leisurely wove the cloth, cutters shaped it, and tailors sat cross-legged slowly stiching seams. Electricity was called on to do these things with speed, and the uniforms were made—breeches, shirts, leggings, shoes, underwear, hats, belts, millions of them. Of these things, some were doubtless made by steam power unaided, but where production was the swiftest and therefore the most effective, electric drive was responsible.

The chemicals that speeded the shells on their way, that burst the shell to fragments, that made the very air untenable for the foe, owed their production in the tremendous quantities required to electricity. Electro-chemical processes fashioned some, electric drive furnished the controllable mechanical power for making others.

The army and the nation needed food and electricity produced it. Fertilizers produced by electro-chemical means made the earth productive, electric drive threshed much of the wheat, prepared the meat, operated the packing plants, ground the flour, entered everywhere into the production of food to make human labor less and to release more men to carry fear to the hearts of barbarians.

In its gentler aspects electricity appeared even on the field of battle, guiding armies, battalions, even individual shells. The airman by his wireless telephone and telegraph guided the gunner far to the rear who would otherwise have been blind. The commander watched through his wire and wireless network the progress of his fighting units miles away, kept them correlated into one vast machine that acted as a whole, not as a multitude of unrelated parts.

Billions of billions of electric sparks daily ignited the cylinder charges of motor trucks, lorries, airplanes, motor cars, motor cycles and the victorious-tanks. Without electricity for ignition these engines would have been unheard of.

Electricity enabled the ships at sea with their precious freight of American manhood to keep each other in touch, to avoid the hidden dangers that menaced, to signal back as each arrived, "We're here, and safe!"

The ships themselves—did not electricity produce them? Their plates were rolled and shaped and machined in electrically-driven machinery. Electric cranes transported their parts, electric compressors furnished the power behind the busy riveters.

Speed won the war when it was won and saved millions of human lives and untold additional human suffering—America's speed. The world marvels at America's speed and even America marvels. America was capable of this unheard of speed because America has made electricity its servant. Many men have been needed to accomplish what has been done in preparation, but at least twice and probably three times as many men would have been needed had not electricity been ready to help; and there were not that many men.

Electric light in battlefield searchlights patrolled the sky and no man's land, guarding against surprise. At home protective electric lighting dispensed with many human guards who thus could lend their hands to much-needed production. Within the busy plants men worked through the long hours of night as swiftly as by day, because electric illumination was at hand.

So short was the man power that even with electricity's help women were required to lend their aid in making ready our fighters' equipment. Without electricity women's help would have been but feeble. It is because electric drive tames rough forces and makes cumbersome machinery so simple to manipulate that it was possible for women to do what only men had done before. Work with machinery had been considered man's exclusive sphere because it had been rough work, heavy work. Electricity has made it such light work that it no longer fatigues the frailer sex.

Nor is this alone electricity's part in putting women at the lathe, the punch press and the planer. It has simplified the home so that she can be spared. We forget the duties that women formerly had in the home. She was spinner and weaver and tailor, she was laundress and housemaid, baker and cook, milkmaid and charwoman. Electrical machinery and electrical transportation have taken many of these duties out of the home. Those that are left, washing, ironing, sweeping, cooking and sewing, electricity has so lightened that women have been able to take their part in saving the world for those that dwell in it. Where many women were needed in the "good old days" to keep one household running smoothly, one alone now finds time to spare.

Trace back to its source any thing or factor that has helped to end the struggle, and electricity is found, not once but many times, to have touched it and hastened it on to consummation. Truly, electricity has won the war—electricity guided by American brains, led on by American energy, crowned by American valor.

Our New Merchant Marine—The Problems of Its Existence and Growth

In this third number of the series by our friend, the Traffic Manager, the history of British maritime legislation is summarized and analyzed. The reasons for British supremacy are shown to have resulted from a gradual progress through experience to a sure knowledge of the kind of legislation that helped trading conditions, and the writer's conclusion is that the United States lawmakers would do well to take advantage of the lessons learned by the British.

THE November article in this publication on our new American merchant marine made reference to the necessity for new, helpful American shipping laws, and referred especially to England's attempts in this regard. This article is an endeavor to publish in a condensed form England's maritime struggle and the laws it enacted to assist the British shipowner to obtain the mastery of the oceans, which the writer hopes may prove of interest.

Navigation laws may be broadly defined as measures of preference and exclusion by which maritime nations endeavor to protect their native, or national, ships in the carrying trade of the sea against foreign competition, and to exclude foreign ships from participation on equal terms with their own marine in their coastal trade, or that of the colonies or possessions they may have.

England's initial navigation act appeared in 1381 and ordained that the King's subjects freight only English ships for and from the realm, on penalty of forfeiture of ship and cargo. This was really an act to augment the navy, as at that time the navy was composed of armed merchant ships. This statute lapsed because it fell short of results—English merchants in foreign ports too often finding themselves without English tonnage in which to ship; but in 1485, Henry VII, it was reinforced with an additional proviso that a majority of the crews of English ships must be English subjects.

Thus, early in English navigation laws, four principles are brought out, viz.: (1) Certain goods must be imported and exported in British ships only; (2) British ships must be manned by a majority of Englishmen; (3) These laws were for the increase of the mercantile navy; (4) This mercantile navy was to be subject to requisition for war service.

These four principles remained the four leading ideas of all future navigation laws until the middle of the nineteenth century, when the restrictive features were abolished.

In the time of Elizabeth, 1558, these laws were modified by the abolition for a term of five years of the clause prohibiting the importation and exportation of merchandise in any but English merchant ships. The reason for this was the striking back by other nations with similar laws, which caused friction between the nations, and the British nation found that their own merchants in foreign countries were handicapped in their business by a shortage of English tonnage. The exception made, in a general way, was that if no British tonnage was available, then, and only then, could English merchants ship in foreign vessels.

In 1563 we find the first British coastwise protective law, "Constitution for the Maintenance of the Navy, etc.," which prohibited foreign ships carrying any freight coastwise from one English port to another.

In 1566 an act made it unlawful for the English-Russian Company in control of the Russian trade with England to export or import their goods in any but English ships and with a majority of English crews, and in 1593 similar restrictions were put upon the trade with Turkey.

Navigation Act.

No further shipping legislation of any consequence was entered into until 1646, when we meet with the first restrictions placed on the commerce of the British colonies; this was an ordinance of the "long Parliament," which prohibited the shipment of colony produce in any but English ships.

Four years later, in 1650, Cromwell's "rump Parliament" passed an act prohibiting all ships of all foreign nations whatever from trading with Virginia, Barbadoes, Antigua and the Bermudas without a license. This was a political and not an economic act. It was the result of the "rebellious attitude" of those colonies in their attachment to the royal family.

The year 1651 (October 9) was made famous by the framing and passage of the "celebrated navigation act," the fundamental principles of which held practically through two centuries. While framed primarily for the protection of British shipping interests, it was essentially a political measure. Dutch ships were able to carry freight cheaper than English ships and had secured practically a monopoly of the carrying trade. This act ordained "that no merchandise either of Asia, Africa or America should be imported into England or Ireland in any but English built ships, navigated also by English commanders and three-fourths of the sailors Englishmen. The act had the expected political result, as it greviously affected the Dutch, they having little or no products of their own to export. A naval war between these two countries followed and finally resulted in the English supremacy of the seas.

Maritime Charter of England

With the restoration of Charles II, in 1660, the act of 1651 by the "New Parliament" was embodied in a code then popularly known as the "Maritime Charter of England." The act may be briefly summarized as follows:

1. Prohibiting import and export of goods into or from any of the King's lands, islands, plantations or territories in Asia, Africa or America in any other than English, Irish or plantation ships and whereof the master and at least three-fourths

of the mariners shall be Englishmen, under penalty of forfeiture of ship and goods.

2. Permitting none but national-born or naturalized subjects to engage in the occupation of a merchant or factor in the places named above. (It was common for Dutch merchants to act as agents in the English colonies.)

3. Prohibiting the importation into England of goods of the growth, product or manufacture of Asia, Africa or America in any but the English owned ships.

4. Prohibiting the importation into England or Ireland of foreign products or goods in other than English built and English manned ships.

5. Prohibiting the carriage of goods coastwise from one English port to another except in English owned and English manned vessels. (This is the first English protective coastwise law.)

6. Prohibiting the importation of Russian and Turkish goods in any but English built and English manned ships.

7. Declaring all foreign goods imported in ships not belonging to England to be deemed alien ships and required to pay all strangers' customs and port dues.

8. Excluding a foreign built ship from the privileges of an English ship until the owners prove that they are not aliens.

In 1663 this statute was made stricter with regard to the plantations' trade, and was enacted for the purpose of **"maintaining the greater correspondence and kindness** between the subjects at home and those in the plantations; keeping the colonies in firmer dependence upon the Mother Country, making them yet more beneficial to it (the Mother Country); it being the usage of other nations to keep their plantations' trade exclusively to themselves." From the laws above it may readily be seen how much "kindness" the colonies received.

In 1675 King Charles, finding the provisions of the code "sometimes violated," issued a proclamation prohibiting the importation into the American plantations of any European merchandise but what should be laden in England, and directing the strict execution of the other branches of the act with respect to America; and in 1696, violations still continuing (smuggling), Parliament enacted that all ships trading to or from the plantations should not only be English, Irish or plantation built, but that their cargoes should be either English, Irish or plantation property and registered as such.

In 1676 Massachusetts Colony alone owned 430 vessels of from 30 to 250 tons burden and many ships were also owned in the other New England Colonies. What was the reason for this successful shipping growth? History records that at this time good ships were built in New England for £4 per ton burden, while in England the cost was from £6 to £8, or 50 to 100 per cent higher. For once in American history we could build cheaper than England. As a result, England bought Colony ships, and Colony shipyards were full of orders. The American seamen of this period were the best in the world. The New England fishery industry trained them, and their efficiency came as the result of great hardships. Their vessels were but partly decked over, and they slept unsheltered. In courage, sea skill and resourcefulness, these fishermen have never been surpassed, and they became the crews of the Colonial clipper ships. Ancient literature states they operated with a smaller crew than that of any other nation.

From this time on until the end of the Revolutionary War, the code was relaxed in some respects and made more stringent in others, and in 1788, after American independence, the trade between the United States and the remaining British possessions in America was placed under regulations similar to the codes set forth above, and in 1787, 1790 and 1799 the United States retaliated with the adoption of a navigation act of its own modeled closely after the British code, prohibiting the exportation of American goods into England except in American ships. As a result of this retaliation, for a quarter of a century, British and American ships often crossed the ocean one way in ballast. This being a ruinous proceeding, both countries greatly relaxed, and in 1815 a "reciprocal liberty of commerce" agreement was entered into between the two countries. America could now take its products in its own ships to England, and England could take its products in English ships to America.

Repeal of Navigation Laws

England's code continued to be liberalized until in 1849 the long step toward freedom of navigation was taken with the passage of the "Act for the Repeal of the Navigation Laws," doing away with the restrictive enactments so far as importation and exportation went, and in 1851, the final step, throwing open the English coast trade to foreign vessels, was enacted. Thus was reversed the English policy which had held with more or less vigor through five centuries.

This brief summary of English shipping laws is written to show how important that nation deems its merchant marine, and to what extent it has gone to keep alive and foster it. But notwithstanding such aid, up to the Civil War, American clipper ships were on the oceans good and strong and contested for the supremacy with England. Our ships were on the oceans through actual merit. In the meantime England had developed the iron screw vessel and perfected the marine steam engine. The British subsidized iron screw vessel drove our now antiquated clipper ships off the ocean; they could no longer compete.

From that time to the present, Britain has maintained its supremacy. Standards of living have gone up with us in greater degree than with any other nation. We cannot build or operate as cheaply, nor have we kept pace with ship development, evidenced by our lack of a reliable high power American built Diesel engine. Up to the present war, Germany was pressing England on the oceans. This competitor has now been wiped out, and the LaFollette bill has given Japan the Pacific Ocean. We are now building a merchant marine through compulsion as a **protection,** and the American public, through war, has awakened to the necessity of a merchant marine. May our legislators also rise to the emergency and favor the American shipowner with helpful laws, and, if nessessary, financially, until we are able to meet the competition of the world. It is a difficult, long-time problem, and this article is an endeavor to convey how for five centuries England struggled with ships, but she conquered. Like England, our ocean frontage is so great that we cannot dodge the issue. **National security** demands an American merchant marine and **protection** for it.

The Marine Terminal Shed

By H. McL. Harding,

Consulting Engineer, Port Richmond Terminal, New York

THE function of the terminal shed is to provide a working area for handling the inbound and outbound cargoes; it is for assorting, distributing and tiering. It is not designed for long storage, which is the function of the warehouse, but for handling and temporary holding.

Outbound freight is often transferred directly from car to ship not passing into the shed.

Outbound freight may, however, be assembled in the shed so as to have together an outbound cargo tiered by itself for shipment.

This is only when the freight is to be moved within forty-eight hours, and then only when there is sufficient room in the shed without congesting any incoming freight.

Where the warehouse is located near the shed, being as it were equivalent to a side extension of the shed only sixty feet to the rear and parallel to it, then the outbound freight assembled for early shipment should be kept in the warehouse instead of the shed, if there is to be long waiting for the arrival of the ship.

Where it is possible and there is sufficient freight and ample room, one terminal unit may be utilized for inbound freight and the second unit for outbound freight. This permits of greater freedom of freight movements.

The freight shed, 35 to 50 feet distant from the water's edge, should be parallel to the waterfront or to the principal berthing frontage, so as to permit rapid transference between all the hatches of the ship and the shed.

The length of the shed, where it is possible, should be about four-fifths of the length of the longest ship that may be there berthed.

If such a ship be 600 feet long, the length of the shed should be 500 feet and the width from 50 to 100 feet. For usual conditions the width is from 60 to 80 feet. The 500 feet shed is preferably divided into two tandem sheds, each 200 feet long with 100 feet between.

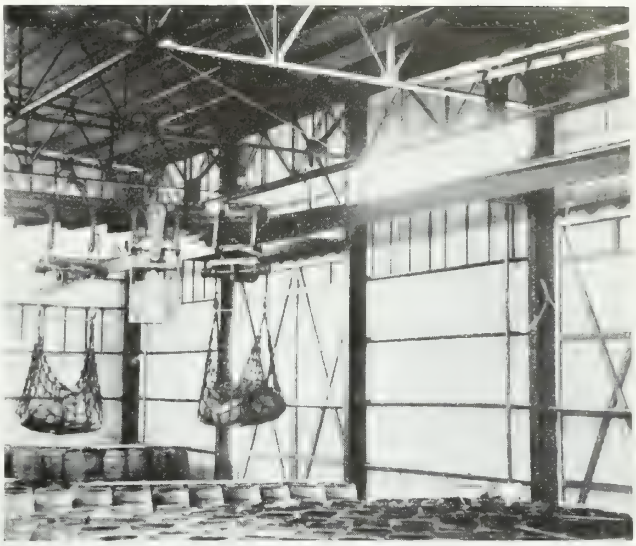
Two or three railway tracks are located between the front of the shed and the edge of the quay or pier; the center of the track nearest the shed may be seven feet distant and the center of the second track thirteen feet distant from the center of the first track or twenty feet from the front of the shed. There should be sufficient cross-overs between the tracks. Three other tracks should be located to the rear of the shed.

One railway track only is not recommended, either in front or behind the shed.

At most public terminals the greater percentage of cargoes is for through freight.

The front tracks are chiefly for outbound freight, though they can be utilized for inbound freight, especially when the cargo is for a few consignees. The rear tracks are mostly for inbound freight from the shed after it is assorted and distributed.

The freight shed should generally be of one story and its height should be from twenty-five to thirty feet clear height under the trusses, and should be provided with overhead tiering machinery, running upon overhead side rails and the shed space spanned by one or more travelling cranes with cross-tracks forming adjustable loops.



Tractor and hoist train with movable cross track. Four two-ton loads handled by one operator

By this mechanical tiering the capacity of the shed can be economically increased so as to hold three or more times the usual amount of freight than when it is tiered by manual labor at the average five feet.

A shed occupying a ground area of 400 feet by 80 feet or 32,000 square feet and tiering on the average twenty feet in height, having a capacity of 640,000 cubic feet, would be equivalent in capacity to a shed 400 feet by 320 feet or 128,000 square feet tiering the customary five feet to have the same capacity of 640,000 cubic feet. Considering the value of improved waterfront property, this increase of holding capacity without increasing the operative expense is important.

A one-story shed tiering twenty feet would have more than double the net capacity of a two-story shed of 32 feet in height tiering five feet in each story, and the investment for the one-story shed would be much less and the operating expenses are also less. Five feet tiering is the average height for tiering with manual labor.

A shed is for a high speed working area, and, as already stated, is for short holding only. If a shed be of two stories, as, for example, for a passenger liner, then the design of the shed should be modified.

For a freight shed the floor area and air space must be free from columns, chutes, inclines, elevators, spirals and stairs, and other incumbrances. In a shed only eighty feet in width, with freight tiered by overhead transverse and longitudinal-handling machinery, there should be no necessity for drays to enter into the shed or to have space reserved for such drayage.

The shed should preferably be constructed of steel, with corrugated galvanized sheets for the siding and ends.

The roof may be of tar and gravel.

The trusses should be of steel.

The internal overhead side tracks for cranes should be of an I-beam, upon which is a sixty-pound T-rail.

The external tracks for the gantry cranes should be of similar construction.

The earth surface of the shed, after being thoroughly rolled, and all settling having ceased, should be covered with a paving of concrete 5½ inches thick and this covered with a layer of asphalt 1½ inches in thickness.

The shed on the quay should have ample capacity for both the inbound cargo of the ship and also the outbound freight.

For a cargo ship with a deadweight tonnage of 6,000 tons, there should be a shed with a net capacity of at least 600,000 cubic feet. This capacity may be provided either by a two-story or a one-story shed.

The choice would depend upon various factors, such as the cost of the land, the cost of the building and the speed and economy of operation.

Of these the speed of the freight movements is most important.

There would therefore, in the case of the two-story shed, 16 feet in height under the trusses in each story and tiering to five feet in each story, be required a building with a ground area of about 60,000 square feet to hold this cargo, provided there were no deductions as described below. This refers to a quay shed and not a pier shed with berths for ships on each side, where the area should be greatly increased.

In the two-story shed, 500 feet long and 120 feet wide, there would, however, be required in the lower story five rows of interior columns spaced twenty feet apart, or 120 columns. As the second story is to hold cargo freight of considerable weight, twenty feet should be the least spacing allowable for the weight of the stored cargo, including the weight of the floor of the second story. With the base of the columns there would be lost about nine square feet, including clearage space, for each column, or 1080 square feet, about 17,280 cubic feet.

Six chutes in the lower and upper stories would take up 32,000 cubic feet.

Four elevators, stairs and spirals and approaches would require 60,000 cubic feet.

These deductions, and allowing fifteen per cent for aisles and working areas in each story, would leave a net holding capacity of about 400,000 cubic feet. At 70 cents per square foot there would be a saving in the land alone of about $37,000 by installing the one-story shed.

The two-story shed would cost at least twice as much as the one-story shed to secure the same capacity.

From experience at marine terminal sheds at the Port of Boston, the expense of handling at the second-story was double that at the one or lower story, and what is of more importance, there was required double the time for handling.

Conclusion

For the two-story shed, with sixteen feet clear in each story, tiering five feet in each story or ten feet in both stories, the land cost is more, the cost of the building is greater than for a one-story shed of equal capacity; the operating expenses and time of transferring and handling are also greater.

U. S. NAVY STEAM ENGINEERING SCHOOL

The United States Navy Department has perfected plans for the training of a considerable number of engineering officers. A school for this training, known as the U. S. Navy Steam Engineering School, has been established at Stevens Institute of Technology, Hoboken, N. J.

Particularly desirable opportunities are presented to the trained engineer, in that he is enabled to supplement his schooling and practical experience along technical lines by an intense applied course of engineering, which gives him an opportunity for service during the war as well as fitting him for post-war employment.

The course consists of five months of training, divided as follows:

One month of training at the Naval Training Camp, Pelham Bay Park, New York.

One month of technical work at the U. S. Navy Steam Engineering School, Hoboken, N. J.

Two months of practical training on board ships and in shops in the vicinity of New York City.

One month finishing course of instruction at the U. S. Navy Steam Engineering School.

A graduate of this school will be commissioned an ensign in the U. S. Naval Reserve Force (pay $1700 per annum, plus allowances for sea duty and dependents). The duty to which a graduate of this school will be assigned will be that of engineer officer in the auxiliary service of the Navy.

The school is open to men between the ages of 20 and 40, who meet the physical requirements of the Navy for line officers, who are of thorough ability and officer-like character, and who have completed an engineering course (mechanical, electrical, civil, mining or chemical), at certain recognized technical schools, or who possess an education and experience along steam engineering lines adjudged equivalent thereof.

Men meeting the above-named qualifications are eligible for induction into the Naval Reserve Force for assignment to this school if able to comply with the following requirements:

Registrants of draft of September 12th, 1918, who have already been classified.

Registrants of prior drafts who have been granted deferred classification.

Properly qualified applicants will be individually inducted into the Naval Reserve Force, and on being assigned to the U. S. Navy Steam Engineering School will be rated chief machinist's mate and will draw the pay of that rating ($83.00 a month, plus allowances for subsistence and dependents as well as uniform gratuity).

FOUR TONS OF LEAD IN PAINT FOR SHIP

R. C. Monteith, painter foreman at the Foundation Company yard, Tacoma, Wash., has figured out, according to the "Foundation Shipbuilder," that the following material from the paint shop goes into each Ferris type ship:

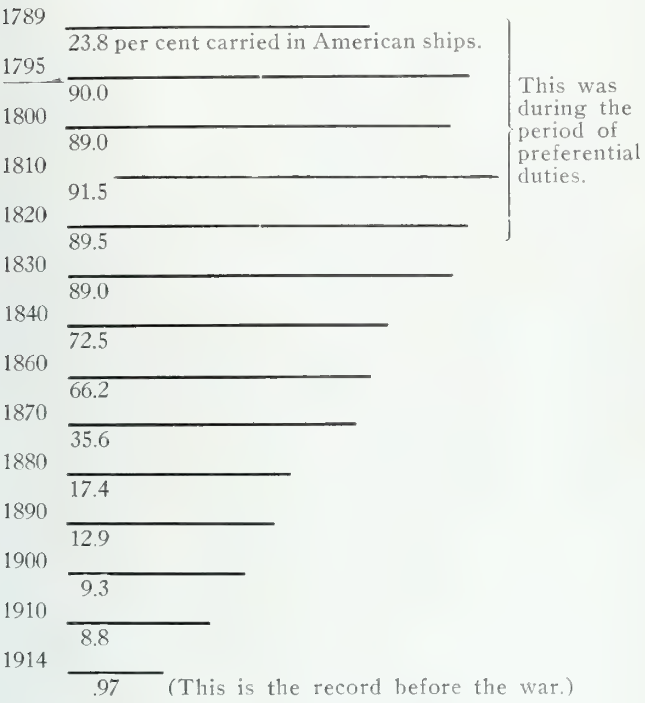
One hundred dollars worth of paint brushes, three barrels of creosote for the frames and deadwoods; 3½ tons white lead; ½ ton red lead for iron work, one ton putty, 225 gallons linseed oil, 50 gallons turpentine, 175 gallons copper paint, 10 gallons stack black for engine rooms and stacks, 20 gallons varnish, five gallons shellac, 150 pounds tints, 110 sacks cement for seams and holes, with two yards of sand and gravel for deck floors in galley and donkey room. It takes eighty men to apply this.

The American Merchant Marine After the War

By Robert Dollar

THE question that is troubling all thinking men today is: How are we going to operate our ships after the war? Seeing that in normal times our present laws and regulations make it a financial impracticability, we must not get carried away with the present abnormal conditions and rates of freight, which make it quite possible for anyone to make a profit, no matter how inexperienced. So all the figures and considerations in this article are based on normal conditions which are sure to come after the war.

Diagram prepared by Mr. P. W. H. Ross, showing the percentage of American goods carried in American ships in years gone by:



(This is the record before the war.)

An illustration that would not be out of place here is one showing the condition on the Pacific Ocean up to May, 1917:

1913—Before the war and before the Seamen's Bill had gotten in its **deadly work**, Japanese vessels in American trade on the Pacific were	26.05%
American vessels on the Pacific were	26.10%
After May 1, 1917, Japanese vessels were	50.90%
American vessels (resulting from the Seamen's Bill)	1.97%

The following shows where crews' wages cut some figure. This is taken from our books on three steamers which we were operating in 1914. Their indicated horsepower was exactly the same and the tonnage was nearly the same:

American steamer,	47 men	$3,720.00	a month
British "	36 "	1,308.00	"
Japanese "	36 "	777.00	"

On the Pacific the keen competition that Americans have to meet is from the Japanese, and after the war this competition will also be felt on the Atlantic. The foregoing figures give a good idea of what it is. The Japanese shipowners have made enormous profits during the war; therefore that competition will in future be backed up by plenty of money, by having subsidies for shipbuilding and carrying the mails and other advantages that the American shipowner must combat. There is some talk of our Government chartering its ships to individuals after the war and not selling them. This will be a **fatal mistake.** The men who in the past developed American and British foreign trade were the **shipowners.** Ship charterers having no money invested will operate the ships only as long as they can make a profit. Responsible shipowners will keep up the business even at a loss, and stay with it until times get better; thereby keeping up the foreign trade of our country.

At a banquet in Philadelphia the Secretary of the Navy announced the contemplated extension of Government ownership, to own and operate all American ships and to engage in foreign trade; thereby destroying the private ownership of ships and going into competition against our merchants in the foreign trade. (Our Government has already started to trade commercially, I understand, in Siberia.) The result of this policy would be to destroy the initiative, "pep" and "getup" of our merchants in the foreign trade and the few shipowners we have left; and this while we are on the eve of the keenest competition the world has ever seen. Then, in addition to all this, we were told that the rates of freight would be lower than those of our foreign competitors. (They will have something to say about this.) Inasmuch as we are in direct competition in the foreign trade, and as our country is going to require this trade as never before, it is the opinion of our bankers, merchants and the people generally that the Administration has another guess coming before it is permitted to carry out such a destructive and disastrous policy.

I suggest that, in stead of Government ownership, the ships should be sold at prices to meet competition and on reasonable terms of payment, to encourage the ownership of ships by men of moderate means. Example:

> "The Government ships should be sold at the current price of similar ships prevailing in London, one-quarter cash, one-quarter in one, two and three years, with interest at 4%, and when the various payments fall due the amount to be paid shall be the price prevailing then in London, thereby putting our shipowner on an exact equality with our foreign competitors as to the first cost of the ship. In other words, keeping the cost of the ships so bought equal to foreign ships while the owner is paying for them. The difference in cost to the Government and the amount sold for to be charged up to the cost of the war, the same as ammunition, etc."

Wages

As explained, the wages of the crew is a very important matter, and as the American cannot be leveled down to the foreign competition, no more than the foreigner can be raised up to the American, the American will, as a consequence, leave the sea unless he gets about the same wages as he could get on shore. I offer as a solution of this condition that shipowners hire their crews at full American wages, but that the difference between this wage and what is paid by Japanese competitors be paid by the Government to shipowners on proper certification by the Shipping Commissioner of the amounts paid. Example:

If the wages of the American seaman was	$60.00 per month
Japanese seamen was	15.00 per month
Then the U. S. Government pays	$45.00 per month

thus enabling American labor to receive its full wage and thereby permitting the American ship to compete with the lower paid foreign crews. This is no subsidy to shipowners, but only an equalization of American vs. foreign labor.

To those who are not familiar with the custom I would explain that when a man hires to work on a ship he must go before the United States Commissioner and sign the Articles of Contract, which is explained to the man by the Commissioner. Then, when the voyage is ended, the shipowner does not pay the crew direct, but takes the money to the Commissioner and he pays the men. By this arrangement the men would receive the full American wage, and such fine young Americans as are being trained in great numbers now would be sure to continue to follow the sea, when the full crew was Americans. And especially when that vicious clause in the Seamen's Act is abrogated which provides that 65 per cent of the crew must be certified able seamen, which no other nation calls for, and which if enforced would tie up half of our ships, as there are not nearly enough of the so-called able seamen to go around.

The licensing of our officers must also be modified to be the same as our competitors.

In ships running to the tropics, Americans will not stand the work in the hot fireroom, and in that trade it is also a great question if Americans would work in the steward's department. All American owners have had this experience. American sailors on deck, however, would get on all right. Outside of the payment by the Government to equalize the wages of the men and the proper payment for service rendered in carrying the mail, I claim that to maintain our American ships on the ocean no Government financial assistance is required. But our laws and regulations **must** be radically changed, not in a way to give our shipowners **any advantage** over their competitors, but to put our ships on an **exact equality** with those of all other nations; and to do this it will not cost our country a cent, except to equalize the wages. The following are some of the changes in our laws that are necessary:

Measurement of Ships

For example, take the standard steamer of 8800 tons, deadweight. (Scores of this size are being built for the Shipping Board.)

The steamer "Robert Dollar", of which all those ships are duplicates, according to British measurement, was net 3420 tons. American ships of this tonnage run an average of net 4283 tons, a difference of 863 tons. Since all port charges, pilotage, drydocking, etc., are charged on the net tonnage, the American ship in foreign trade pays 25 per cent more than the ships of any other nation; and since this is paid in foreign ports and to foreign nations, is it not up to Congress to tell us **why** our ships are thus penalized?

(Note: The laws of Great Britain and ours, as to measurement, are about the same, but the application makes this difference. The fact remains that the actual difference is as stated.)

Panama Canal Tolls

In an address Colonel Goethals delivered in San Francisco he told us of two sister ships, one under the British flag and the other under the American flag. The latter paid $500 more tolls than the Britisher. I would again as Congress, **why?** In this connection it might be pertinent to ask why an American ship carrying a cargo of lumber pays more tolls than a ship carrying merchandise, coal or iron.

Yearly Inspection

Under American regulations the ship must be free of cargo, the boilers all filled with cold water; therefore all handling of cargo is suspended and the inspection must be completed before work is resumed. On British ships no work stops. One part of the inspection is done, then when another part of the hull, boilers or engines is ready—that is, inspected—and if the inspection cannot be completed, the vessel is allowed to proceed to the next port, where it can be finished. The instructions are, not to stop the ordinary work of handling the cargo. In the successful operation of ships, one of the most important factors is the quick despatch of ships in port.

Boiler Inspection

The American rules require a cold-water hydrostatic pressure, once and a half the working pressure, to be applied to the boilers once a year, which racks the boilers and pipe, causes much expense and shortens the life of the boilers. This is not required annually by any other nation, and they have no more explosions than American boilers so inspected. The American rules require a fusible plug in each boiler. No other nations have them. The loss of time and expense on American ships is considerable. Again I ask, **Why?** especially when no benefit is derived from it. More inspectors should be employed and the regulations entirely changed to enable our ships to gain much valuable time.

Engine Room Crew

The Secretary of Commerce, under whose jurisdiction this comes, has said that Americans are able and can do more and better work than any others and fully pay their employers for their higher wages and better board. Therefore it is again quite pertinent to ask **why** on, say, a 10,000-ton deadweight American steamer it takes 30 per cent more men than on a similar sized steamer of any other nation? The British require two licensed engineers, the American four; and in addition to this, the American requires three oilers and three water tenders. Ordinarily on foreign ships the storekeeper, donkeyman and a greaser do the work of the oilers and no water tenders are carried. In fact, the name of water tender is unknown. At an investigation of a committee of the House, I was asked what the water tender did. I replied he sat on a box in the fireroom and did nothing but draw his wages.

The Crew

Then we come to that clause in the Seamen's Bill which states that 75 per cent of the crew in each department shall understand any order the officers may give. This prevents American ships from carrying 75 per cent foreigners who do not understand the English language. It is intended to prevent the carrying of Chinese on American ships to meet the competition of the Japanese, but it gives the latter **carte blanche** to carry Japanese crews with Japanese officers; hence the reason that the Japanese today have **full control** of the commerce of the Pacific Ocean. Another clause which I referred to provides that 65 per cent of the crew, exclusive of officers and apprentices, shall be certificated able seamen. This part of the law was so impossible and unreasonable, because they could not be obtained, that no notice has been taken of it during war-time. When peace comes, however, it will be enforced, thereby tying up half of our new merchant marine.

It provides that the Collector of Customs may, on his own motion, and **shall** upon the sworn information of any reputable citizen, deny clearance and hold the ship until an investigation is made. So any waterfront sorehead can hold up any ship. This is so drastic and vicious that it also has not been enforced; but it is the law, nevertheless.

Another clause provides that the seaman can demand and receive half of the wages he has **earned** (note the word "earned," not due, as it should be) at every port the ship goes to, and every five days he can make another demand. This has done more harm to the few American ships that were left than anything else, as it gives the men money to keep them in a drunken state. The police records of various ports where American ships have gone, especially Shanghai, Kobe and Yokohama, bear ample proof of this bad law. The intention of this clause was to allow the men to draw their wages and desert; but it did not work that way, although it causes serious delay to the ship at almost every port. **This must be repealed.**

The sailors shall be divided into two watches. On many ships a big crew is carried and enough men to navigate the ship are put on watch and watch. The balance of the crew sleeps all night and works all day, the object being to get the day crew to keep up the ship in good condition. If this section was enforced we would have to keep a smaller crew and let the keeping up of the ship go, as men cannot do any work at night except what is necessary to navigate the ship.

This bill was entitled "To promote the Welfare of American Seamen." The Inspector's records of San Francisco, shortly after it became law, show that of 2064 men, 8 per cent were American born, 17 per cent naturalized citizens and 75 per cent aliens. An American steamer cleared recently from San Francisco with a crew composed of three Hollanders, four Greeks, one Swede, two Irishmen, three Englishmen, one Australian and three Americans. What a joke, calling them Americans!

The clauses in the bill providing for greater safety of life at sea and having better accommodations for the crew should be retained (except the absurdities relating to davits and lifeboats on cargo vessels, which has never been enforced), but the American ships built recently have excellent accommodations and leave nothing more to be desired, and the food served to American crews is much better than that of any other nation; in fact, it is as good as I have at my home.

The foregoing are only the most vicious parts and only a few of the many changes that must be made to put us on an equality. Other parts of the bill against foreign ships will no doubt be attended to by foreign nations after the war.

The President said that if American shipowners could not operate ships the Government would operate them. This statement is on a par with tying our hands securely behind our backs and putting us in the prize ring against an opponent with both hands free and backed up by his Government. The answer to this is that American citizens before the war were successfully operating two and one-half million tons of ships under foreign flags. Those same men would be only too glad to operate them under the Stars and Stripes if our laws and regulations would only permit them.

More foreign trade is conceded to be an absolute necessity after the war; therefore it is well to remind the people of these United States that our foreign trade is so linked with our merchant marine that they cannot be separated. This is also true of our manufacturing plants, banks, merchants and farmers. The ramifications of this subject are so great that directly or indirectly they affect every American citizen. Therefore the time has come to demand the necessary legislation and regulations to put the operation of our ships on an exact equality with our competitors. **Nothing else will do!**

We certainly want to get some ordinary common sense injected into our laws. Surely our Government will see to it that useless, oppressive laws and regulations will be changed, in view of the fact that when the reconstruction period is over we will have nearly as big a merchant marine as Great Britain. If this is not done, we will see it melt away, as shown in the diagram from 1810 to 1914.

This article has been approved by and represents the views of all the big shipowners of the United States.

EXTENSIVE ALTERATIONS ON A SEATTLE MOTORSHIP

Messrs. Treiber & Scheel, naval architects of Seattle, are designing extensive alterations for the M. S. "Apex." This vessel, owned by Lee Wakefield & Company, Seattle, was designed by Capt. O. D. Treiber and built by the National Shipbuilding Company about a year ago. She is powered with a 700 Brake horsepower Atlas Diesel engine and has proved very economical in operation, her fuel and lubricating oils costing less than $18.00 per twenty-four hours running time.

The alterations proposed include the extension forward for 25 feet of the main deck passenger accommodations, the enlargement of the dining saloon to seat thirty additional, and the enlargement of the galley by about 150 square feet. A superstructure will be built over the present deckhouse to make room for berths for forty-five additional passengers. Larger and more convenient quarters are to be provided for the storage and examination of charts and for the wireless outfit. The comfort of the captain and deck officers is to be better taken care of, and a forecastle added to the present flush bow.

A complete system of refrigerating rooms with an ammonia ice plant installation is another addition which will contribute to make the M. S. "Apex," as altered, one of the most complete ships of her class in Seattle waters.

The offer of a Los Angeles attorney, Robert G. Loucks, to take action to nullify the compromise agreement and ordinance reached between the city and the Southern Pacific over tide lands, has been rejected by the city council. This action was taken upon the advice of City Attorney Stephens, who said the compromise was legal Mr. Loucks contended that it was not legal and that the city had given away many of its rights to the railroad company. The compromise was made several years ago to settle tide land litigation which had been holding up numerous harbor improvements.

PACIFIC MACHINERY

Core Mixtures for Large Marine Engine Cylinder Cores

By John F. Kellogg, Jr.,
Manager, Foundrymen's Club of California

DURING the strenuous months through which the foundry industry has so recently passed, there arose many new conditions of trade and material which made necessary a large number of changes in the old methods. One of the most formidable of these conditions was the shortage of core flour and the regulations of the Food Administration regarding its use in core mixtures. Many substitutes were suggested and given trial. Both success and failure crowned the efforts of the core maker. The new compounds and substitutes for flour, with which the market has been flooded, have produced mixtures that have proven very satisfactory in many of the foundries. In other core rooms the old-time mixtures of water, sawdust and floor sand have found their staunch supporters.

It was the desire of the Foundrymen's Club—which, by the way, is the educational adjunct of the California Foundrymen's Association—to reach some decision as regards which particular mixture was the best. To realize this end the Policy Committee of the club appointed a special investigating committee, composed of Mr. Wm. Lauten of the Coast Foundry, Mr. H. C. Macaulay of the H. C. Macaulay Foundry Company, and Mr. Henry Niemann of the Enterprise Foundry Company. The especial line of investigation that this committee was to follow, embodied itself in "Mixtures for large marine engine cylinder cores and other cores that could be made with the same mixtures." The committee spent an afternoon at each of the three plants in San Francisco that were engaged in the manufacture of these cylinders. At the December meeting of the club the following report of their findings was very ably presented:

"Through the courtesy of Mr. R. W. Schilling, foreman, the committee were admitted to the foundry of the Bethlehem Shipbuilding Corporation and were shown everything that they desired to see or know. We found a thirty-ton marine engine bed under construction and also a seventy-two inch low pressure cylinder which, when cast, would weigh about sixteen tons. Three varieties of core sand were in use in making the cores for these two castings, viz., compound, kordek and the old reliable stand-by, flour.

The compound mixture consisted of two parts floor sand (or sometimes used over compound sand), one part of new sand, one to sixteen of sawdust and one to forty of compound. This was mixed by hand and then screened in a rotary power driven riddle. This mixture is used on all pipes, tees, elbows and in the making of all plain cores. It is also used in making the cores for the low pressure cylinder. This mixture must be worked very wet, rammed exceedingly hard and rodded well. The chippers report that this mixture is very hard to dig out.

The kordek mixture consists of equal parts of new and sharp sand, mixed by hand, dampened and then screened by the rotary riddle. This mixture has been used to good advantage on all shapes and sizes of cores and especially in the lightening cores of the low pressure cylinders. The foreman reports that this mixture is dangerous for use in large castings where the flow of iron from the gate hits the core, for there is danger of the core washing away. The chippers also report that this mixture is hard to remove from the castings.

Flour mixture is, as it was of old, two parts of sharp sand, one part of new sand and one part of flour to ten parts of mixture. This mixture is being used on the port and exhaust cores of the low pressure cylinder. It is also used as a facing on many other cores backed up with the compound mixture. This mixture allows the core to be removed from the casting with much less difficulty.

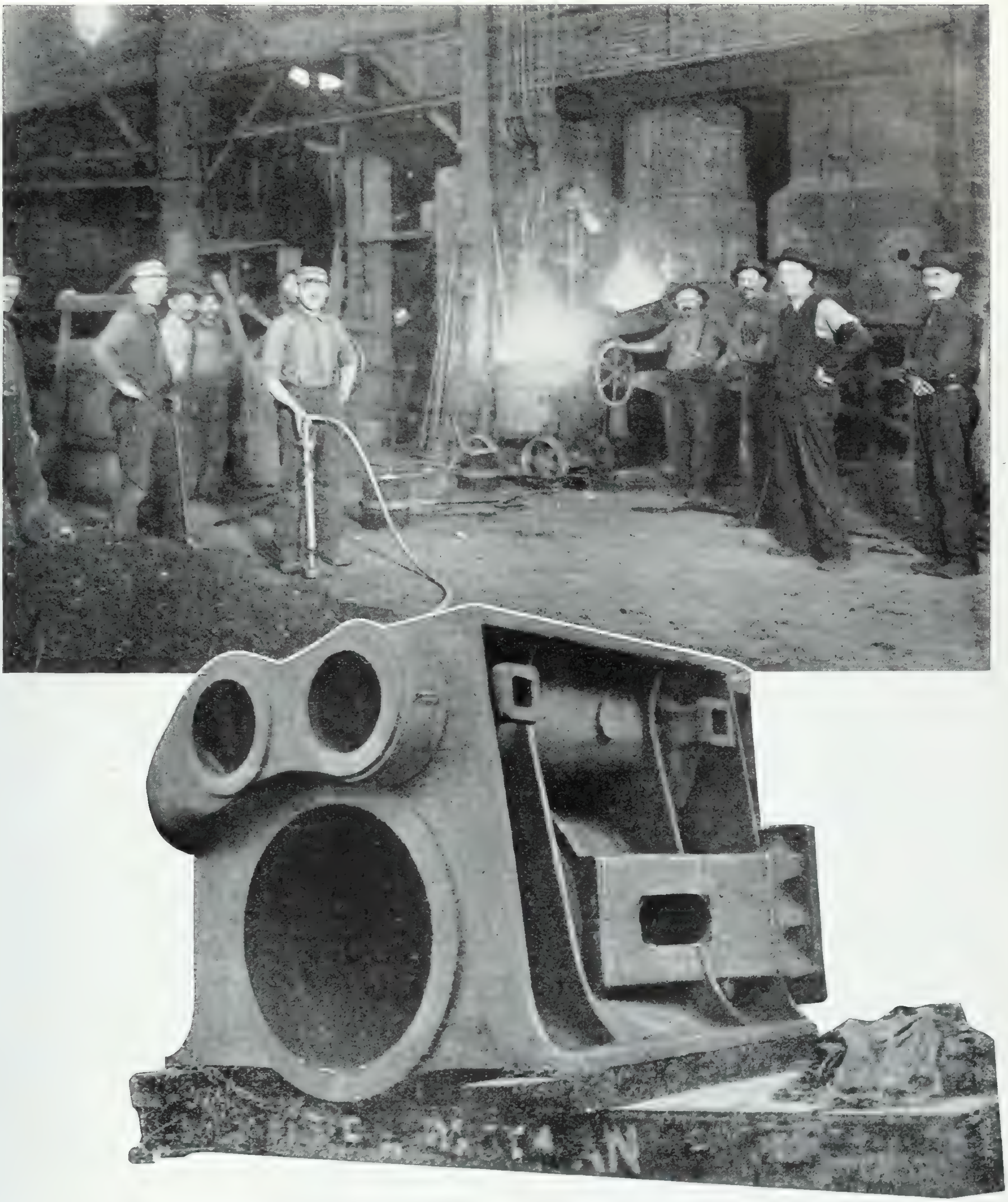
The main core of the low pressure cylinder is built up with brick, faced with loam. There being a large number of these cylinders to be made, cast iron dryers have been made for the port and steam chest cores. This special method saves much handling and the cores dry much faster, for they require no green sand to back them up.

A simple way has been devised of casting all rods required for the port cores into a cast iron plate that fits in the bottom of the port print. The rods are later bent to suit the curves of the dryers and are cut off to proper length. This method makes a very rigid arbor and it is easily removed from the casting by breaking up the cast iron plate.

At the Western Foundry the committee found that two mixtures were being used to good advantage. The Bayley mixture, which consists of three parts of floor sand, one part of new sand and one to fourteen of sawdust, worked very wet. This mixture makes a good core which presents no difficulty in the process of removing it from the casting. The core made from this mixture will stand the heat well in large castings, such as propeller hubs. The Bayley mixture is being used in tees, ells, hawser pipes and all general cores.

The kordek mixture consists of two parts of sharp sand, one part of red sand and one to twenty-six of kordek. This mixture is being used in all the high pressure cylinder cores, such as ports, steam chest, main and lightening cores. In pouring the molds they have experienced no washing effects where the gates hit the cores. The chipper reports that the cores remove easily from the castings.

A visit to the Nineteenth street plant of the Enterprise Foundry Company found them using two mixtures on all their marine and other work. The compound mixture consists of one-half gangway



Interior view of Enterprise Foundry Company and one of their large marine engine cylinders, illustrating complexity of cores needed for producing these castings

sand, one-half burnt sand, one to five of red sand, one to fifteen of pine sawdust and one to thirty-five of compound. The other mixture is the same, omitting the compound. Either mixture makes any core true to shape, easy to remove, and produces a clean skin on casting. The intricate port cores, as well as the plainest brick, can be made of the compound mixture. The management of the foundry lay the success of these mixtures to the thorough mixing it gets in the Enterprise planetary mixer, as it is almost impossible to thoroughly mix the sand by hand.

The committee found that there are no more foundry secrets, as of old, and that everything they desired to know, at all of the plants visited, was given with willingness and good cheer.

An Efficient Oil Filter for Marine Installations

THE Peterson Marine Type Oil Filter, shown in illustrations, is a combination batch and continuous oil filter. When operating on the batch principle about 100 gallons of oil may be handled at a time—that is, no other oil can be taken care of until this batch of 100 gallons is purified and removed from the filter. When operating on the continuous principle a steady stream of oil from an overhead supply passes through the filter and clean oil is drawn off at the same rate.

The filter consists essentially of three compartments — receiving or precipitation compartment "A", filter compartment "H", and clean oil compartment "N".

The receiving compartment is equipped with a heating coil so that the viscosity of the oil may be reduced to break up combinations of oil and water and dirt. Suitable connections between this compartment and the filtering compartment are provided. The filtering compartment is equipped with seven filtering units and an overflow funnel. Two sets of filter cloths are furnished with the filter. Clean and dirty oil gauges, head gauge, thermometer, sight flow, three-way valve, automatic water ejector, etc., are provided.

The shell of the filter is 3-16 inch steel plate riveted, with all joints lap-seamed, closely riveted and caulked. Oil proof packing makes the joints between the covers and the shell oil-tight. The entire filter is finished in black and all trimmings are polished brass.

The dirty oil receiving compartment "A" has a holding capacity of 100 gallons, filtering compartment "H" 35 gallons up to the center line of the nozzles "M", and clean oil compartment "N" 100 gallons up to the same center line. There are 31½ square feet of effective filtering surface and the normal filtering capacity is 100 gallons per hour.

To operate at sea as a batch filter, fill upper compartment "A", first being sure to close three-way valve "G" and water ejector valve "BB". The oil should be maintained at a temperature of 140 to 150 degrees for a period of one hour. The precipitate, which will consist of entrained water and heavy foreign matter, is drawn off through outlet "J". Next, the valve "G" is opened and the oil passes directly into the filtration compartment "H" through the filtering units "L" into the clean oil compartment "N". Each of the seven filtering units "L" consists of two 18 by 18 inch sheets of heavy galvanized wire screen, separated one inch and held in a suitable frame. The edges are smooth so that the bags can be easily slid on and off. The cloth is in the form of a bag and is held over the frame by means of a cover and two thumb nuts. These nuts are so arranged that they may be turned, but will not become detached from the cover. The cloth is brought up over the top of the filtering units and then the cover nuts are screwed down, which holds the cloth tightly in place. This method of attaching the filtering cloth provides for its easy removal for cleaning, and the oil in passing through the filtering units must go through the cloth. The oil passes from the outside to the inside of the units and then out through nozzles "M", which project through the wall of the filtering compartment into the clean oil compartment. The nozzle fits into a spring actuated valve "E", so that any individual unit can be withdrawn and cleaned without interfering with the continuous operation of the filter. When the unit is withdrawn, this valve instantly closes and prevents any new filtered oil from flowing into the clean oil compartment. No oil can pass into the clean oil compartment until the level in the filtering compartment "H" reaches the outlets "M". Thus no filtration takes place until every square foot of filter cloth is submerged in oil. As soon as a slight head builds up over the outlet nozzles, the process of filtration commences and is distributed over every square foot of surface. The rate of filtration depends on the head above the outlet "M", this head automatically adjusting itself to the rate at which the filter is being worked and may be observed by head gauge "R". Normally this head should be about two inches. A greater height indicates that the cloths need cleaning, because it shows that the oil requires more pressure to cause it to pass through the filter cloth on account of the latter having become fouled. If, for any reason, the operator fails to clean the cloths, the oil can only rise to the level of the overflow funnel and pipe "Z" and will pass to the drain tank of the system.

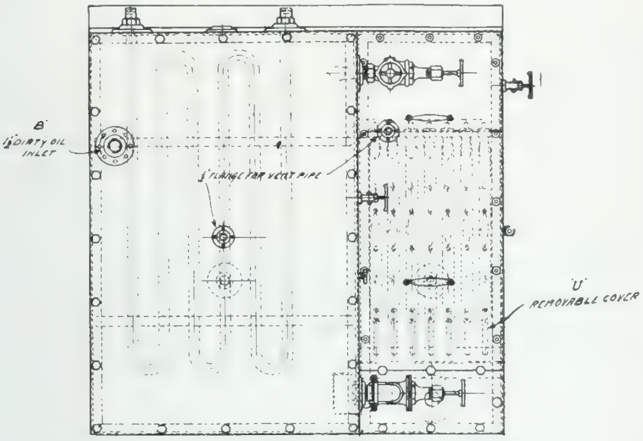
It will be noted that there is a decided advantage in having the cloth in a vertical position and as the oil passes from the outside to the inside of the unit, the muck and other foreign matter which collect on the outside of the cloth tend to work their way toward the bottom of the unit and drop off. To clean a unit, cover "U" is taken off and thumb nut "D" and channel section "W" removed. This latter holds the units in position and prevents them from becoming dislodged when in a sea-way. The unit to be cleaned is then removed as described above and can be cleaned either by brushing with kerosene or gasoline the foreign matter from it, while it is still attached to the metal frame. Occasionally the cloths should be removed from the filtering units and thoroughly washed in kerosene or gasoline.

The amount of clean oil is shown by gauge glass "P". This oil is drawn off through connection "O" before the next batch of oil is admitted to the filter.

Continuous filtration should only be attempted when the vessel is in port, or in a calm sea. To operate as a continuous filter, valve "G" is closed and valve "BB" opened and water poured into compartment "A", as explained in detail below. Oil at the rate of about 100 gallons per hour enters through inlet "B". In compartment "A", the precipitation of entrained water and heavy foreign matter takes place, the water being removed through the automatic water ejector "V" and the partially filtered oil passes through pipe "X" and sight flow "AA" to the filtering compartment "H". Here it passes through the filtering units and all foreign matter in suspension is removed. Clean oil flows through outlets "M" into the clean oil chamber "N" and through outlet "O" to the drain tank. If necessary to bring the temperature up to 140 degrees, the steam coil "E" may be utilized.

On starting, of course, the upper compartment "A" is empty, and as valve "G" is closed, the oil rises until it reaches the dam "K", and then overflows through pipe "X" and sight flow "AA" into filtering compartment "H".

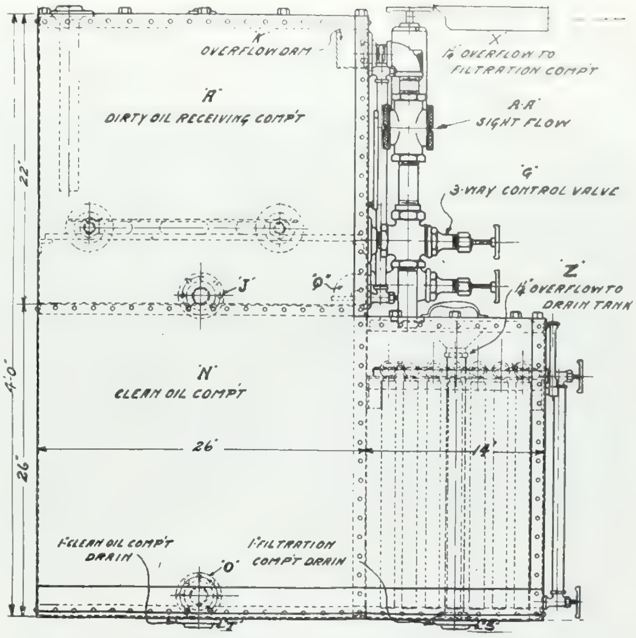
When operating as a continuous filter it is very important that sufficient water be poured into compartment "A" so that the lower fitting "Q" of automatic water ejector "V" is sealed and water overflows the cup of the ejector. In addition to this, water purposely placed in this compartment to seal the water ejector, entrained water from the oil is continuously precipitated in compartment "A" as the dirty oil flows through it. To remove this accumulation of water, automatic water ejector "V" is fitted with a cup that may be adjusted up and down, so that different specific gravities of oil may be satisfactorily handled. After once being set for a given oil, all entrained water is automatically ejected from compartment "A" without further attention. This water overflow operates on the U-tube principle—that is, the column of water in the pipe "V" balances a column in compartment "A" made up partly of oil and partly of water. As oil is lighter than water, the top of the overflow is a little lower than the level of the overflow dam "K". As more water is precipitated out of the oil, the water lever in the precipitation compartment tends to rise and leg of the U-tube, which is inside of compartment "A", becomes heavier because it is made of a greater proportion of water and less of oil. Water is caused to overflow the cup of the automatic water overflow until the two legs of the U-tube again balance, thus automatically maintaining a low water level in precipitation compartment "A". The overflow point of the automatic water ejector is adjusted by the hand wheel at the top.



Plan of filter

After a little experimenting the height of the water overflow can be set so that not more than one inch of water will show and be maintained in dirty oil gauge glass "Y". If more than one inch of water appears, overflow point should be lowered by turning hand wheel in a clock-wise direction, and if less than one inch of water appears, the overflow should be raised by turning hand wheel in a counter-clock-wise direction.

In all Peterson filters cloth is used for purifying the oil. This cloth is closely woven, but made of loosely twisted threads, so that the oil is filtered largely by capillary action rather than by simply straining. We have found that cloth is not only the most efficient filtering medium, but the one which can be most easily handled and cleaned.

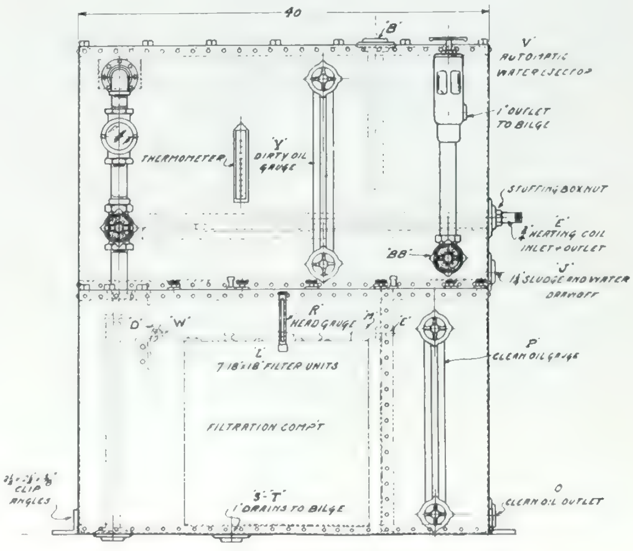

'K'
OVERFLOW DAM
'X'
1¼ OVERFLOW TO FILTRATION COMP'T
'A'
DIRTY OIL RECEIVING COMP'T
'A-A'
SIGHT FLOW
'G'
3-WAY CONTROL VALVE
22"
'J'
'Q'
'Z'
1¼ OVERFLOW TO DRAIN TANK
4'-0"
'N'
CLEAN OIL COMP'T
26"
26"
14"
1" CLEAN OIL COMP'T DRAIN
'O'
1" FILTRATION COMP'T DRAIN
'T'
'S'

End elevation of filter

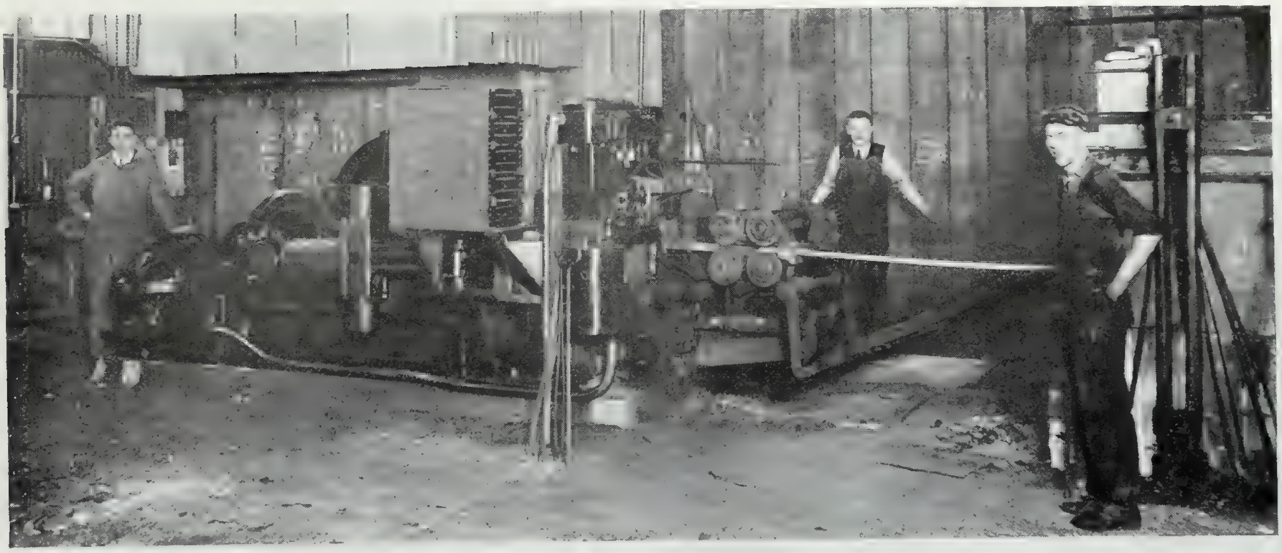
Loose materials have been tried, but modern practice has shown that they are not suitable, because they channel—that is, passages soon form—through which the oil and impurities pass. If, on the other hand, these loose filtering materials are packed tight enough to prevent channeling, the rate of filtration is so slow that a filter of excessive size is necessary to meet the requirements of even the smallest power plant. Filters of this type are also difficult to clean and may have to be cut out of service in order to renew the filtering medium.

An important feature is the scientific design and large capacity of the water separating compartments, and the simple automatic water ejector. Experience in designing and installing thousands of lubricating systems has demonstrated that the capacity of an oil filter depends more upon its ability to remove entrained water from the oil than upon the amount of filtering surface employed. Unless this water is thoroughly removed, an emulsion is liable to be formed which will cause serious trouble and greatly reduce the lubricating value of the oil.

This form of Peterson filter has, after thorough trial, been approved by the United States Shipping Board Emergency Fleet Corporation and is in use in the engine rooms of a number of their vessels.



Front elevation of filter



Automatic rivet machine, Judson Iron Works

Rivets by the Ton

BACK in a dark corner of the old Judson Iron Works at Emeryville, there is working today one of the finest automatic mechanical blacksmiths for forging rivets that the writer has ever seen. In front is a long brick furnace heated by eight high-pressure oil fuel burners. This is used for heating the mild steel rods which are required in great quantities to satisfy the appetite of the machine behind. In order to keep the rods clear of the scale that collects on the floor of the furnace, iron pipes, in which water is constantly circulating, are laid across at intervals. If the rods were allowed to lie in the scale, the machine would be constantly in trouble. A furnace man shifts these rods occasionally, keeping separate the ones that are ready to be fed into the jaws at the other end. A boy at the back seizes with tongs the end of each rod as it is pushed to him and guides it into the jaws of the machine. Here it is grasped by the feed mechanism which is worked by an eccentric rod, bell lever, pawl and ratchet wheen and can be set for any length of rivet from 1 inch to 7½ inches.

The hot rod is fed by this mechanism through a hole in a steel disc, and the travel given is just the proper length of steel needed, allowing for the head, to make a finished rivet of the length required. Back of this steel disc is a die plate in halves, carried in a frame which has a transverse motion transmitted from the main shaft by an eccentric rod and a double bell crank, the eccentric motion being timed so that as the feed motion stops, the cross travel of the die begins and shears off the proper length of steel. The die now acts as a forging plate, holding the rivet for the blow of the head-forming die. This latter die is carried on a cross head worked by a huge connecting rod from a crank on the main shaft. As this cross head backs away a pricker pin, worked by an eccentric, roller and train of lever and rods punches the completed rivet out of the die. The rivet then falls on to an inclined tray, down which it slides on to a chain conveyor, which carries it up over a sprocket and dumps it into an iron push cart. While we were watching, the machine was working on ⅞ x 2 inch rivets. It was producing them at the rate of 98 per minute by the watch. An interesting feature is the safety breaker on the eccentric rod which works the shearing die. This eccentric rod is attached to the double bell crank by a ball and socket connection and has another ball and socket joint midway its length. The sockets on this latter joint are carried in cylindrical boxes cast integral with the rod, and are free to move in a vertical direction against the pressure of heavy spiral springs. Any excessive strains due to clogging of the motion of the die from hard spots in the steel or cold steel causes the ball to slip through these sockets by spreading them apart against the pressure of the springs, thus saving the machine from breakage.

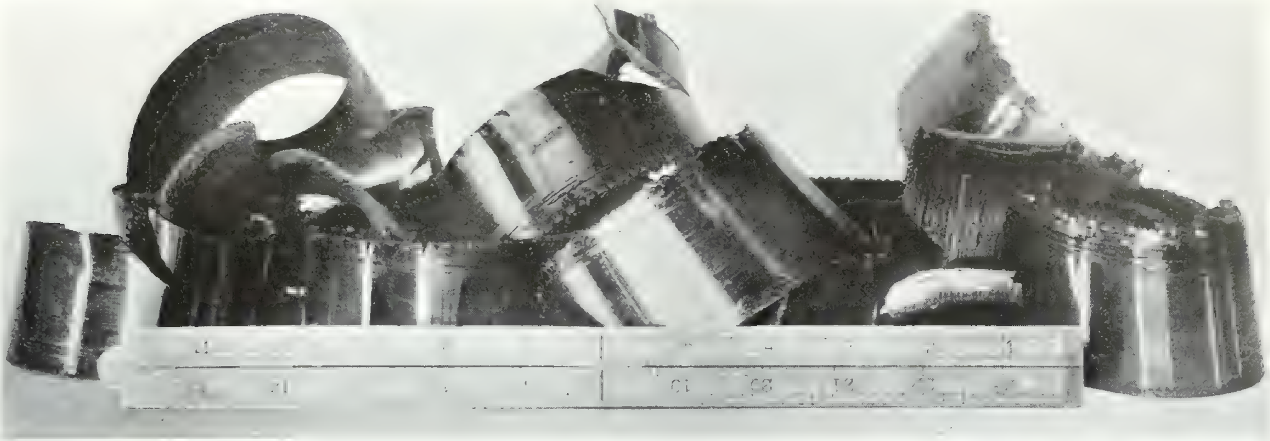
Motive power is furnished by a 32 amp. 440 volt induction variable speed motor direct connected through a worm and spur gear train. Every revolution of the main shaft of the machine produces a finished rivet. The capacity runs about five tons of rivets in an eight-hour day if fed continuously. The machine is now working on a contract for about 1300 tons of rivets and is powerful enough to handle rivets up to 1½ inches in diameter and 7½ inches in length.

The steel used is smelted, cast into ingots, rolled into rods, forged into rivets, and heat-treated on the premises of the Judson Iron Works.

WESTINGHOUSE TURBINES MAKE FINE RECORD

The steamers built by the Los Angeles Shipbuilding & Dry Dock Company, the S. S. "Wassaic" and S. S. "Accomac," recently entered New York Harbor. Both are equipped with Westinghouse turbines and floating-frame type of reduction gears, and both reported, after having traveled over 15,000 miles, that their propulsion machinery was in excellent condition.

The S. S. "Polas Land," a refrigerating ship in U. S. service, built by the Baltimore Dry Dock & Shipbuilding Company, and also geared turbine driven, came up from Baltimore on her maiden trip. Her machinery is said to be operating perfectly.

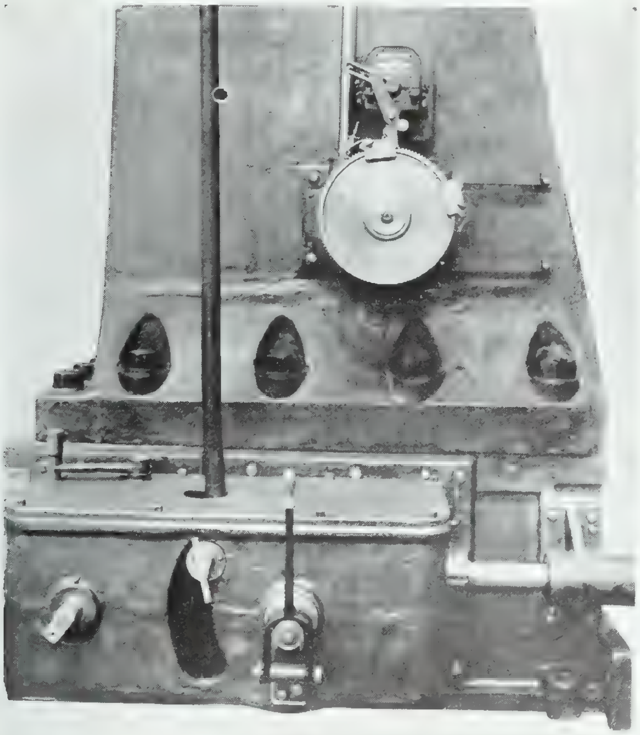


Chips taken at random from upright generating planer

An Upright Generating Planer

DURING the past few years many developments have been made on the simple upright slotting machine, and the present result is a semi-automatic tool which the Newton Machine Tool Works, Inc., have christened "Upright Generating Planer" and which they are building in sizes having 36 to 72 ins. maximum stroke.

These machine tools are built for individual electric drive only, the reversing planer type of motor being used. Motor speed should range from 400 to 1200 R. P. M. and the speed ratio should preferably be three to one. Motion is transmitted from the motor to the cutter-bar rack through a carefully designed train of all-steel cut spur gears, which, on the operating side of the machine, are completely enclosed.

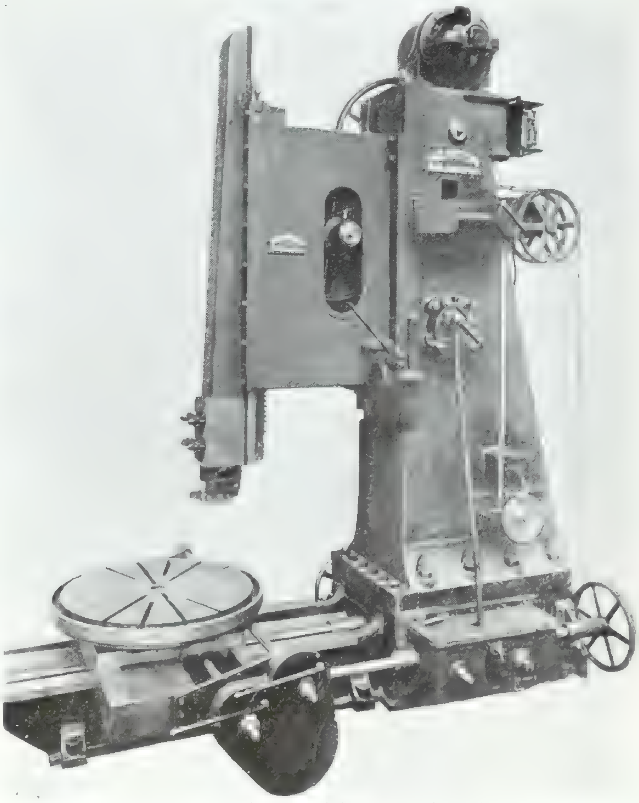


Patented stroke control disc, upright generating planer

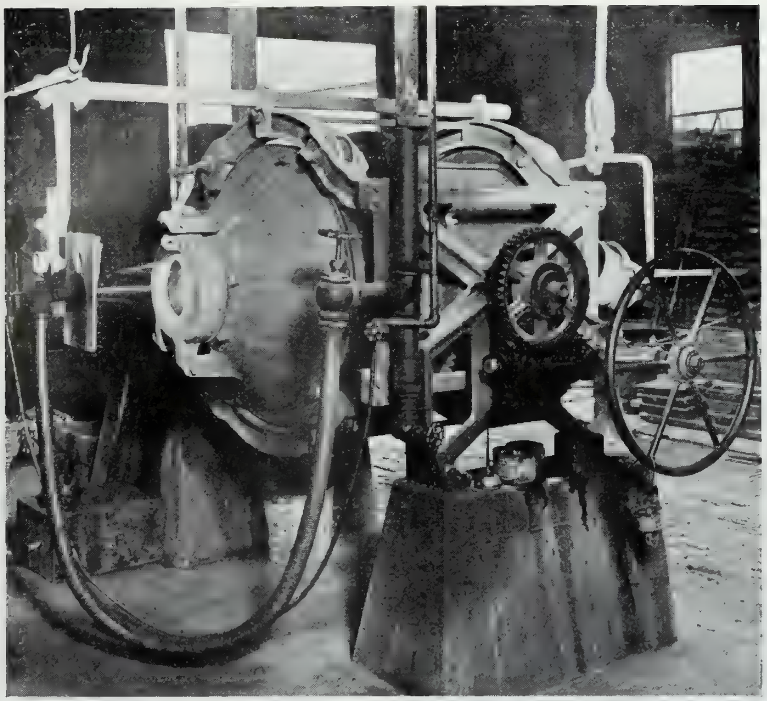
The cutter-bar, or ram, slides in square guides with ample bearing surface, and a taper shoe allows side adjustment. For vertical clamping of tools, a surfaced section of the face of the ram is faced with knurled steel plates and provided with suitable yoke clamps. At the lower end of the ram is mounted the newly developed "swiveling relief tool box apron," which is so arranged that the cutting tool can be operated at any point in a complete horizontal circle. The ram is counterweighted.

Feed motion is taken from a rocking friction box, on the outside of which is the pawl rod adjusting screw. The use of pawl and ratchet wheels makes possible variations in rate and reversal of the circular, cross and longitudinal feeds. To insure operation in tension, all feed screws have bearings at each end.

These machines appear to be designed for great capacity in rapid removal of excess metal from forgings, as they show great rigidity of frame and remarkable convenience of control.



Side view of 72-inch upright generating planer



James Jones Brass Works smelting furnace

An Interesting Development in a Brass Furnace

THE brass furnace shown in our illustration was designed and constructed by the James Jones Company Brass Works of Los Angeles for use in their own shop. The results sought for in this design were economy of fuel, long life of fire brick lining, and great capacity without loss of metal. That these results were attained in the design is proven by the fact that from the day this furnace was first erected and tried, no change has been found necessary in any detail or feature.

The furnace proper consists of a cylindrical drum of steel lined with fire brick, having at each end rails running in four rollers. These rollers are carried in a massive frame which is supported on pivotal bearings. Thus at will the drum can be revolved in the frame, or the frame with the drum tilted to any angle. The drum is closed at each end by a conical head, also fire brick lined, having at its center an opening used for pouring and for entrance of the heating flame. For revolving the cylindrical drum in its frame, a one-horse power electric motor is used, power being transmitted through a bevel pinion and a large annular bevel gear bolted to the outside of the drum.

In operation the flame passes through the drum, playing over the top of the metal and heating both the metal and the upper firebrick lining. The drum being constantly revolved at a slow speed, the heat is carried by the lining to the lower side of the mass of metal, and the metal constantly agitated has a tendency to become more thoroughly mixed and to produce castings of greater homogeneity and more even texture. This revolution of the drum also gives a much longer life to the lining.

Tilting is accomplished by means of a large hand wheel with bevel gear and worm, engaging a worm gear keyed to the pivot of the frame.

The burner supplied with the furnace is designed to use crude oil or distillate, with air under pressure. When using crude oil of 90 degrees gravity, ten gallons of oil will melt 1000 pounds of brass in one hour, with a metal loss in melting less than that in any other oil-burning, brass-melting furnace on the market.

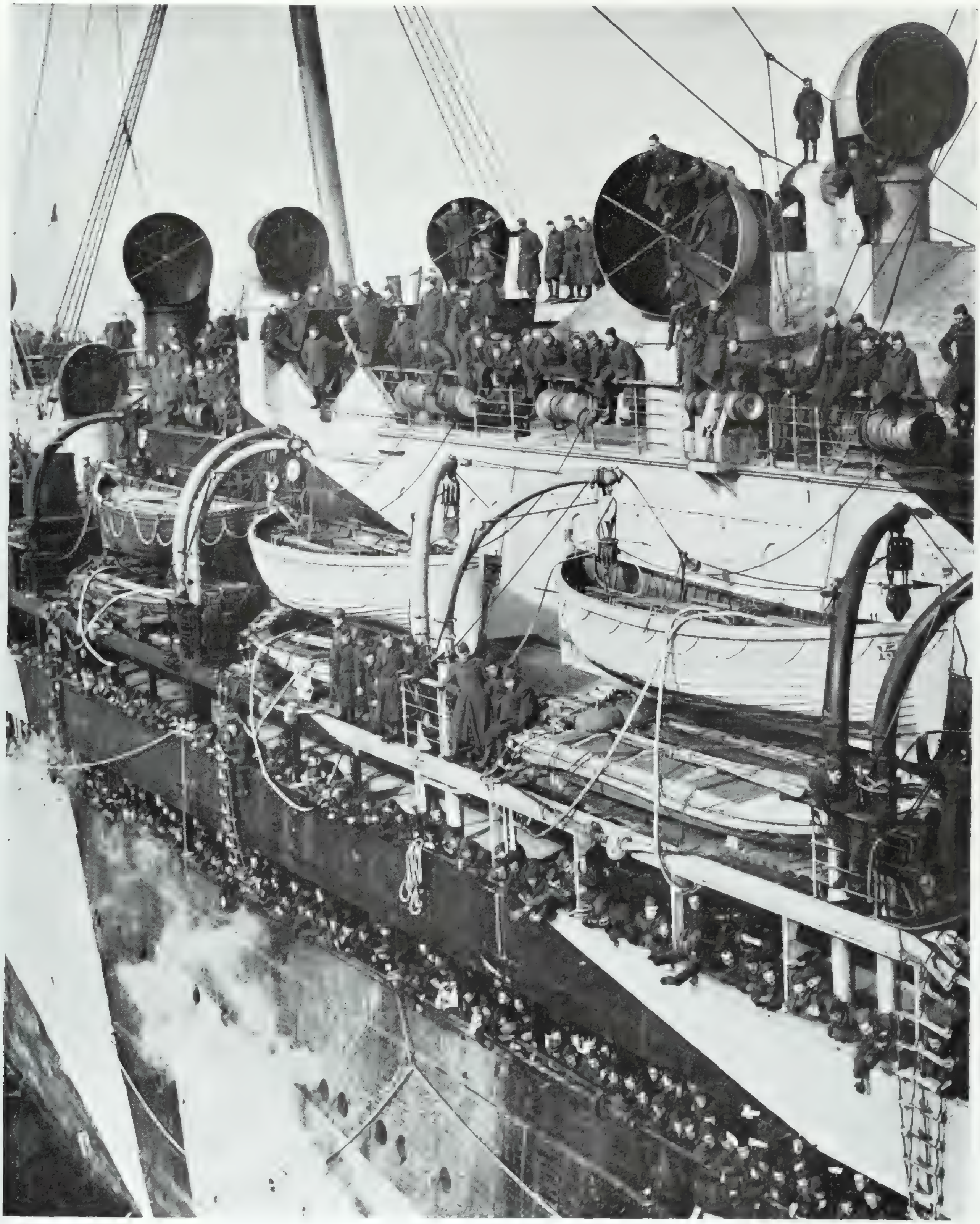
The General Import & Export Company, who are temporarily established at 210 California street, San Francisco, have changed their name to Christenson, Hanify & Weatherwax. This new name embraces three of the members of the firm and the change was deemed advisable on account of other firms located in San Francisco who operate under similar names, as "General Import & Export Company." This change in name will accordingly avoid any confusion.

The personnel of the firm is as follows: E. A. Christenson, of Sudden & Christenson; C. E. Dant, of Dant & Russell; J. R. Hanify, of J. R. Hanify & Company; James Tyson, of Chas. Nelson & Company; Cliff M. Weatherwax, of the Aberdeen Lumber & Shingle Company; Herbert Fleishhacker, of the Anglo & London Paris National Bank.

All of the above gentlemen are presidents of their respective firms.

This company is taking up the importing and exporting business very actively, and are sending three representatives to the Orient in January. They are also sending two men to South America, one going down the east coast, and the other the west coast. It is understood they intend opening offices in the near future in New York City and Shanghai.

Mr. E. C. Hallinan, who was for seventeen years identified with the Portland office of the Balfour-Guthrie Company, is directing the activities of the San Francisco office.



Watching for the Red Cross canteen workers as the "Mauretania" docks. One of the interesting sights to the soldiers as these big liners come to dock at the Hoboken piers is the band of Red Cross canteen workers. These workers pass out from huge baskets chocolate, smokes and sandwiches, which disappear like lightening before the sharp appetites of the dough boys. One can read the keen anticipation of this treat in the eager faces shown in this picture.

Panoramic view showing docks, shops, building ways and outfittng

Tebo Yacht Basin Plant of the Todd Shipyard Corporation

ONE year ago the Tebo Yacht Basin consisted of three long wharves, a storehouse, an office and lounging room, two small dry docks and a large collection of yachts of all sorts laid up in winter quarters. On August fifteenth, Mr. William H. Todd, president of the Todd Shipyard Corporation, signed a contract with the Navy Department to build and equip four mine sweepers. This contract was later increased to include ten vessels. Ground was broken immediately for the erection of building slips and wrecking crews were put to work tearing down brick tenement houses and other structures to make room for a three-story machine shop and storehouse at the corner of Third avenue and Twenty-fourth street, Brooklyn. A compressor house was built and compressors of 3000 cubic feet capacity installed. The first keel was laid on November first. The first vessel was launched on March 16th and the fifth on Labor Day, September 2nd. These vessels are 188 feet long, 35 feet 6 inches beam, 18 feet moulded depth. They are fitted with oil-burning Scotch boilers and triple extension engines of 1400 horsepower to produce a speed of 14 to 15 knots. The equipment includes wrecking apparatus for salvage work and all the most modern appliances for mine sweeping tackle.

All material for these ships was delivered to the Robins plant of the Todd Shipyard Corporation, where it was fabricated into the required forms and trucked over to the Tebo Yacht Basin to be assembled on the hull.

An unusually severe winter delayed both building program and yard equipment, but in the face of great difficulties the plant forged ahead. Some of the other yards engaged on this class of work laid keels and launched their first hulls fully a month in advance of the work at the Tebo Yacht Basin, but the latter delivered the first completed ship to the Government on June 1st, leading the next delivery by nearly a month. At this date they have delivered four ready for service.

The compressor house capacity has been increased to 5000 cubic feet and a great deal of repair work has been done for the United States Navy.

This plant also has contracts for installing machinery on twenty wooden vessels for the Emergency Fleet Corporation. The first vessel under this contract has been completed and several are well under way.

This record of work finished and the yard built in a single year is one of which any plant might be proud.

NEW USES FOR BALSA WOOD

The American Balsa Company, Inc., has recently been organized under the laws of New York State with a capital of $1,000,000, fully paid, to take over the business, property and assets of the Welin Marine Equipment Company and of the American Balsa Corporation.

Directors of the American Balsa Company are: A. P. Lundin (chairman), R. C. Carpenter, J. F. Case, George S. Lewis, George Mixter, William Finlay Morgan, R. B. Sheridan, C. C. Stillman, Beekman Winthrop. The officers are: George S. Lewis, president; A. P. Lundin, William Finlay Morgan, R. B. Sheridan, vice-presidents; Cecil Page, secretary; Percy Mayes, treasurer.

The business of the company is to develop the use of the wood from which the company takes its name. The balsa tree grows in all tropical countries, the principal supply at present coming from Costa Rica and Panama. The chief charactertistic of the wood is its extreme lightness, the weight being one-third less than cork; it also possesses considerable structural strength, being fully one-half as strong as spruce. The tendency of the wood to absorb moisture and to rot is completely overcome by patented processes. The company

wharves of the Tebo Yacht Basin plant of the Todd Shipyard Corporation

also holds world-wide patents on the use of the wood for insulating purposes, for in addition to its lightness and strength, balsa wood possesses remarkable heat insulating properties, which make it particularly valuable for cold storage and other refrigeration purposes. Ample supplies of the wood are assured.

At the present time the American Balsa Company is operating plants at Long Island City, Astoria,, Long Island, on the Harlem River, New York, and Delawanna, New Jersey; practically the entire output being taken by the U. S. Navy, the U. S. Army Transport Service, and by the Emergency Fleet Corporation. The principal products are Welin davits and Lundin lifeboats, which are the standard for U. S. transports, special buoys, balsa wood for airplane and hydroplane construction, A-B-C life rafts and life preservers, and other marine life-saving devices extensively used in the equipment of merchant and war vessels now being constructed. Additions to several of the factory plants are now under way on account of increased orders, particularly from the Emergency Fleet Corporation, which will keep the company running at capacity for over a year ahead.

As soon as war conditions permit, it is expected that there will be increased development in the manufacture of insulation material, especially for refrigerator cars, refrigerator ships, etc.

The principal office of the new company will remain at No. 50 East Forty-second street, New York City.

Hulls at the outfitting wharves, Tebo Yacht Basin plant of the Todd Shipyard Corporation

A. F. Haines, recently elected vice-president and general manager of the Pacific Steamship Company

By Special Correspondent

DESPITE the delays due to the unravelling of federal red tape necessary to secure the sanction of the sale of bonds providing funds for the construction of the new Smith's Cove terminal, a duplication of the existing ocean pier, the Port of Seattle is making rapid progress in the preparatory work.

Though the new port unit was authorized at a special election last September, it was only early in December that the capital issues committee of the Federal War Industries Board at Washington, D. C., finally sanctioned the bond issue of $1,990,000, covering the estimated cost of the new pier and certain additions to the existing wharf, but even before that sanction reached Seattle, the Port Commission, anticipating favorable action, had authorized Chief Engineer George F. Nicholson to proceed with preliminary plans for the dredging and initial construction work.

In co-operation with the city of Seattle the Port of Seattle entered into a joint contract whereby the port would do the necessary dredging work and give the material thus secured to the city at half the cost price, the city to use this material in creating a filled-in harbor line thoroughfare along what is known as Elliott avenue, at present occupied by a wooden viaduct, part of which has been closed to traffic for two years because of lack of funds with which to make necessary repairs.

The dredging contract at the Smith Cove site has been let by the Port Commission to the Tacoma Dredging Company, the lowest bidders on the job, and work has actually commenced.

At the regular Port of Seattle election in December, Dr. W. T. Christensen, a former member of the State Legislature for a number of terms, defeated Judge C. E. Remsberg, incumbent and president of the commission, who was out for re-election, by a large margin. Dr. Christensen will assume the duties of his office, which now carries a salary of $3,000 per annum, in January. He is an enterprising, public-spirited citizen and for many years an advocate of publicly owned terminals. Judge Remsberg had been a member of the Port of Seattle Commission ever since its organization in 1910, having been re-elected to the body twice prior to his recent defeat.

Another mark of progress on the part of the public terminals is noted in the completion of the new addition to the Spokane street salmon storage warehouse, which was finished December 1 and which is a duplication of the existing unit with the exception that it is of wood construction. In this connection it might be mentioned that within twenty-four hours of the completion of this warehouse it was filled to capacity with the Alaska salmon pack of 1918. During the progress of the construction, as fast as a section of the storage warehouse was roofed over, incoming salmon cargoes were stored within, and this practice was kept up until the completion of the building, which resulted in the capacity being taxed upon completion, as three salmon carriers arrived the day the contractors put the finishing touches to the building. The structure was designed by George F. Nicholson and cost approximately $145,000. The installation of mechanical equipment and the like will swell the total cost to about $165,000.

At a recent meeting of the Port Commission, that body went on record with a resolution favoring government ownership and control of shipping and transportation lines of all kinds. It was the sense of this resolution, relative to shipping, that the government retain ownership of the big new emergency fleet, and allow their operation on a liberal charter or subsidy basis to shipping firms.

By an arrangement entered into between the Alaskan Engineering Commission and the Coastwise Steamship & Barge Company, of which latter James Griffiths & Sons are the Seattle representatives, the steamship "Anyox," built at Winslow, Wash., and the barge "Baroda" are now on their way to Balboa, Panama, for the purpose of loading a large consignment of railroad cars destined for the Alaskan railroad. The railroad equipment consists of freight, passenger and flat cars, most of which were originally built by French interests which one time contemplated the construction of the canal, and these cars will be shipped knocked down and put together at the Seward and Anchorage railroad shops of the Alaskan commission.

A marine wrecking and diving concern continues to make soundings and gather marine data with a view of attempting to raise the sunken Alaskan cannery ship "A. J. Fuller," belonging to the Northwestern Fisheries Company, which went to the bottom of the bay here early in November, after being rammed by the Osaka Shosen Kaisha liner "Mexico Maru." When the Fuller sank she carried with her a new harbor mooring buoy belonging to the city of Seattle, and since the recovery of this apparatus, salvage experts believe that the "Fuller" can also be raised. She is loaded with a full cargo of cased Alaskan canned salmon, which will add to the salvaging difficulties, it is said.

The Osaka Shosen Kaisha liner "Canada Maru," which crashed on the reefs at Cape Flattery in August, will resume her run to the Orient about January 5. The "Canada Maru" for a time was believed to be a total loss on the jagged Flattery reefs, but later she succeeded in pulling off the rocks by her own power, and was then convoyed to Tacoma by attending salvage vessels. On discharging her cargo she proceeded to Esquimalt, B. C., where the contract for repairing the ship was let. At that time all of the Seattle and Tacoma repair plants were engaged, and the company, unable to get a guaranteed time for docking, went to British Columbia. W. C. Dawson & Co., Seattle agents for the O. S. K. fleet, recently removed their offices from 101 Yesler Way to the fifth floor of the Mutual Life building, almost directly across First avenue from the old location. This concern is also local agent for the McCormick fleet of coasting steam schooners, the Charles Nelson line, and the Seattle Steamship Company.

The Universal Shipping and Trading Company, Ltd., an American concern backed by Norwegian capital, has established a suite of offices in the Alaska building here, and recently closed negotiations whereby they act as charter agents for a number of new ships, in addition to several well-known craft of the Pacific. Among the latter are the schooners "William Nottingham" and "J. W. Clise," and the motorship "H. C. Hansen." This firm is also agent for Hansen & Holm Rhederi, of Pausgrung, Norway.

The second week in December was remarkable for the departure of the greatest number of passengers bound for the Orient in any one week in the history of Seattle. In fact it is doubtful if a greater number ever before departed in a month. The Nippon Yusen Kaisha liner "Katori Maru" and the "Chicago Maru" and "Manila Maru" of the Osaka Shosen Kaisha fleets left that week taking a total of 863 passengers, about equally divided between Europeans and Orientals.

The first of the North Pacific codfishing fleet to arrive out on an oversees voyage following the closing of the fishing season, is the schooner "Charles R. Wilson," which arrived at Levuka with a cargo of lumber from Port Angeles early this month. The schooner made the run from Port Angeles to Levuka in forty-five days. She is owned by the Pacific Coast Codfishing Company of this city, and is under charter for the Levuka voyage to Comyn, Mackall & Co. She is commanded by Capt. Harry Johnson, who is on his first offshore voyage as a master.

The steamship "Santa Cruz," one of the W. R. Grace & Company fleet of big freighters, recently sailed for Vladivostock from Seattle with 2,700 cubic tons of freight loaded here and about the same amount loaded at San Francisco. She is the second vessel to leave here in the past few weeks for the Siberian port. The vessel's cargo consisted almost exclusively of Government material, a goodly portion of which was shoes.

Transports of joy were noticeable about the various steamship and railroad offices of Seattle early in December, for the Government sent out a notice to the effect that the ban on the issuance of passes to employes of railway and steamship lines had been withdrawn. The order meant that many employes, who had anticipated having to pay their fare to their homes for the Christmas holidays, would thereby be able to travel gratis as in the days before the Government commenced operating the transportation lines.

With the cessation of the war the custom of the naval authorities of meeting all incoming foreign ships and the placing of a guard aboard while the vessels were in American waters has been withdrawn.

One of the largest and newest freight steamships built in Japan is now well on her way across the Pacific destined for Seattle, with over 9000 tons of general Oriental merchandise. The steamship is the "Konan Maru," chartered by Mitsui & Company, and is bringing a cargo consisting principally of rice, tea and matting.

From Nome, Alaska, comes a plea that the United States Government take cognizance of that harbor as a regular port of call, and asks that steps be taken toward the completion of a Government built jetty and the construction of a long wharf where vessels may dock instead of being subject to the existing lighterage system. J. P. Daly, a member of the territorial Legislature of Alaska, is one of the most earnest advocates of the idea, and announces his determination of going to Washington to place the proposition before Congress.

According to information reaching State Fish Commissioner L. H. Darwin, the State of Massachusetts intends to continue the policy of stocking the rivers and streams of that State with salmon brought from the Pacific Northwest. The hatcheries of the Northwest have taken 60,000,000 salmon eggs this season, and Commissioner Darwin declares the State can easily spare the 200,000 eggs asked by Massachusetts.

Robert MacDowell, son of Matthew MacDowell, the pioneer Puget Sound steamboatman who founded the MacDowell Transportation Company, has given up his berth as a chief engineer on a Puget Sound craft, and has joined the crew of the French auxiliary steam powered schooner "Adjutant Dorme." The MacDowells are well known all over the Sound, since they operated steamboat lines to most of the island points from both Seattle and Tacoma.

During the second week in December the Inter Ocean Barge & Transport Company launched the second concrete barge built by that concern for the Border Line Transportation Company. This craft was the first from the new plant of the concern on the Duwamish waterway.

Advices received here by Balfour, Guthrie & Company announce the return of the steamships of the Harrison direct line between Liverpool, London, Antwerp and Puget Sound. The announcement is to the effect that the steamship "Professor" will be placed on berth at Liverpool during January, and is expected to sail from that port for London and Antwerp about January 25. She is to be followed by monthly sailings. The Harrison line ship to call here was the steamship "Merchant," which was on Puget Sound last January.

The Seattle firm of Thorndyke, Trenholme Company, Inc., which has handled all of the French ships built by the Foundation Company at Portland and Tacoma, has decided to establish an agency in Paris. For the purpose of opening this office, Fred P. Gross, an attache of the company's local office, is on his way to France. Gross is a native of that country, but has lived in Seattle for the past ten years, during which time he has been active in shipping circles.

Bringing big cargoes of cranberries from the Kuskokwim River flats, the power schooners "Eunice" and "Apokak," both operated by the Kuskokwim River Fishing & Trading Company, arrived in Seattle December 12. Capt. Louis Knaflich, president of the concern, came south in the "Eunice" and he declares that the native population of the Aleutian Isles is in dire danger of starvation due to the almost total absence of trading vessels in the archipelago during the summer. He urges that the Government send a relief ship north at the earliest possible moment.

Juneau, Alaska, early in December, was threatened with a serious coal famine, and the situation was relieved by the rushing of the Alaska Steamship Company's freighters "Latouche" and "Cordova," both coal laden, to the Alaskan capital.

One of the unique occurrences in local shipping circles during the past month was the arrival of the Chinese steamship "Hwah-wu," a former German steamship which was seized by the Chinese republic upon the severance of relations with Germany. The "Hwah-wu" was formerly the "Albenga," and before that the British steamship "Mayflower." She is a vessel of 4149 gross tons, Lloyd's measurement, and brought a cargo of approximately 3000 tons of general freight for Seattle. The "Hwah-wu" was chartered by the Chinese government to the Nippon Yusen Kaisha and when she arrived here she flew that house flag as well as the flag of the Oriental republic. On the same day the steamship "Keishin Maru," another N. Y. K. charter, arrived with 9000 tons of gunnies.

The United States Shipping Board has established a new system of tests for the wood ships of its fleet. The new schedule calls for sea trials, each new ship being taken on an endurance run outside of Cape Flattery before the ship is accepted. Seven new ships built at Puget Sound points have recently successfully completed the tests.

The United States merchant marine recruiting service is endeavoring to maintain a complement of 1500 men at the training station at West Seattle and aboard the two training ships, the "Chippewa" and "Iriquois." Recruiting is being carried on throughout the Northwest, especially at Camp Lewis, and the adjacent training stations where soldiers and sailors on being discharged from the service are being recruited for the merchant marine.

What is to become of the wood shipbuilding business in the Northwest and other parts of our country is the question now facing the men engaged in this industry, on account of the action of the United States Shipping Board in announcing a drastic retrenchment policy which virtually cuts off the building of wood ships as far as the emergency fleet is concerned.

The shipbuilding concerns engaged in wood construction are inclined to be censorious of the United States Shipping Board, at least such is the attitude of the operators of many yards in the Northwest. In a sense they really have a grievance.

Upon the declaration of the armistice the Shipping Board announced the cancellation of a large number of contracts. A week or so later, evidently under pressure, a portion of the cancellations were rescinded. It was announced that only those orders placed with plants which had not yet laid a keel were to remain cancelled, and all plants actually engaged in ship construction on Shipping Board order would be expected to complete their contracts. At the same time it was announced, that the Government was entertaining a proposition whereby these wood ships were to be sold, and a definite price of approximately $750,000 per vessel was declared to be a reasonable figure.

On the strength of this announcement the wood ship men felt highly elated and immediately commenced a campaign of recruiting their shipyard forces to greater capacity from the thousands of soldiers of the spruce production corps now being discharged from the Army in this locality.

Hardly had they started on this campaign, which was being materially aided by the United States Department of Labor, when along came another decision from the Shipping Board which threatens to drive out the industry completely. This is the order, still effective, that only wood ships upon which from $200,000 upward in workmanship and material has been expended shall be completed. All other vessels of the wood ship program are cancelled, and the order declares that the Shipping Board will adjust the expenditures of the yards affected upon vessels on which less than the stipulated ratio has been done, on an equitable basis.

Now the builders want to know how the board proposes to discriminate between the hull upon which the required $200,000 in work and material has been expended, and the ship upon which from $100,000 to $200,000 is expended. This problem, together with numerous other plaints of the wood builders, promises to be a bone of contention between the contracting yards and the fleet corporation for months to come.

When Director General Schwab and Vice-President Piez were in Seattle last July, the wood ship men claim to have been assured by both that the plants then in operation would be kept busy with Shipping Board work until December, 1919, at least. They accepted this statement in good faith, and, according to the officials of the Washington Shipbuilders' Association, laid their plans accordingly. Orders for timber and materials were placed on this basis, and unless private contracts, either local or foreign materialize, many of these plants face serious losses.

Another phase of the wood ship program, and probably the most trying situation of all, is the fact that two months ago, or during the month of October, foreign wood ship contracts were to be had here in sheaves. At that time none of the plants were in a position to undertake these contracts because of the Shipping Board provisions safeguarding the construction of the emergency fleet ships, embracing as it did an embargo on materials for other than Gorevmnent contracts.

Norwegian and French interests besieged virtually all of the Seattle plants at that time. Contracts were offered for wood ships at good prices, and even bonuses were offered in many instances, but the local builders engaged in construction for the Shipping Board were helpless under the circumstances, while the independent yards were handicapped through the regulations which permitted them only to secure timber and materials for the vessels already under contract, and even in these cases they were subject to long delays in the securing of needed materials.

At the four Seattle wood shipyards building on emergency fleet order, it is estimated that all of the ships now on the ways at these plants will be completed under the apportionment ruling. Meacham & Babcock have six ships on the ways at that plant, and an estimate made by the plant officials with a Shipping Board inspector on hand finds that at least five of the vessels fully meet the estimate, while the sixth ship is thought to be far enough along in frame, figured with the material already delivered, to be included. All are Ferris type ships.

At the Puget Sound Bridge & Dredging Company plant the officials estimate that the five ships on the ways will undoubtedly be completed. One of these vessels is ready for launching, and is a Ward type ship. The other four are what is known as Geary type ships, and are in various stages of completion, though a survey will probably be required to adjudge the status of at least two of them.

Nilson & Kelez, also building Ferris type ships, have two vessels on the ways, and both are believed to come within the requisite amount of work performed to insure their completion, and the same condition prevails at the Allen Shipbuilding plant, where one vessel is on the ways and virtually completed as to hull. There are four Seattle plants building on direct contracts. Seven other shipyards are building for private interests or foreign accounts.

The largest of these independent plants is the Patterson-MacDonald Company, which is building the last of ten 4200 tons wood vessels for the Australian government. This concern was given a contract with the Shipping Board for ten of these ships, but as work had not yet started on the vessels at the time of the cancellations following the armistice, these were included in the cancellations ordered at that time.

The Anderson Shipbuilding Company, on Lake Washington, is also engaged in building on private account. This plant has already turned out two wood ships, built originally for a New York concern, but since sold to French interests, and has two vessels on the ways for Norwegian interests.

The Elliott Bay Shipbuilding Company is engaged in the construction of four motorships for a Norwegian concern. One of these ships is already in the water, while the other three may be launched soon. This concern, as did the Anderson Company, took contracts with the Shipping Board during the summer, but in both instances these were cancelled with the declaration of the armistice.

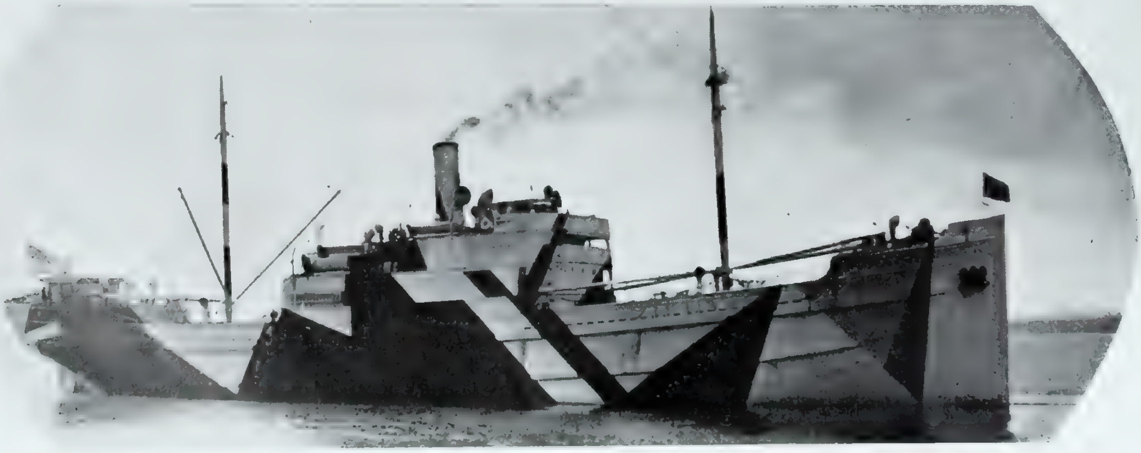
The Price Shipbuilding Company, formerly the Sandstrom plant, which has already launched one Norwegian motorship, has two more on the ways and is prepared to complete these vessels. There is also a strong probability that this plant will continue to build for some time, since the management, while not making an announcement at this time, declares that a contract for a number of ships has been practically closed. As far as is known, this is the only Seattle shipyard to have new contracts actually in sight at this writing.

The National plant, having launched two schooners recently, is now practically idle, as is the Ballard Shipbuilding Plant. The McAteer shipyard is building two wood schooners and a small steel hull, the latter being for the U. S. quartermaster's department. These comprise Seattle's wood shipyards.

Every one of these plants during October was approached with offers of contracts on either Australian, French or Norwegian account. The Shipping Board's control of shipbuilding material made it impossible for them to assume such contracts. The result was that these offers were taken to British Columbia, where the Canadian Munitions Board, controlling the shipbuilding over there, at once issued permits for the construction of the ships. It is estimated that fully sixty ships were contracted for in British Columbia the latter part of October and during November.

As a result there are no contracts offering in the Seattle market. The Foundation Company, with two big plants, one at Portland and the other at Tacoma, has ceased operations and is now devoting its activities in the Northwest to the operation of two plants at Victoria. Officials of that concern deny that the Portland and Tacoma plants are to remain idle, but so far have made on announcement of their reopening.

Another matter likely to add to the handicap of local wood plants is the high cost of material and labor here as compared with British Columbia or European countries. During the war period the cost of a ship was a secondary consideration. This condition no longer exists and the foreign contracts are going where the market is most reasonable. A prominent Norwegian agent, a man who has contracted for many ships in this section, recently remarked that, with the war over, he could now build a ship in Norway for 50 per cent or less of what it would cost him to build the same ship here. This last is probably the answer to the absence of contracts here, but had the local yards been permitted to accept the contracts at the time they were offered, the cessation of the industry would not be likely for at least another year. Now it appears likely that March will see the setting of the curtain on wood shipbuilding in this district, at least so far as the big majority of the plants is concerned.



Steamship "Cruso," built by the Pacific American Fisheries, South Bellingham, Wash.

Auxiliary motorship "Gaby," built for Belgian interests by Chilman's Shipyards, Hoquiam, Wash.

Some Belgian Shipping Plans

WAR-SCARRED Belgium has taken the first step toward her commercial rehabilitation. As plucky in peace as she was in war, she is not waiting for others to help her but is helping herself. And in token of her appreciation of Yankee friendship and Yankee worth, she has chosen an American to hew the way for her.

This American is Joseph A. Nash, for four years general manager of the shipping and purchasing department of the committee for relief in Belgium. He arrived recently from London in New York in the capacity of manager for the United States and Canada of the Lloyd Royal Belge. This is a purely Belgian enterprise, the first attempt on the part of that country at direct trans-Atlantic connection between her own shores and those of North America, and the first step in the direction of weaving a strong commercial and industrial bond between the two nations. A pet project of King Albert, certain of government support, endowed with funds to insure almost unlimited expansion, the Royal Belge is in the market for ships, and assurances have already been received that every vessel that flies the red, yellow and black will cross the ocean filled with rich cargo.

The main offices of the company just now are in Paris, where the line's president, M. Arthur Brys, makes his headquarters while his old home office at Antwerp is being prepared for his return. The American branch is located at 141 Broadway, New York City, and from there Mr. Nash is conducting his negotiations.

The Royal Belge was organized as a corporation after the war had broken out. At that time it owned forty ships and its head, M. Brys, turned them over to war purposes. In his own country and in France he is considered one of the most remarkable figures of the day—immensely wealthy, yet always at work; indomitable in his determination to win for Belgium a commanding position as a commercial power and ready to sacrifice his own interests and his own wealth in the service of his nation. The leading men of Belgium look up to him as minor officers in an army look up to their general.

Of the original fleet of forty, only sixteen vessels are left. The other twenty-four were sunk by submarines or mines. Twelve of the remaining ships are temporarily flying the British flag, carrying supplies to France and being engaged in other similar work. The other four are still in the service of the Belgian relief.

The Royal Belge has a large liquid capital of its own and a great additional sum has been guaranteed for its enlargement. The first trip, as soon as the service has been organized, is to be made between Antwerp and New York; and just as soon as this route has been fully established, the great Belgian port is to send vessels to Philadelphia, Norfolk, Baltimore, Charlestown and even Galveston. Later, Canadian ports may be added.

What Belgium needs first of all, Mr. Nash said, is American machinery. Cotton and textile fibres are next required, as well as immense quantities of tobacco. In return, Belgium will ship us her linens and needlework. Much of this is being manufactured even now, more than 60,000 women and men being engaged in these industries. For, despite the havoc wrought by the Germans, enough has been saved to enable these people to keep at work and produce marketable goods. Glassware, too, is one of Belgium's specialties and its manufacture will be resumed on a large scale just as soon as a proper survey can be taken of what has remained intact of the country's industrial facilities and what is in need of reconstruction.

Speaking of this feature, Mr. Nash said: "Belgium will get back into the commercial race without delay. The speed with which she does this will depend upon two factors—the amount of industrial rehabilitation to be accomplished at home and the number of vessels she will have at her disposal for importing and exporting. There is one thing Americans must bear clearly in mind when thinking of their own future relations to Belgium: Belgium is not a poor country. Far from it. She is one of Europe's richest. She is like a man who has been in jail with plenty of resources, but unable to utilize them. She has never been like a pauper and is not now. The war is over, her leading men are eager to put their wealth to work.

PORTLAND

By Special Correspondent

Paul B. Thompson, superintendent of the Portland yard of the Foundation Company for several months, who returned early in December from an Eastern trip, which included attendance at the annual New York dinner of the Foundation Company, has accepted the superintendency of the company's wood plant at Victoria, B. C.

Harry Humphrey, Philadelphia representative of the Willamette Iron & Steel Works, formerly manager of the boiler department of the plant here, was in the city the first week in December, attending a gathering of selling agents for the organization. Incidentally, Mr. Humphrey brought with him contracts for thirty-one Scotch marine boilers, six of which will be shipped to Balboa for installation in two of the captured German steamers, the boilers of which were rendered useless by the German crew.

Lloyd J. Wentworth, supervisor of the Oregon district of the wood ship division of the Emergency Fleet Corporation, has returned from Philadelphia and Washington. He was East when the Shipping Board ordered suspended the last contracts for wood ships that had not been started, and says that, regardless of the closing of the Federal programme, the fame and records of the Oregon district will not be dimmed for some time.

Placing the steamer "City of Topeka" on the San Francisco-Portland route, with calls in Humboldt and Coos Bays, marked the real entrance of the Pacific Steamship Company into the coast trade out of this city, the vessel making her first trip into Portland December 15. She is to remain on a twelve-day schedule, and there is every reason to expect her owners to augment the service as rapidly as trade development warrants. The San Francisco and Portland Steamship Company has the liner "Rose City" on the through run from Portland to Los Angeles, by way of San Francisco, and it is not known at present whether another ship will be added to the line.

Authority has reached the bureau of operations of the Shipping Board for the charter of new wood steamers to private individuals or corporations, but as no rate has been quoted, and it is reported the Government expects from $4 to $5 a deadweight ton a month for the bare ships, it is regarded improbable there will be a scramble for the tonnage. So far the vessels have been assigned to companies acting as managers for the Shipping Board, the only exception being the San Francisco & Portland Steamship Company, which chartered the "Blandon," a Hough ship, and gave her up after three months because of the expense of her operation.

During the year the Peninsula Iron Works has devoted all of its capacity to Government needs and part of its output has included all underwater machinery for thirty-two wood vessels, twelve of them Hough ships and twenty of the Ferris type.

United States Steam Vessel Inspectors Edwards and Wynn have exonerated all licensed officers on watch when the 8800-ton freighter "Westview" struck the Port of Portland steamer "Pronto" on November 26, at the Fifteenth street terminal and sank her. The "Pronto" was raised December 14 and ordered repaired.

Captain Jack Speier, harbormaster of Portland for ten years, who was given leave eight month ago to serve as port captain for the Shipping Board, then accepted a commission as a captain in the United States Engineers, was mustered out of the service at Fort Douglas, Utah, December 13. He will resume his duties as harbormaster, in which capacity he had been rated one of the most efficient men on the coast.

Bringing close to 700 tons of copra and 11,800 feet of iron bark, the schooner "Golden Shore" made the Columbia River December 11 after a voyage of eighty-one days from Sydney. She will load outward with lumber.

As a consequence of the Shipping Board's order to suspend work on ships not actually on the ways November 25, about twenty-six ships are affected in the Oregon district. Builders are planning for future business and will first devote considerable attention to the matter of filing claims with the Government, feeling that they are entitled to adequate reimbursement for having gone to such an

Wooden steamer of the Ballin type

expense in preparing plants, steps regarded fully justified at the time, owing to promises that the wood ship program would be carried along until the close of 1919.

Leasing of the Oregon and California dock, on the East Side above the Harriman bridge, is the first step by the Edlefsen Fuel Company toward the establishment of modern bunkers. The Pacific Coast Coal Company is rapidly completing its new bunkers, which will have a capacity of 5000 tons, and the Port of Portland Commission has a coal storage dock under way alongside the St. Johns drydock which will hold 5000 tons. There a 25-ton locomotive crane will be used to handle the fuel from the dock to lighters, the latter to go alongside vessels and fill their bunkers by means of a "clam shell" gear.

I. N. Day, general manager of the Kiernan & Kern Shipbuilding Company, which has a contract for the construction of four 4500-ton composite steamers, of the Ballin type, for the Emergency Fleet Corporation, spent the fore part of December at Washington on business connected with the effort made by wood builders to have the suspended contracts reinstated. The Kiernan & Kern plant had just started the first ship, the keel being in place, when the order came, so without a moment's delay the force of 250 men was discharged.

During a visit to Portland last month, H. F. Alexander, president of the Pacific Steamship Company, and A. F. Haines, vice-president, announced that it was the intention of the directorate to establish a direct line between Portland and the Far East, not to simply operate a fleet that would give joint service to Portland and Puget Sound territory. It has been reported also that Sudden & Christenson were surveying the field with the expectation of placing steamers on the Oriental route out of Portland. Both plans are to be influenced largely on the allotment of steel steamers by the Shipping Board.

W. R. Hewitt, of San Francisco, marine superintendent for the McCormick fleet, who was in Portland two weeks ago, says that there is no question as to the future of the wood ship and points to the successful operation of the auxiliary fleet under the McCormick flag as indicating what can be done, though there are some who held the auxiliary type was not to be expected to "break even." It is fully believed the McCormick interests will take up the construction of ships for their own account as soon as the St. Helens Shipbuilding Company clears its ways of Federal vessels.

A. B. Hammond, a Portland visitor from his San Francisco headquarters during the month, paused from his attention to lumber matters and his shipyard on Humboldt Bay to delve into plans for a 5000-ton wood steamer, which were perfected by Oregon interests and approved by the Emergency Fleet Corporation a short time before its wood program was brought to an abrupt stop. Mr. Hammond is another who says, after wide experience as an owner, that there is nothing wrong with the right kind of a wood vessel.

Pouring of concrete on three of five hulls the Great Northern Concrete Shipbuilding Company has undertaken for the Government at its Vancouver, Wash., plant, was started in December, and by the middle of the month the first hull was well along, only bulkheads remaining to be poured. The ships are intended for the transport department of the Army to carry liquid cargo in harbors or on short trips and are 100 feet long. They will be driven by twin heavy oil engines.

First of the cargoes of a new line of business here, the shipment of box shooks to the Hawaiians, was carried in the steamer "Moraine," built by the Grant Smith-Porter interests and loaded by Dant & Russell. She got away about December 10.

Henry Rothschilds, manager of Brown & McCabe, stevedores, has been named by the Chamber of Commerce to represent the employes on the waterfront grievance committee, and when a member is named by the Longshoremen's Union the two will select a third.

Steel shipbuilders have received offers of negotiations from foreign interests and the Northwest Steel Company had contracts placed before its directorate for twenty freighters for the French, but the refusal of the Shipping Board to permit construction for foreign interests of other than wood carriers, has prevented future orders being taken. William Cornfoot, of the Albina Engine & Machine Works, reports having received offers for new vessels, but as yet no encouragement is held out for the steel builders to do other than concentrate on completing the Federal vessels.

First of the "after the war" shifts to manifest itself among Portland marine plants is the announced determination of the French government to convert the yard of the Foundation Company, which it controls, or has controlled for the period during which twenty French steam auxiliary schooners were built there, into a steel plant for turning out vessels of about the 5000-ton class, with provision for handling up to 95-ton ships if desired.

Captain F. Tristan, of the French High Commission, came from Washington the fore part of December and spent several days inspecting all shipyards here, ascertaining particularly how steel yards had carried on their work and obtaining a comprehensive insight into the general situation. He went to Tacoma, where the Foundation Company has operated a wood yard also for the French with the same number of ships completed during the year, twenty, and where a second steel yard is contemplated. Proceeding to Victoria a new wood plant, the third under the Foundation flag in the Northwest, was inspected and the future of that plant may be considered. Captain Tristan said that he will carry all data to Washington and there make a report with recommendations as to the steel transformation. The report in turn will go to France and he hopes an early authorization will result, so that by spring most of the plant at Portland will be in readiness for undertaking of the steel fleet.

The latter part of July, 1917, the Foundation Company gained possession of the O. W. R. & N. "boneyard" property for the shipyard. An immense fill was necessary and a vast amount of work followed in building ten ways and putting in the necessary plant, yet the last hull was floated November 27, 1918, that being the "Soissons," and December 23 the ship went on her trial trip, being the tailender of the French fleet.

Bayly Hipkins, Pacific Coast manager for the Foundation Company, who is also one of its vice-presidents, was with Captain Tristan, and, while

The wooden steamer "Airlie" on trial trip

noncommittal as to the plans, it is known that they include the company taking over the French properties and conducting them under their own control.

Plans for the building of a 12,000-ton timber drydock by the Commissioner of Public Docks; a 6000-ton concrete dock by the Pacific Marine Iron Works, and a 10,000-ton dock by the Port of Astoria Commission, while the Port of Portland Commission has ordered the construction of a sixth pontoon for its 10,000-ton dock at St. Johns, all in preparation for future shipping, is accepted as insuring Portland and the Columbia River district having abundant facilities for handling vessels.

The Commission of Public Docks is now planning a number of harbor improvements, a $5,000,000 bond issue having been authorized by voters in November for the purpose, and besides a drydock there will be a broader program at the St. Johns municipal terminal, where already a 600-foot pier is ready that is to be extended to a length of 1500 feet, and a second slip of the same length is proposed with an open pier to be served there. The 1,000,000-bushel grain elevator is being pushed rapidly and the ninety-nine bins, each 85 feet high, are finished. They are of concrete and the rest of the plant is being carried along so that it will be ready for service about April 1.

Steel ship contracts placed with yards in the Portland zone by the Emergency Fleet Corporation and those previously awarded which were taken over by the Government when war was begun, represent an aggregate valuation of $147,621,120. There were a total of 107 vessels, representing 856,100 tons, deadweight, of which thirty-seven were completed and delivered in 1918, providing the country with 288,400 tons.

When the year closed there were three other hulls in the water, they having been floated the last of December, one each by the Northwest Steel Company, the Columbia River Shipbuilding Corporation and the Albina Engine & Machine Works.

In all the Northwest Steel Company has floated twenty-one hulls since March 20, 1917, when its first ship left the ways. Two of the vessels were delivered in 1917 and sixteen have been finished since. The company contracted with the Government for forty-one vessels of the 8800-ton class, so under construction and remaining to be laid down are twenty of the fleet. Delivered ships during the past year represented 140,800 tons.

The Columbia River Shipbuilding Corporation held contracts for thirty-two of the same type and to date has launched thirteen of them, twelve in 1918, while the same number have been delivered during the year. Deliveries for 1918 were one hundred and five thousand six hundred tons.

The Albina Engine & Machine Works had a total of nineteen ships to turn out for the Emergency Fleet Corporation. Two of them were 3300 tons and the others 3800 tons, and there were nine delivered the past year, 33,200 tons being their capacity.

The G. M. Standifer Construction Corporation holds contracts for fifteen carriers of 9500 tons each, totalling 142,500 deadweight tons, the first five of which are under way and the opening of 1919 will see the first in the water, with every reason to expect the corporation to turn over the last of the fleet during the present year.

There are a total of eighteen steel ship ways in the district, the Northwest Steel Company having four, the Columbia River Shipbuilding Corporation and the G. M. Standifer Construction Corporation each having five, and the Northwest Steel Company and Albina Engine & Machine Works four each.

CHANGE IN EASTERN ORGANIZATION

Effective November 27th, 1918, the Brown Hoisting Machinery Company announces the following changes in its organization: Mr. Harvey H. Brown, chairman of the board of directors; Mr. Alexander C. Brown, president; Mr. Melvin Pattison, vice-president, general manager and director; Dr. Robert G. Clapp, director; Mr. John F. Price, director; Mr. Ewen C. Pierce, general manager of sales.

Port of Astoria

AT a recent meeting the commissioners of the Port of Astoria voted to authorize the immediate construction of a large dry dock and the immediate building of an additional export and import pier. To carry out these designs Engineer Bartlett of the Port of Astoria departed early in December on an extensive tour of inspection of the most modern and complete ocean terminals of the country, including San Francisco, New Orleans and New York. Plans and specifications will then be prepared for the prompt construction of a dry dock adequate to care for all of the shipping needs of the mouth of the Columbia. Present plans seem to favor the construction of a monster floating dry dock, probably of reinforced concrete, with a 10,000 to 15,000-ton capacity. The new export and import pier will be located just west of Pier No. 2, occupied by the Astoria Marine Iron Works. It is planned that this new pier shall accommodate the largest vessels afloat, with dockage room at one time for not less than six steamers of 12,000 to 24,000 tons, and with every modern facility for loading and unloading. In addition to these important port improvements, the commission also voted for the immediate enlargement of their bulk grain storage space. Sheds for the storing of one million additional bushels will be added, thus increasing their available grain storage capacity to a total of about 3,500,000 bushels. These several improvements have been made necessary by the unexpectedly great ocean shipping demands upon the port, following the deepening and widening of the entrance to the mouth of the Columbia River.

The McEachern Shipbuilding Company is making a number of improvements that will add to the efficiency of their yard. A new power plant for the centralizing of their air compressors is under construction; and a new saw shed, which will be one of the most efficient on the Coast, is planned. The yard is now being served by the extension of the double-track belt line railway of the Port of Astoria. For a considerable period, earlier in our wood shipbuilding era, the McEachern yard was the largest wood shipyard in the United States. It has six ways, has launched a total of sixteen wood ships, the final eight of which have been for the Emergency Fleet Corporation.

Tied up at the Port of Astoria docks, the three-masted rigger "Reuce" is being subjected to her regular winter overhauling, preparatory for another season in her Alaskan salmon trade. On her final trip south she brought a full cargo of canned salmon, now stored at the port dock warehouse awaiting transshipment.

Hundreds of men have already been mustered out at the large near-by spruce camps, which at the height of their efficiency employed some 4000 men, who cut and loaded more than 1,000,000 feet of airplane spruce daily. It is announced, however, that approximately 500 men will be retained for several months yet in the Clatsop camp, completing and maintaining the logging railroad from Youngs River Bridge to Stavebolt Landing, and getting out timber already cut. These crews are ordered now to save all logs.

On November 22 occurred the death, after a lingering illness of two years, of Charles W. Wilson, one of the pioneer wood shipbuilders of the Columbia River District. Mr. Wilson was a native of Finland, he arriving at Astoria thirty-seven years ago, at which time he established the Wilson Ship Yard. Since that date the Wilson yard has been continuously building wood ships, ships which have the reputation of being among the best.

At the ship equipping plant of the Astoria Marine Iron Works, which occupies the greater part of Pier No. 2 of the Port of Astoria docks, the first unit of a modern steel foundry is being completed. In the interest of additional important plant improvements, General Manager Thomas Bilyeu is absent on an extensive business trip in the East. During the next thirty days from the date of this writing, four additional Government wood ships are scheduled to leave the docks of the Astoria Marine Iron Works for trial trips.

One of the most recent of the French ships to coal at the Port of Astoria coal bunkers is the auxiliary steam schooner "Nancy," with a cargo of 2200 tons of flour from Portland mills en route to France. The Port of Astoria bunkers, located on Pier No. 2, is an official coaling place for French vessels and Emergency Fleet steamers launched in the Columbia River District. The bunkers have a capacity of 3000 tons, and there is open coal storage on the dock for 20,000 tons additional. During the past few months there have been discharged at the port bunkers cargoes of coal in order as follows: "Lieut. De Lorme," 3200 tons; "Gen. Baratier," 2886 tons; and "Wasco," 2668 tons. The bunkers are equipped for the transfer to ship of 175 tons of coal per hour.

The Common Council of the City of Astoria recently voted to rebuild the Forty-fifth street public landing, damaged some time ago by log booms.

These are days when the trial trip crews of the Government wood ships completed in the Columbia River District get a touch of the "real thing." Formerly, the initial trial trip usually proceeded either up or down the hundred-mile section of the Columbia between Astoria and Portland. But now, following a recent order from the district officials of the Emergency Fleet Corporation, all Government ships must prove their qualities by a twenty-four-hour trial trip at sea.

IMPORTANT RESOLUTION OF THE PORT OF PORTLAND

"It is the sense of the present board of directors of the chamber that without at present committing this organization to the principle of municipal ownership of steamships to serve the port, that we do recommend to the incoming board of the chamber that the law giving the Port of Portland the power to own and operate steamers be amended so that the fund available for this special work may be increased from the present limitation of one-third of one per cent of the assessed valuation of the Portland district to five per cent, or such other sum as the incoming board may deem necessary to make this power of the port a real effective possibility for the community and that this power should be created at the earliest possible time and be held in readiness for procedure in the event the port is not properly served when ship transportation through the Panama Canal between the two coasts is resumed.

FIREMAN'S FUN
Insures Hulls, Cargoes
HEAD OFFICE: CALIFORNIA AND SANSOM
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714-715 BOARD OF TRADE BUILDING
PORTLAND, ORE.
FRANK G. TAYLOR, GENERAL AGENT FOR WASHINGTON, OREGON, ALASK

Hull Insurance (Part Two.) Form of Contract

By Benjamin Rush

THE forms of policies on hull are so extremely varied that I shall confine myself to the recital of the general law of marine insurance as applicable to the regular form of hull policy, known as Lloyd's policy, and shall then, if time suffices, give a few leading illustrations as to how these principles may be modified by special contract. The common form of Lloyd's policy reads as follows:

"BE IT KNOWN THAT (..............................) as well in (..............) own name as far and in the name and names of all and every other person or persons, to whom the same doth, may or shall appertain, in part or in all, doth make assurance, and cause .... and them and every of them to be insured, lost or not lost, at and from .... upon any kind of goods and merchandises; and also upon the body, tackle, apparel, ordnance, munition, artillery, boat and other furniture, of and in the good ship or vessel called the ....; whereof is master, under God, for the present voyage (..............................) or whosoever else shall go for master in the said ship, or by whatsoever other name or names the same ship or the master thereof is or shall be named and called.

Beginning the adventure upon the said goods and merchandise from the loading thereof aboard the said ship (..............................), and so shall continue and endure, during her abode there, on the said ship, &c., and further, until the said ship, with all her ordnance, tackle, apparel, &c., and goods and merchandises whatsoever, shall be arrived at (..............................); upon the said ship, &c., until she hath moored at anchor twenty-four hours in good safety, and upon the goods and merchandise, until the same be there discharged and safely landed.

And it shall be lawful for the said ship, &c., in this voyage, to proceed and sail to and touch and stay at any ports or places whatsoever (..............................) without prejudice to this insurance.

The said ship, &c., goods and merchandises, etc., for so much as concerns the assured, by agreement between the assured and assurers in this policy, are and shall be valued at (..............................).

Touching the adventures and perils which we, the assurers, are contented to bear and take upon us in this voyage, they are of the seas, men-of-war, fire, enemies, pirates, rovers, thieves, jettisons, letters of mart and counter-mart, surprisals, takings at sea, arrests, restraints and detainments of all kings, princes and people of what nation, condition or quality soever, barratry of the master and mariners, and of all other perils, losses and misfortunes that have or shall come to the hurt, detriment or damage of the said goods and merchandises, and ship, &c., or any part thereof.

AND in case of any loss or misfortune, it shall be lawful to the assured, their factors, servants and assigns, to sue, labor and travel for, in and about the defence, safeguard and recovery of the said goods and merchandises and ship, &c., or any part thereof, without prejudice to this insurance to the charges whereof we, the assurers, will contribute, each one according to the rate and quantity of his sum herein assured.

AND it is especially declared and agreed that no acts of the insurer or insured, in recovering, saving, or preserving the property insured, shall be considered as a waiver or acceptance of abandonment.

And it is agreed by us, the insurers, that this writing, or policy of assurance, shall be of as much force and effect as the surest writing or policy of assurance heretofore made in Lombard Street or in the Royal Exchange, or elsewhere in London.

And so we, the assurers, are contented and do promise and bind ourselves, each one for his own part, our heirs, executors and goods, to the assured, their executors, administrators, and assigns, for the true performance of the premises.

CONFESSING ourselves paid the consideration due unto us for this assurance by the assured, at and after the rate of (..............................).

IN WITNESS WHEREOF, we, the assurers, have subscribed our names and sums insured in London.

N. B. Corn, fish, salt, fruit, flour, and seed are warranted free from average, unless general, or the ship be stranded; sugar, tobacco, hemp, flax, hides and skins are warranted free from average under 5£ per cent; and all other goods, also the ship and freight, are warranted free from average under 3£ per cent, unless general, or the ship be stranded.

(...)
£ (sum in figures) A. B. (sum in words) day of
£ (sum in figures) C. D. (sum in words) day of
£ (sum in figures) E. F. (sum in words) day of

(and so on, until the aggregate amount of the different sums subscribed by each underwriter equals the amount required to be insured)."

To this there is commonly added a clause reading as follows:

"And it is further agreed that if the ship hereby insured shall come into collision with any other ship or vessel, and the assured shall in consequence thereof become liable to pay, and shall pay by way of damages to any other person or persons any sum or sums not exceeding in respect of any one such collision the value of the ship hereby insured, we, the assurers, will pay the assured such proportion of three-fourths of such sum or sums so paid as our respective subscriptions hereto bear to the value of the ship hereby insured, and in cases in which the liability of the ship has been contested, or proceedings have been taken to limit liability, with the consent in writing of two-thirds of the subscribers to this policy in amount, we will also pay a like proportion of three-fourths of the costs which the assured shall thereby incur, or be compelled to pay; but when both vessels are to blame, then unless the liability of the owners of one or both of such vessels become limited by law, claims under this clause shall be settled on the principle of cross

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Freights and Disbursements
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ATLANTIC MARINE DEPARTMENT
37-43 WALL STREET NEW YORK
AND BRITISH COLUMBIA, 264 COLMAN BUILDING, SEATTLE, WASHINGTON

> liabilities as if the owners of each vessel had been compelled to pay to the owners of the other of such vessels such one-half or other proportion of the latter's damages as may have been properly allowed in ascertaining the balance or sum payable by or to the assured in consequence of such collision.
>
> Provided always that this clause shall in no case extend to any sum which the assured may become liable to pay, or shall pay for removal of obstructions under statutory powers, for injury to harbors, wharves, piers, stages, and similar structures, consequent on such collision, or in respect of the cargo or engagements of the insured vessel, or for loss of life or personal injury."

I shall comment on this policy insofar as it is applicable to hull insurance.

Coming to the first clause in the policy:

"Be it known that .... as well in .... own name as for and in the name and names of all and every other person or persons, to whom the same doth, may or shall appertain, in part or in all, doth make assurance and cause .... and them and every of them to be insured, lost or not lost, at and from ...."

The purpose of this clause is to specify the person who is insured so that the insurer may know to whom he is granting indemnity, or shall at least be put on inquiry upon that point, for the clause as drawn protects the nominal assured and any other person who can prove that he was interested in the subject matter of the insurance during the risk and at the time of loss, and who is the person upon whose account the insurance was bona fide intended to be made.

As policies are frequently effected on ships believed to be in foreign ports, or at sea, the words, "Lost or not lost," are inserted in the contract for the purpose of protection, and their effect is that even though the loss has occurred before the contract is concluded the risk attaches unless at such time the assured was aware of the loss and the insurer was not.

As a corollary, should a ship have arrived in safety before the time when the contract was concluded, the premium is not returnable unless at such time the insurer knew of her safe arrival.

Now follow the words, "at and from." These are adapted either to a voyage policy or a time policy.

Let us consider their application to a voyage policy.

In voyage policies the "terminus a quo," the place at which the risk commences, is usually the port of departure; and "terminus ad quem" is the port of the ship's destination.

That which is limited or described in the policy by these termini is the voyage insured, which may be described as a transit at sea from the terminus a quo to the terminus ad quem in a prescribed course of navigation, which is never set out in any policy, but virtually forms part of all policies, and is as binding on the parties thereto as though it were minutely detailed.

If the ship, without entirely abandoning the prosecution of the voyage described in the policy, yet voluntarily and without justifying cause departs from the prescribed course of that voyage, this is called a deviation, and the underwriter is not liable for any loss occurring after the point at which the ship first quits the prescribed course.

If the ship orginally sail on a different voyage from that described in the policy, the latter never attaches. If, although she sail on the voyage insured, she afterwards entirely abandons all intention of prosecuting the voyage described in the policy, this is an abandonment or change of voyage, which voids the policy from the moment the intention of so abandoning it is definitely formed, though in the United States courts the policy is not voided until the vessel actually deviates.

These two violations of the contract of insurance are named, respectively, "deviation" and "change of voyage."

Let us consider, first, "deviation."

It is an implied condition of the policy that there shall be no deviation. In every contract of insurance by a voyage policy the law decides that the assured shall enjoy the protection of the policy only as long as he strictly pursues the regular course of the voyage insured, and carries it on to its termination with all safe, convenient, and practical expedition. It is only upon this condition, never expressed, but universally implied, that the underwriter agrees to indemnify the assured. Therefore, any failure to comply alters the nature of the risk, which the underwriter has assumed, and frees him from liability for subsequent loss.

This implied condition extends as well to the time in which the voyage insured ought to be completed, as to the track or course of navigation by which it ought to be pursued.

Briefly summarized, where a ship without lawful excuse deviates from the voyage contemplated by the policy, the insurer is discharged from liability as from the time of deviation, and it is immaterial that the ship may have regained her route before the loss occur. There is a deviation from the voyage contemplated by the policy.

1. Where the course of the voyage is specifically designated by the policy, and that course is departed from, or

2. Where the course of her voyage is not specifically designated by the policy, but the usual and customary course is departed from;

3. The intention to deviate is immaterial; there must be a deviation in fact to discharge the insurer from his liability under the contract.

The adventure must be prosecuted throughout its course with reasonable dispatch, and if without lawful excuse it is not so prosecuted, the insurer is discharged from the liability as of the time when the delay became unreasonable.

Where the subject matter is insured by a voyage policy, at and from, or from a particular place, it is not necessary that the ship should be at that place when the contract is concluded, but there is an implied condition that the adventure should be commenced within a reasonable time, and that if the adventure be not so commenced, the insurer may avoid the contract.

This implied condition may be negatived by showing that the delay was caused by circumstances known to the assurer before the contract was concluded, or by showing that he waived the condition.

Particular care is necessary in describing the "terminus a quo" and "ad quem", because if there is an error in this respect the policy never attaches at all. Thus, if on a voyage policy of insurance on a ship from New York to London, and the ship did not sail from New York, but let us say from Boston, the policy would never attach, although the risk of the voyage from Boston to London is no greater than from New York to London. Similarly, if she was to sail from New York to Liverpool, instead of London, the policy would not attach.

A policy may be voided by any unreasonable delay that takes place between the time when the policy attaches on the ship, and when she sails on her voyage. As long, indeed, as she is bona fide preparing for her voyage, the delay will be excused, but if all thoughts of the voyage be laid aside, and the ship kept lying in port, the underwriter is discharged. Also an unreasonable delay in performing the voyage insured is equivalent to a deviation, as is inexcused and unreasonable delay at the termination.

The test of what is or what is not a delay, within the meaning of the law, is a clear imputation of waste of time.

Of course, a deviation caused by the operation of a peril insured against, such as a vessel putting into port to repair sea damage, does not avoid the policy.

The distinction between deviation and change of or abandonment of voyage is that in the former the original voyage as described in the policy is not given up or lost sight of, while in the latter it is.

Deviation discharges the obligation of the underwriter as soon as such deviation actually takes place.

Change of voyage discharges the underwriter from the moment the intention of so abandoning the voyage is made.

As you can readily see that this is a very drastic obligation on the part of the assured, a clause is usually inserted in hull policies by which the underwriter agrees to hold the assured covered in case of deviation or change of voyage at an extra premium.

It is therefore much more common now-a-days to insure ships for a specified period of time.

Then follow the words:

"Upon the body, tackle, apparel, ordnance, munition, artillery, boat and other furniture of and in the good ship or vessel called ...."

This means the whole corpus of the ship insured, whether of sail, steam, motor or other description of vessel, and it covers all the necessary fittings and furniture and supplies of the ship insured, such for instance as refrigerating machinery of a ship engaged in carrying frozen meat.

"Whereof is Master under God for the present voyage ...., or whoever else shall go for master in the said ship, or whatsoever other name or names the same ship or the master thereof is or shall be named or called."

The effect of this is to identify the master, although as a matter of fact, provided the master be competent and legally qualified to command a ship, his name is immaterial, and as a rule the name of the master is never inserted in the hull policies at the present time.

Now follow the words, "Beginning the adventure upon the said ship (......................), &c. (at and from ....) and so shall continue and endure during her abode there on the said ship, &c., and further until the said ship, with all her ordnance, tackle, apparel, etc., shall be arrived at................ upon the said ship, &c., until she hath moored at anchor twenty-four hours in good safety."

The blank above mentioned is filled up in the case of a voyage insurance with the terminus a quo and ad quem. In the case of a time risk with the period covered.

Coming now to the words, "Moored at anchor twenty-four hours in good safety," this is to prevent the underwriters from escaping from a loss which had its beginning before the arrival of the vessel, but which is not consummated until the vessel has arrived at her port. For instance, a ship may be in a leaking condition at sea, but nevertheless able to make port, where subsequently she sinks, in such a case the policy on hull would still continue because the vessel had never been moored twenty-four hours in good safety, as provided for by the policy.

A vessel is not considered to have been moored for twenty-four hours in good safety unless she has been moored for that space of time in the harbor of her port of discharge:

First: In such a state of physical safety that she can keep afloat while her cargo is being unloaded.

Second: In such a state of political safety that she shall not have been subjected during that time to any embargo, seizure or capture on the part of the government of the port or of strangers.

Third: Under such circumstances as to have had an opportunity of unloading and/or discharging.

The next clause reads:

"And it shall be lawful for the said ship, &c., in this voyage to proceed and sail to and touch and stay at, any ports or places whatsoever................ without prejudice to this insurance."

The blank which is left is for the purpose of specifying the particular ports and places to which it is intended this liberty shall be exercised.

This at first sight would appear to give the ship insured permission to go anywhere, irrespective of the contemplated voyage. Such, however, is not the case.

Where the policy is to port or ports of discharge within a given area, which are not named, the ship must, in the absence of any usage or sufficient cause to the contrary, proceed to them or such of them as she goes to in their geographical order. If she does not, there is a deviation. Where several ports of discharge are specified in a policy, a ship may proceed to all or any of them, but in the absence of any usage or sufficient cause to the contrary, she must proceed to them or such of them as she goes to, in the order designated by the policy. If she does not, there is a deviation.

If, however, long and uniform usage have established a different order, the geographical order may be disregarded, and the other observed, unless the policy specifies to the contrary.

Generally speaking, it will be a deviation, after having once touched at one of such ports to revisit it, or to sail backwards or forwards from one to the other, unless express liberty for that purpose be inserted in the policy.

Now follows the valuation clause, e. c.:

"The said ship for so much as concerns the assured by agreement between the assured and the assurers in this policy, are and shall be valued at ...."

When the blank is filled in with the proper valuation, the figures therein agreed to are final and binding between the assured and his underwriter, in the absence of fraud, misrepresentation or concealment. It obviates all question of dispute as to what was or what was not the value of the ship in the event of loss.

Present Marine Insurance Conditions in America

By W. D. Keeson,

Manager Insurance Department, Gaston, Williams & Wigmore, Inc.

EXPORTERS, importers, shipowners and the large banking houses of this country have recently displayed a very keen interest in certain phases of the marine insurance business to which they formerly gave little thought. Today it is not uncommon for searching inquiries to be made with regard, not only to the financial standing of the company with which a risk is placed, but also as to the ability and qualifications of the men controlling its operations.

These inquiries are usually prompted by the growing realization that during the last three years an industry requiring an exceedingly high degree of technical knowledge for its successful conduct, has developed within this country, and further that during the next year it will be subjected to a severe strain, will determine whether or not it has, as a whole, had time to become established on a strong and permanent foundation during this period.

Higher Rates Probable

While it is generally believed that there are exceedingly bright prospects for the future of this industry in America, it is quite evident, however, in view of the cautious supervision which is now being exercised by many of the commercial and banking houses in connection with the placing of insurance on property in which they are interested, that considerable concern is felt with regard to how seriously the reduction of income resulting from the elimination of war risk premiums, the continued restrictions upon exports and imports, and the excessive competition which may result because of the greatly increased number of underwriting offices, will affect some of the companies.

Within the last few weeks shippers and shipowners have received intimations that they might shortly expect an advance in marine insurance rates.

Apart from the question as to whether or not underwriters are justified in raising rates on the grounds that overhead expenses have heavily increased during the last four years, there is no doubt but that an advance would materially strengthen the companies by enabling them to regain a considerable portion of their recently diminished income. It is generally recognized, however, that rates cannot be advanced beyond a certain point without the danger of a considerable portion of the business now being written by American companies being diverted to foreign markets.

Insurance Combinations

The possibility of excessive internal competition among the English underwriters is being steadily reduced by the continued amalgamation of their largest and most powerful companies. Huge combinations, such as the Eagle Star & British Dominions, which has just absorbed its sixth company, are able to get together not only a far superior organization than can a large group of individual underwriting officers, especially at this time when there is a shortage of competent help, but are placed in a better position to quote lower rates than American companies through the reduction of their overhead expenses.

While present conditions are such as to lend weight to the opinion recently expressed in some quarters that the American marine insurance market is in the near future due to suffer contraction rather than enjoy any further expansion, it is more generally believed that any contraction which takes place will be in the number of underwriting offices rather than the volume of business placed here,and that the centralization of underwriting in fewer hands, together with the taxation on insurance placed abroad, are the two factors which will have the greatest beneficial influence on the insurance industry of this country.

AUSTRALIAN TRIP OF A MARINE INSURANCE BROKER

Harold F. Allert of Finn Sandberg, Raynes and Lee, New York Marine Insurance Brokers, has just returned from a four months' trip to Australia. He reports that business conditions in his line are exceptionally good in all the Australian ports, and says that he is the first marine insurance broker from New York to have at any time visited Australia on a business trip. He urges that exporters of American farming machinery, dry goods and other lines should reach out after Australian business. A friend whom he met in Sydney had in ten weeks sold $350,000 worth of American goods without going outside of that city.

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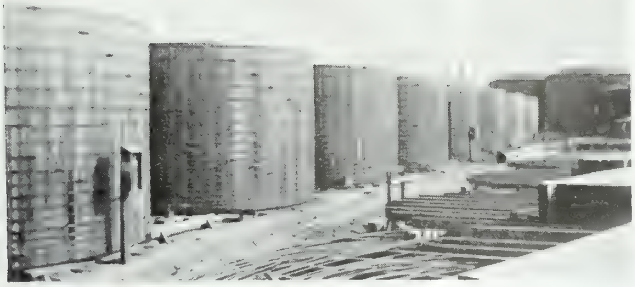
A Busy Seattle Terminal



One of the batteries of wooden storage tanks

Steamer at the dock

The East Waterway Dock & Warehouse Company property, located on the northern extremity of Harbor Island, Seattle, is considered by transportation and terminal experts to be one of the best arranged and best equipped dock and warehouse properties, and its oil-handling and storage facilities make it pre-eminently the world's foremost oil dock.

Early in 1917 the officers of Rogers Brown & Company of Seattle, with branches in Shanghai, Kobe, Los Angeles, New York and Chicago, saw that the rapidly increasing volume of their Oriental oil business was making it absolutely necessary that special terminal facilities be provided for the handling of this commodity, and at that time the East Waterway Dock & Warehouse Company was conceived; the primary idea being to construct a plant for the handling, bulking, testing and loading of oils.

Almost before the pile driver had left the premises, in fact before the pile driver was through driving the last stick, cargo was being handled over the partly completed dock, tanks were being hurried to completion and warehouse facilities provided as rapidly as labor and materials could be secured.

It was soon found that the dock could not be confined to the handling of oil alone as oil ships naturally carried general cargo, and so much tonnage of incoming and outgoing freight was offered, that it was manifestly necessary to provide for general cargo handling, as well as oil.

The instructions then were to build the best dock and warehouse that skill and money could provide, and do it quickly and with the primary object of expediting the handling of every ton of merchandise that passed over the dock. It was realized by the men who conceived this project, Messrs. C. Rogers Brown, R. F. W. Young, James Farrell and J. F. Brown, that it was not sufficient to provide a dock and warehouse for the handling of freight, but that this property must be equipped to handle freight safely and intelligently, and above all, rapidly, because the dearth of freight cars and trans-Pacific bottoms made even the slightest delay of vast importance and extremely expensive.

George B. Green, Manager of the East Waterway Dock & Warehouse Co.

Since the construction of the property was begun, something less than a year ago, its growth has been so phenomenal as to amaze even those men who had become accustomed and hardened to rapid growth. The first plans included merely a dock and nominal sized warehouse, together with some steel and storage tanks and an administrative office.

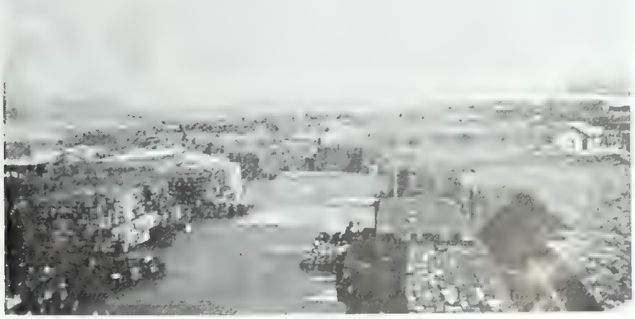
Before the first unit could be completed, the second was under way, and before the second was really finished the third had been started, and tanks have been going up as rapidly as materials could be secured.

There are thirty wooden tanks with a capacity of 1,250,000 gallons, and twenty-two steel tanks with a capacity of 7,000,000 gallons. To the rear of the dock are dumping tables, tanks and pumps, scales and other appurtenances for emptying cases, barrels and drums of oil, and conveying them to the storage tanks; and of course an equipment of pumps and piping, steam coils and other accessories for emptying tank steamers directly into the storage tanks and for loading tank cars.

It is believed that there is no other dock in the world so well equipped for quickly and economically handling oils as that of the East Waterway Dock & Warehouse Company.

Two noticeable features about the warehouses are their accessibility and well lighted interiors. Every facility for easy and rapid handling of freight is afforded.

At the present time the East Waterway Dock & Warehouse is day and night the scene of inspiring activity—boats, sometimes to the extent of two or three, are discharging or taking on cargo, and the plant is literally alive with men and trucks, winches and barrels and boxes, all being handled in an orderly and systematic manner that delights the heart of the transportation man who wants to see his vessels discharge and load cargoes without loss of time.

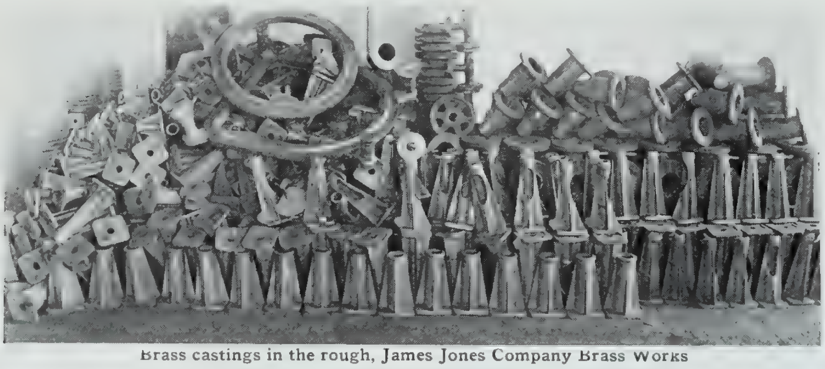


Case oil just off the ship

Steel storage tanks under construction

Foundry, James Jones Company Brass Works

James Jones Company Brass Works



Brass castings in the rough, James Jones Company Brass Works

Working full speed ahead on 400,000 pound order of rough bronze and brass castings for the Bethlehem Shipbuilding Corporation, 400,000 pounds of brazing flanges for submarines and destroyers, and a large order of Navy valves finished complete, the James Jones Company Brass Works of Los Angeles is one of the busiest shops in the city of the Angels. They have erected and equipped one of the largest and most modern brass manufacturing plants in the West to take care of these orders, and as stated in our December issue, they have so succeeded in their organization plans as to earn a very enviable record for exact fulfillment of contract specifications and prompt deliveries well within time limits.

In no small degree this success is due to the untiring efforts and just business methods of Walter and Wallace B. Jones, the men responsible for the phenomenal growth of this plant. Their development of the highly efficient revolving brass furnace, which is described in this issue under "Pacific Machinery," together with their wise selection of machine tools for the shop, pneumatic tools for the foundry, and a complete monorail hoist system serving all departments, entitles them to rank as manufacturers of brass goods in the correct sense of that term.

These men have set for themselves high ideals as brass manufacturers, reaching out with confidence after the difficult and complex work specified by the Equipment Bureau of the United States Navy. That they have been highly successful in meeting the conditions imposed by Navy specifications shows that they belong in the front rank among western brass works.

Machine Shop, James Jones Company Brass Works

Four James Jones revolving and tilting brass melting furnaces of 2,000 pounds capacity each are used in the foundry, and the present contracts are straining even this large capacity.

SEATTLE MANUFACTURING COMPANY SECURING LARGE COAST ORDERS

The Vulcan Manufacturing Company, which during recent months passed into the ownership of the Frank Waterhouse & Company, and has since made many improvements and greatly added to its facilities, thereby greatly increasing its output capacity, has just secured an enormous order from San Francisco. This latest order from the San Francisco Shipbuilding Company was secured by the Vulcan in the face of severe competition from many well-known engineering and manufacturing plants in the Northwest.

Mr. R. J. Church, the general manager, has just returned from a trip to San Francisco, where he personally negotiated with the above-mentioned shipbuilding concern in regard to the big orders for winches and deck machinery. Mr. Church not only secured a contract for the concrete vessels they are now building in San Francisco, but secured contracts for machinery for other boats to be built in the near future. The machinery turned out by the Vulcan was investigated by the best engineering experts and declared to be equal, if not superior, to any machinery built. The output of the Vulcan has taken on immense proportions and the modern plant is steadily gaining recognition abroad. The San Francisco Shipbuilding Company was the first Pacific Coast company that successfully started the building of concrete ships and Seattle people will recall the trial voyage of the "Faith," the first concrete ship to reach this harbor.

The Vulcan Manufacturing Company of Seattle is not only aiming at the attainment of the maximum of efficiency in the war work upon which it is now almost altogether engaged, but is preparing to take its place as a manufacturing enterprise of the first rank at the close of the war. Control of the company was acquired a short time ago by Frank Waterhouse, and, under its new management, the plant has been thoroughly rejuvenated and modernized.

At present its entire efforts, like those of most large concerns of similar character, are devoted toward the common cause, but with the coming of peace there will be a falling off to a large degree of the demands which are now being met. It is the Vulcan's intention then to appear as a manufacturer of various lines of machinery and preparations are already under way for the marketing of its products.

Among recent improvements is the new elevated track, and a track scale for weighing cars. By means of this track, cars loaded with pig iron, scrap, coke, etc., will be brought into the plant and hauled up an incline directly over the bins, into which their contents will be dumped. Other tracks also are brought within the buildings, so that finished products are loaded upon the cars by the electric cranes and unnecessary hauling is entirely eliminated. Several other notable improvements are also under way, in addition to those recently completed.

The greater part of the Vulcan's output at present is going into the Seattle shipyards. It is supplying nearly all of the deck machinery for the vessels turned out by the Skinner & Eddy Corporation and probably 90 per cent of the engine castings for the Ames yards.

Cargo winches for the ships of the new Liberty Fleet represent a large portion of the Vulcan's production. They are built from the ground up in the Vulcan shops, although simply in the interests of speed and efficiency, large quantities of the smaller castings are being turned out by other concerns to the Vulcan's order. Of course, this work is being done by Seattle firms to the extent of their ability to handle it. Some of it, however, has had to be sent East for the reason that it could not all be done in Seattle. Two Seattle foundries are supplying approximately one million five hundred thousand pounds each of these castings, while an Eastern concern is at work upon another order.

Martyn's Bolter-up as used on ship's bottom

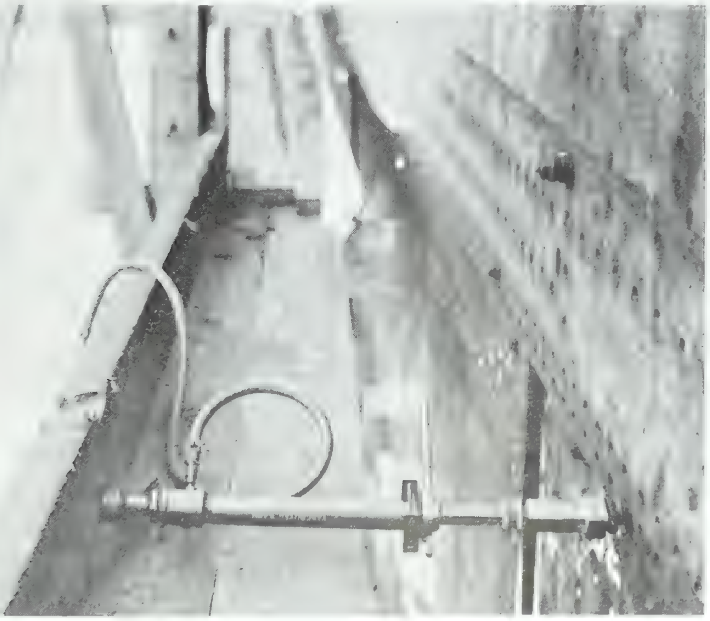
Another item of the present output is anchor windlasses, twenty of which weighing 34,000 pounds each, have been delivered, with orders on hand for sixty-seven more. Ship shafting is another, the plant now turning out one complete set for new ships each week, including stern bearings and propeller hubs. The building of condensers is still another contribution toward the ships that are carrying supplies abroad.

Forging for the Bureau of Aircraft Production, or the Spruce Board, which is now getting timber for America's airplanes out of the woods of Washington, is another matter directly bearing upon military operations upon which the Vulcan plant is engaged, and there are other items of its output which are indirectly war work. For example, it is supplying steel for the new municipal elevated railway, which will go far toward solving the transportation problem for the shipyard employes. Cranes for the shipyards are another item, and the plant supplies all the brake shoes used by the Great Northern Railroad on its western division, which also must be considered war work at present. In the Vulcan's machine shops at present three shifts are employed, in the foundry two, and in the forge shop one.

A SHIPYARD LABOR SAVER

MR. DAVID MARTYN, until recently a foreman in the steel yard of the G. M. Standifer Construction Company, Vancouver, Washington, has invented a pneumatic Bolter Up machine that is proving itself practical, efficient and easy of operation. It is a labor saver, time saver and safety device all in one simple, inexpensive and strongly constructed little machine. It can be used on keel, bottom and side shell—in fact, from any position or at any angle where a set-up can be obtained. All parts are of steel and each machine is supplied with three cast steel socket wrenches—that is, one each to fit ¾-inch, ⅞-inch and 1-inch nuts.

In addition to the greater ease and facility with which bolts can be tightened with this machine, it also acts as a powerful air-jack. The compressing force exerted at each bolt is one and one-half times the air pressure per square inch in use in the yard and is sufficient to push the plates tightly together at the same time that the bolts are being tightened.


Martyn's Bolter-up as used on side shell plant

In perfecting his machine, Mr. Martyn has sought to make this work easier, to get more done and to eliminate the chance of injury. The invention is fully protected under the patent laws of the United States and Canada, and the following description of the machine and its use was furnished by Mr. Martyn:

"The machine is fitted at the bottom end with a special cap with a flat chisel point which prevents it rotating when the bolts are being tightened up and thus avoids twisting the hose. The air cylinder, which is the upper portion, is about 15 inches long. In this is fitted a piston connected to a one-inch piston rod. This rod is made to rise by the admission of compressed air and has a travel of seven inches. The air is admitted and released by a control valve fitted at handiest position for operator. The amount of air used is negligible, being only 10 cubic inches per bolt, and it has been demonstrated that by using a manifold made up of ¾-inch fittings, one section of half-inch hose will supply sufficient air for twelve machines. At the top of cylinder is fitted a cap which acts as a guide for and prevents the piston being ejected.

"The machine is fitted with a hexagon wrench which engages with a hexagon fitting on the square piston rod. This wrench, which is operated at any convenient height to suit the operator, is used to turn the nuts until the bolts are screwed up fairly tight, when the extension lever supplied with the machine is put on and the plates screwed up absolutely tight. Sufficient force can be applied to tear asunder one-inch bolts without risk of injuring the machine. At an extra cost a specially made, strong and fool-proof ratchet is fitted in place of the wrench.

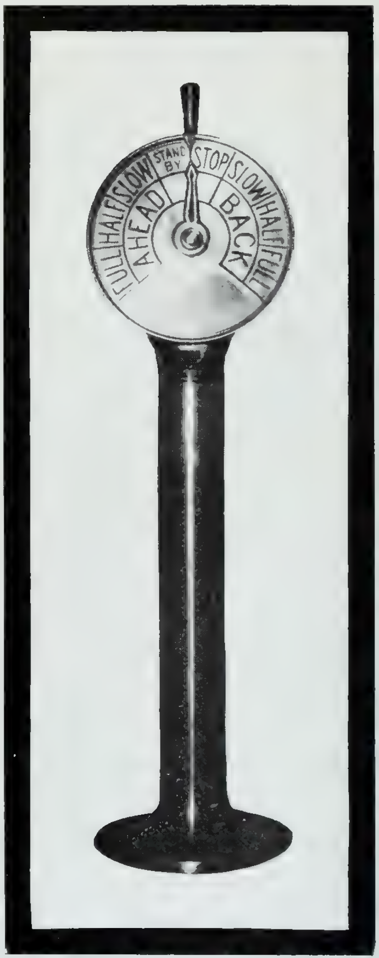
"Above the handle or ratchet is fitted a steel collar which prevents the air-tight piston from coming into contact with the bottom of the cylinder on the air pressure being released. At the upper end of the square piston rod the socket wrenches for the different size nuts are placed. The minimum length of the machine is 28½ inches, but with the extension pieces supplied it can be extended to 72½ inches, or, in other words, the set-up for the machine to work against can be anything from 28½ inches to 72½ inches away from the bolt being tightened up. The bolter up is readily portable, as it weighs only twenty pounds.

"To use the machine the workman connects the air hose to the valve, which is the standard air hose connection, and then opens the valve. The air forces up the piston rod and the socket wrench on its top end is guided over the nut on the bolt to be tightened. The wrench, or lever, which remains at a convenient height or distance and does not rise with the piston, is then turned round until the nut on the bolt is screwed up tight and the plates or bars drawn tightly together. The lever, as stated, is just at the height where the workman can use his maximum strength and do this without any fear of the wrench slipping, as this is impossible while the air is on. To remove the machine the operator simply turns off the air and proceeds to tighten up the next bolt."

Mr. Martyn takes much pride in the fact that his former employers, the G. M. Standifer Construction Company, were the first to adopt the machine and put it into actual use on all of its five ways. Other prominent Pacific Coast steel shipbuilders who have adopted and are using Martyn's pneumatic Bolter Up include the Skinner & Eddy Corporation, Duthie Shipbuilding Company, and Albina Engine & Machine Works.

Under the old method all the bolts in keel and bottom shell are tightened by workmen with arms raised above the head. In that position it is not possible for a man to work efficiently or to exert his full strength as the risk that the ordinary wrench will slip off the nut is ever present and serious injury to the workman's hands or arms will be the result of coming into contact with the other projecting bolts. This risk deters a man from using his full strength under these conditions, even if it were possible. It is thus very apparent that plates and bars can be bolted together much more quickly and tightly with this than with the old-fashioned wrench. Good, tight and speedy bolting up gives the reamers and riveters every advantage, and as the whole progress of shipbuilding depends on the speed with which rivets can be driven, it is evident that any machine which makes for greater speed in this work and at the same time enables a man bolting up to do the work of four men and thus releases men for other work, is the tool which is required in American shipyards today.

The invention of labor-saving, time-saving and safety devices under the impetus of our hurry-up shipbuilding program has been one of its most important developments as affecting the permanent welfare of the industry in America.



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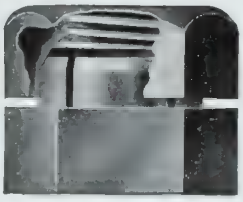

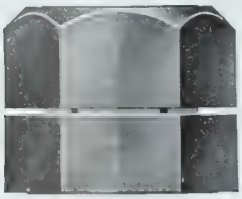

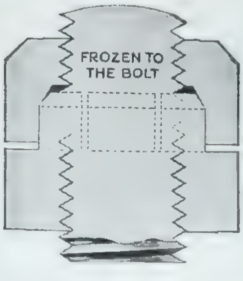

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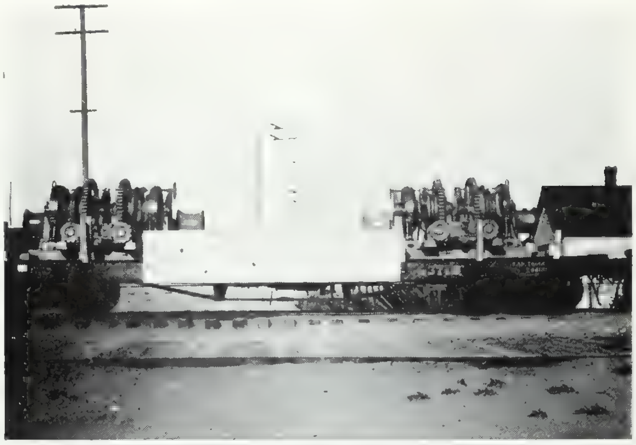
As used in welding, it has been demonstrated that this apparatus reduces costs fifty per cent and produces a much better weld.

E. D. Bullard, with offices at 268 Market street, San Francisco, who is the Pacific Coast distributor for the Buckeye Pre-heater, advises that he has placed many of these efficient burners with Pacific Coast plants and that users are very enthusiastic over the results. Mr. Bullard is distributing, in addition to the Buckeye Pre-heater, a full line of Oxweld welding and cutting apparatus; helmets, goggles and gloves; high powered carbide flare lights; lung motors; smoke and fume helmets; first aid cabinets, etc., etc.



One of the many carloads of steam windlasses shipped by the Pacific Machine Shop and Manufacturing Company from its busy Seattle plant

SEATTLE PLANT BUSY ON WINDLASSES

Mr. Allen Cunningham, president and general manager of the Pacific Machine Shop & Manufacturing Company, has had many years' experience in the manufacture of ship auxiliaries. He has designed and built a type of steam windlass which is very much in demand for the vessels of the Emergency Fleet Corporation, and which is giving great satisfaction under hard service conditions. The engines on these winches have 11 x 13 inch steam cylinder and are of the slide valve reversing type. All gears are steel and all bearings brass bushed and of ample surface, the whole machine being of rugged strength. Our illustration shows one of the many carload shipments that are being sent out from the plant.

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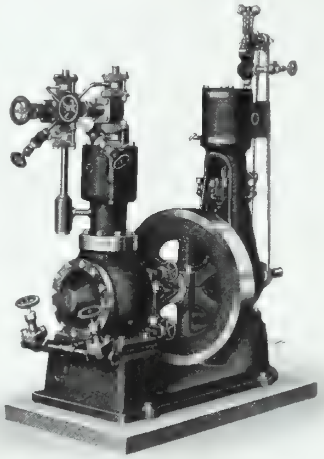

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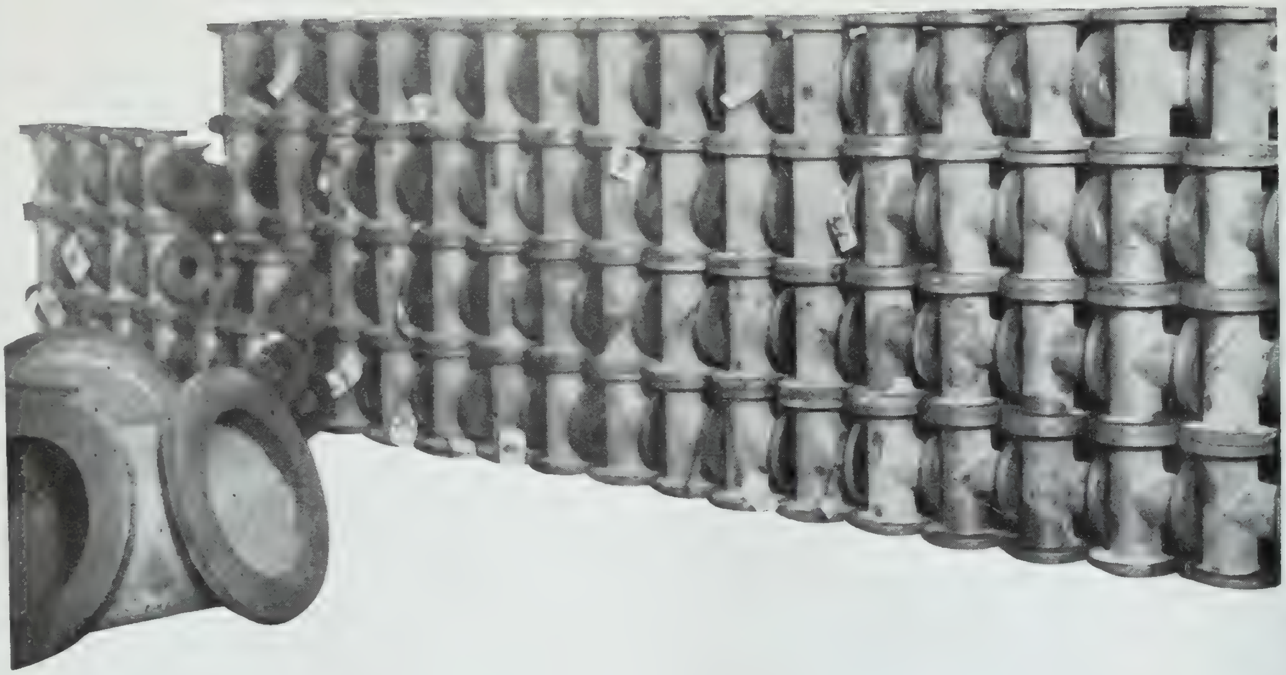

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February 1919
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Pacific Marine Review

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PACIFIC MARINE REVIEW
February, 1919

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The Shipping Board versus the Motorship

THE following letter from William Denman, former chairman of the United States Shipping Board, to the editor of Pacific Marine Review, is an interesting contribution on why the government has no fleet of Diesel-engined vessels:

My Dear Mr. Dickie: I am very glad indeed that the Review is pressing the project for Diesel motorship construction. It is a singular commentary on our governmental blindness in maritime matters that the United States, a high wage and oil producing nation, exporting a great volume of bulky products, has not today a single fleet of Diesel vessels and that up to a very recent date, if at all, no practical encouragement had been given by the government in our shipping program to the building of large commercial Diesel units, of 1500 indicated horsepower and up.

You ask why this is? There are a number of reasons, but the chief one has been the entire absence from our Government administrators, in the past, of men in practical touch with shipping problems. My own experience probably affords some explanation of the reluctance of any man to risk his reputation to the cross currents of private interest and political maneuvering, inevitable in the capital of a great but loosely coordinated government. For instance, my most important personal contribution to the creation of a war fleet was the project presented to Congress on May 5, 1917, for the stopping of all peace-time steel construction, such as high buildings and bridges, and a drastic concentration of all our steel producing power on ships and munitions. I was the first administrator in Washington to advocate this. I urged and facilitated in every way I could the making of contracts for steel vessels. On April 5th, the day after war was declared, I announced that our wooden ship project was merely an emergency auxiliary to steel ship construction which I called the "major program." I then called attention to the inferior character of wooden vessels as compared to steel. This was ten days before we employed General Goethals, and yet today fifty per cent of the persons, who think of it at all, regard me as the advocate of a small wooden ship overseas war tonnage to the exclusion of steel construction. It is doubtful if five per cent of the shipping world is aware of our plans regarding a Diesel motor fleet.

William Denman

It is not at all surprising that you ask why the government has not forced the construction of Diesel motor cargo ships with some small part of the billions of dollars it has expended for steam vessels, many of which cannot be delivered till at least two years and a half after our declaration of war.

It is true, as you have pointed out, that over three years before the war, the Diesel motor cargo ship of over nine thousand tons deadweight had shown its great superiority over steam vessels, even with oil as fuel. It is true, that every master mind in the commercial shipping world was shaping the prospective future reorganization of his fleets on the basis of the demonstrated economies in space, deadweights, fuel and, above all, crew's wages of the vessels of the type of the Siam and the Norwegian George Washington. It is true that in vessel and vessel there had been successful use of Diesel motor units of 500 horsepower and above, producing in twin screw installations, on 9500 ton vessels, voyage after of eleven to twelve knot sea speed with a daily fuel consumption of around twelve tons of oil.

When he organized the Shipping Board in January, 1917, it had been clearly demonstrated that every distinguishing feature of the Diesel motor boat fitted into the peculiar national need and natural resources of the United States. Our ship wages are the highest of all the competing maritime nations; the Diesel reduces to a minimum that most dangerous cost element in our struggle with rival nations having cheaper labor. Our lack of bunkering facilities in foreign waters rendered our steamers under peculiar obligations to other nations. These vessels for many years before we commenced our shipping program, had made their 11 knots an hour in round-the-world voyages with a sailing radius capacity in their double bottom tanks of 25,000 miles—that is once around the world past the bunkering stations of every maritime nation. Such experiences had been repeated in more than twenty other vessels of over 6500 deadweight tons before we formulated our policy regarding them. Our bulky farm products need the ship's space above our rails and plates and bars; the Diesel ship gives a greatly increased percentage of space with its absence of boilers and bunkers. The Diesel burns crude oil; we and our neighbor, Mexico, have at home on this continent the largest fields of oil in the world.

So, we need not wonder at your inquiry why nothing has been done towards developing American manufacture of Diesel engine motors of the larger sizes. What does surprise me is the fact that the country does not seem to realize that it was the declared policy of the Shippig Board during my chairmanship, to make the development of the Diesel a part of our war building program as well as our contribution to our permanent after-the-war maritime fleets.

It happened that my experience as attorney for the Pacific Coast agents of the Olsen fleet of Diesel vessels made me familiar with the experience of the Bayard, Brazil and George Washington, and I brought to the Board a keen realization of the country's need for vessels of this type. In the year 1916, I personally chartered the George Washington to the Navy Department for the carriage of coal from an Atlantic port to San Francisco. In June, 1917, we persuaded a group of interests, among them the Cramp Shipbuilding Company, to organize for the building of a fleet of twenty-four Diesel motor ships engined by the Burmeister and Wain motors, the type propelling not only the Norwegian motor ships, but also those of the older East Asiatic Company, of which the Siam was one. The Cramps already had the Burmeister and Wain patent rights and the State Department assisted us in securing certain necessary drawings. The machinery for building the egines and the ways for the 24 hulls were fully ararnged for. The plans of the vessels and engines secured the approval of Mr. Ferris, then the Fleet Corporation consulting engineer and designer and the question was under discussion whether we should award a contract along lines succested by these gentlemen, or commandeer their proposed plant and patents and make the venture a national one.

The first vessel was to be delivered in thirteen months and the balance one a month. The contract called for hulls of the Santa type which had then been developed by our own Mr. Rosseter. The summary of the specifications was as follows:

1. Deadweight capacity	9,588 tons
2. Length overall	420′-6″
3. Length between perpendiculars (Lloyd's)	404′-6″
4. Beam, moulded	36′-9½″
5. Depth moulded	36′-9½″
6. Draft, loaded	28′-4½″
7. Deadweight capacity at 28′-4½″	9,588 tons
8. Cubic capacity, grain, about	476,000 cu. ft.
9. Gross tonnage, approximately	6,500 tons
10. Net tonnage, approximately	4,500 tons
11. Fresh water tank capacity (drinking)	34 tons
12. Oil capacity	34 tons
13. Speed on trial	12 knots
14. Indicated horsepower	3,000
15. Radius of action	24,000 miles

16. The main propelling machinery will consist of Burmeister and Wain four stroke, six cylinder Diesel engines of 630 m.m. diameter and 960 m.m. stroke, with auxiliaries in accordance with the installation in the George Washington.
17. Twin screw, steel, cargo, 'tween deck motorship ready for service, including full equipment for going to sea, as per specifications. Every care to be taken to produce and use good material and reliable workmanship throughout.

NOTE—All tons are taken at two thousand and two hundred and forty pounds per ton.

On July 24th, 1917, the day set for the final discussion of this question (in which we were in substantial accord) both General Goethals and I resigned.

It is my understanding that at a very recent date the government had not as yet placed any contracts for the larger Diesel engines. The organizing work of the Cramps and their associates in the Spring of 1917 came to nothing. Why this is, I do not know. Quite possibly, the members of the reorganized Shipping Board were swamped by their new duties.

It has been suggested that there would have been difficulty in obtaining a personnel to handle the engines of these (24) ships during the period of their construction. This position is hardly tenable in view of the numbers of green men who, during that time, have been taught to handle the vastly more complex and powerful engines of our naval vessels. The proposal provided for instructing engineers during the construction af the engines.

Whatever the cause or causes may have been, it certainly cannot be said that the first Shipping Board either failed in its vision of the national need or in its intiation, at least, of an enterprise which would have embodied in an actual fleet the realization of that vision. I a mthoroughly convinced that had the project gone forward we would have gained at least eighteen months in our race for national supremacy on the seas.

In your Diesel motor edition, you are rendering a public service. I trust every other American maritime publication joins with you.

Very faithfully yours,
WILLIAM DENMAN.

Reconstruction in Foreign Trade and Merchant Shipping

By Joseph J. Slechta

In this article on foreign trade and merchant shipping, Mr. Slechta, vice-president of Gano, Moore & Company, formerly traffic manager for Gaston, Williams & Wigmore, advances some conclusions that will force his readers to use their brains to keep pace with him; and surely his plea for more thoroughgoing and independent Americanism in business should not pass unheard. "Our business men need a broader vision—the power to think in terms of continents," Mr. Slechta tells us, and he urges that we "cast off the swaddling clothes of foreign classification societies who tell us how we must build our ships." Another traffic manager has been writing a series of articles in which he approaches much the same problems from a different point of view. The two series should help to clear the minds of many and bring out sharply just what are the issues before the country and how they best can be met.

EXAMINATION of the fundamental principles of trade and commerce does not permit me to accept the popular impression that a national merchant marine is a prerequisite to a dominant position in overseas trade affairs. That statement is made at this time, not with a view to disparaging the Nation-wide stimulus which is being given to the rehabilitation of the American merchant marine, but as a thesis to be carefully and painstakingly elaborated in all its bearings upon the general economic position of this commonwealth.

I have ventured the assertion that America has worshipped too strenuously the god of industrial super-development. At the risk of seeming iconoclastic, I have pointed out what seems to be almost a fetish in the abnormal growth of factory and mill production. In the face of the generally forgotten fact that in the first six months of 1914, immediately preceding the outbreak of war, a sudden reduction of tariff rates plunged the industrial situation in this country into deepest gloom and portents full of foreboding, I do not hesitate to defend the position that we have had altogether too much Protective Tariff in this land. It is perfectly true that without the tariff wall, French foundrymen could deliver cast steel car wheels in Pittsburgh at prices which foundrymen across the Allegheny River could not meet and live. Without tariff protection, the cotton and woolen mills of Massachusetts could not compete in Boston with the spinners of Manchester and Lancaster, in certain lines of textiles. In almost numberless commodities made of fine grades of steel, German manufacturers could undersell American producers, even in the face of a tariff one-half less than that which had prevailed before 1913.

But by the same token, there were numberless items of manufacture which we could deliver to the doors of consumers in Great Britain and continental countries and undersell producers of the same commodities in those countries. America had so built up her industrial power that the total output exceeded the total production of manufactured goods in Great Britain, Germany and France, with Belgium thrown in for good measure. Of our total, we consumed at home all but a scant 5 per cent, while our competitors across the Atlantic were compelled to seek foreign markets for over half of their total output, in the aggregate. With a hundred millions of population in a territory larger by some hundreds per cent than is occupied by twice the number of human beings, we have sought to overrun the world with our output of mills and factories. Not content to maintain an economic existence unparalelled in all the world in the degree of its luxury, we have sought to take markets away from those who could and who can now live by no other means. America needs, above all else, a goodly portion of introspective deliberation on these subjects.

High protective tariffs have so unduly stimulated production of manufactured goods in the United States that we quickly came to the point of saturation. We began to accumulate surplus product and the only means of disposing of it without reducing prices at home and so reducing wages, was to sell to foreign buyers at any cost. It suddenly became almost mean in the eyes of the commercial world to supply foreign customers with raw products of mine and agriculture.

With the end of the war, we are now visualizing a renewed stimulus to exertion in securing foreign markets for our products. Foreign trade is pursued by the propagandists of commerce and factory, yes and of academic halls, as a fetish, in the possession of which is thought to rest all hope of ultimate prosperity. Foreign trade is to many of these a sort of Pandora's Box from which the Nation is hoping to see brought forth all sorts of commercial power not otherwise to be realized. The fact is, however, that the manufacture of products for sale abroad must necessarily be accompanied by a levelling of economic standards in the nations participating therein at least proportioned to the relative degree of dependence of the country upon such sources of commercial power.

It is claimed that foreign trade can be duly expanded only through the aid of vast merchant marine power, but it must be obvious that if this Nation is to export as large a proportion of its domestic production as do England, France or Germany, not to mention Belgium or Holland, we must lower our wage scales and other factors in the cost of production to a degree at least commensurate with those countries. Unless such a levelling process of production costs is brought about, neither a merchant marine or any other incidental factor will serve to expand our foreign trade beyond what may be considered its normal growth.

Already evidence is not lacking to indicate that the United States, during the next generation, may anticipate severe competition from England, fighting to retain her commercial prestige; from Japan, already evincing a power in trade and on the high seas not to be lightly regarded; from France, soon to be rehabilitated and with a new spirit in world affairs; and indeed from fallen Germany, whose economic power in productive energy has been by no means wholly swept away.

This competition will take the form of strife not only for spheres of influence in export and import trade, but rivalry for control of sea routes, through the employment of each nation's ocean carriers.

I am not disposed to view the prospects for the United States with the slightest degree of apprehension. We may, or may not be able to maintain our high seas fleets profitably in a struggle with our several competitors. It may not be possible for us to control the foreign trade of some sections of the world which some are inclined to view as our own particular province. There is no sound reason, however, for believing that either our prosperity or our international prestige can be unfavorably affected by such failure.

Without venturing too far to oppress my readers with statistical data, attention is called to the need for careful consideration of the following records, based on the official reports of the various governments. I have used as a particularly significant period, the fifteen years immediately preceding the outbreak of the Great War.

The combined area of our seven greatest trade rivals in Europe—United Kingdom, France, Germany, Austria-Hungary, Belgium, Switzerland and Holland—is less than one-fourth the area of the United States, excluding Alaska, whereas the population of these seven countries was in 1914 about 225,000,000 as against 101,000,000 in the United States. In other words, the density of population in these seven nations was, and is now, approximately nine times greater than in the United States. I would have you bear in mind that broadly speaking, this means that economic pressure, or the compelling urge of the respective populations to earn a living is pretty well measured as to its relativity by just about that ratio, even if we disregard the fact that natural resources are in our advantage. The ability of the population of the United States to be self-sustaining is at least nine times greater than that of the population in the European group.

This explains why, in the face of the fact that American manufactured output rose from some $9,000,000,000 in 1900 to over $25,000,000,000 in 1914, we were in the latter period exporting less than 5 per cent of our total output while the seven countries named above were finding markets abroad for at least 50 per cent of their aggregate production. With a population two and one-half times greater, these seven nations were producing only 20 per cent more manufactured goods than the United States alone.

The foreign commerce of the world abounted to 17½ billions of dollars in 1900 and 37½ billions in 1914. Our own foreign commerce grew at about the same ratio, or from 2¼ billions to 4.3 billions, notwithstanding the fact that we had a steadily declining merchant marine; that our national efforts were largely expended in attention to our domestic, that is, our inter-state and intrastate exchange of the commodities of commerce which grew during the same period from some 15 billions to not less than 50 billions, or more than the entire foreign commerce of the world. Our national wealth grew from 94 billions to 225 billions in the same period. Not a single one of our competitors was able to increase their foreign trade more rapidly during that period than we, with the exception of Germany, whose increase was less than 10 per cent greater than ours. While our exports more than doubled, with an ever-increasing proportion of manufactured goods in such trade, England, with more merchant vessels than all the rest of the world, increased her exports by only 50 per cent.

No, I cannot be pessimistic about the possible outcome of our competition with the rest of the world. A comprehensive understanding of fundamental principals of political economics, from a proper comparative point of view as to nations and continents, must leave the thoughtful student with every degree of confidence in the security of the prosperity of the American people. If the economic necessities of those whom we falsely consider commercial rivals forces them to pay low wages to industrial workers in order to undersell us in certain lines of commodities, and to employ their nationals on the high seas at beggarly wages, in order to profitably employ their vessels, that is their misfortune, not ours.

It is my confident belief that the immediately succeeding era in this country will witness an even greater advance in the economic welfare and prosperity of the American people. We will become even more self-sustaining by a greater effort to develop our natural resources in agriculture, stock growing and mining. The most stable element in our national regime has always been on farm and field. We will require ever increasing quantities of raw materials from abroad, such as nitrate from Chile, potash from Alsace and Germany, silk from China, coffee from Brazil, and many other peculiarly tropical products. But our surplus of other raw materials and food supplies should increase rather than diminish. Our own production of wool, sugar, cotton, wheat, meat and other essentials should be vastly increased, to supply not only our own growing consumption, but the needs of populations more dense than our own.

We need ask of ourselves and of our foreign friends but very little. Our business men need a broader vision—the power to think in terms of continents. Our woolen manufacturers must think beyond the mere market quotations when buying their raw material. Instead of counting upon the wool broker in New York or Boston to tell them the day's price, let them go afield to the far corners of the world, if need be, and buy their wool as cheaply as do England's mills. Let the buyers of other imported raw material do the same, even to the extent of organizing new corporations under the laws of Japan, China, Australia, Chile or India, in order that they may not be dependent upon the wiles of crafty merchants in London, Berlin or Calcutta.

Let our ship builders take full advantage of American engineering skill, the greatest in the world, to cast off the swaddling clothes of foreign classification societies who tell us how we must build our ships in order that they may be insured in London, Paris or Berlin. We have financial power sufficient to establish marine insurance companies able to act independently of Europe and the scientific knowledge to design ships more efficient and yet with less weight of steel than any now built.

In this connection, it is significant that vessels built by the greatest yards in this country under contract for the Shipping Board, of exactly the same type and dimensions as vessels built at the same time in Great Britain, contain from 10 to 40 per cent more steel than the latter, with a consequently increased cost and decreased efficiency. In the next article of this series, I will elaborate this feature of what may be considered a positive, or constructive, suggestion, relating to the upbuilding of American Merchant Marine strength, together with other current features of world conditions in ocean transportation, which must receive consideration from those who would have us participate predominately in this sphere of activity.

Of those who trade to and from our shores, but who are not of our own people, we must ask only that they observe the same rules of fair play and justice that we demand of our own citizens. Let no monopoly of ship owners, whose very existence is largely dependent upon American trade, discriminate against our shippers by the unfair control of ocean trade routes. If the wily Jap has a vessel to take cargo from New York to South Africa and is willing to accept lower rates than the British "Conference Lines," give him a chance to do it. If an American capitalist wishes to try out his business fortunes by operating, let us say, a line of chartered Scandinavian steamers, in order to open up a new trade field, our legislation should be so framed that no greedy foreign, or even American, shipping company can smother him with deferred rebate systems or secret agreements with shippers, and thus bring failure to his venture at the very outset. To do this, it is only necessary that the freest possible effect be given to the laws of supply and demand.

My next article will cover more fully the way in which this can be done, and set forth the general effects to be anticipated from such a policy, in connection with trade, as well as ocean shipping development.

Our Ships After the War

By E. M. Herr,
Pres. Westinghouse Elect. & Mfg. Co.

IN 1915, owing to the adverse shipping laws and the generally unfavorable attitude of the United States Government for many years, our flag had practically disappeared from the seas, except in local and coastwise service. It was late in that year that the purchase of the ships of the Pacific Mail Steamship Company by the American International Corporation prevented the disbandment of the only fleet of considerable size under our flag on the Pacific Ocean.

This marked the real turning point in the decadence of our merchant marine in foreign trade, for in 1916 the United States Shipping Board was created by congressional action and $50,000,000 appropriated to build and acquire ships for the United States Government. The original plans of the Shipping Board have been enormously expanded and to date upwards of $3,000,000,000 have been appropriated and over 800 shipbuilding yards employed—many of them newly created and some of unprecedented size and resources—until today the United States is well under way in the creation and operation of the largest maritime program ever undertaken by any nation, and one which bids fair to make our merchant fleet, if not the largest, at least the equal, of that of any nation.

Having an adequate fleet under our flag and laying aside for the moment the fact that this fleet is owned by the Government, what other things are essential to the full development of our foreign trade?

During the war these vessels will be entirely used by the United States Government and therefore will form a part of the U. S. Navy and Army Transport Service. As such they will be manned by our young enlisted men who will thus be trained as sailors in much greater numbers than would otherwise be possible, and while many will return to other avocations at the termination of the war, a large number will still be available for the manning of these ships in export trade. Many of the sailors of other nations, whose marine trade has to a greater or less extent been injured by the ravages of the great war, will also be available, so that it would seem reasonable to expect no very great difficulty in manning our new merchant fleet.

There is no doubt that the ending of the war will not only leave the United States the greatest creditor nation on earth, but also the nation with the greatest command of financial resources. It should, therefore, be entirely possible and perhaps comparatively easy to arrange the financial resources necessary for the conduct of this great business.

With the ships, the men and the money provided, we are still face to face with the all-important problem of the proper utilization of our great fleet after the war. It is impossible to discuss this problem broadly within the limits of the time available, not only on account of its vast extent, but also because of its many ramifications and manifold angles of approach. The American manufacturers are, however, so vitally interested in the successful solution of this problem and their interests so closely reflect the interests of the nation itself that it is from this—the manufacturer's point of view—that I shall attempt a brief review of this important subject. What, then, is the paramount interest of the American manufacturer in the proper utilization of the merchant marine of the United States after the war? Manifestly cheap and efficient transportation in these ships of raw and manufactured products — or, in other words, favorable freight rates and how they can best be attained in foreign trade—brings up at once the question whether the operation of these ships shall be under Government or private ownership.

Government ownership of transportation facilities has never brought cheap rates and efficient service, and in my judgment never will, especially under a republican form of government, or, in fact, any form of government now to be considered. Why government ownership is inefficient has been so thoroughly discussed and clearly explained that it is unnecessary to here repeat the argument. We must, therefore, turn to private ownership for the successful operation of our merchant ships.

Our New Merchant Marine---The Problem of Its Existence and Growth

In the final article of the series by the Traffic Manager, on the new American merchant marine, he answers Edward N. Hurley, chairman of the United States Shipping Board, who recently set forth his views on American shipping on the Pacific. He counters Mr. Hurley's plea for "real information" by citing the experience of the great exporting and shipping companies; answers his consideration of the La Follette law; and particularly questions what government operation of the merchant marine may lead to. "Take the lid off now, remove the camouflage, and let us know just what we may look for from government ownership. Far better to let us know the whole truth now than force Congress into further investigations, which are always very expensive."

EDWARD N. HURLEY, Chairman of the U. S. Shipping Board, has at last spoken on the question of ship operation. All of his former efforts and writings have been confined to building ships to win the war. In the November issue of "Asia" he has contributed an article entitled "American Ships on the Pacific" in which he gives his views on the La Follette act and ship operation.

An American Merchant Marine and its future existence is a burning question. Mr. Hurley's article develops the fact that a great difference of opinion exists between experienced shipowners and himself as head of the United States Shipping Board. He believes that the handicap of our present laws, and the highest cost of vessel building, and the highest cost of vessel operation (all of which we have with us) can be overcome by efficiency in other directions. Experienced shipowners and operators disagree with him. Mr. Hurley is sincere in his convictions and so are the shipowners. Honest difference of opinion admits of debate, and this article is not intended as criticism; it is an attempt to respectfully set forth the views of one who believes just as implicitly in an American Merchant Marine as does Mr. Hurley, but one who believes, through experience, that the "pitfalls" are many and that the handicaps on our foreign American Merchant Marine cannot be overcome as Mr. Hurley suggests. Mr. Hurley's article is taken in sections and each section answered:

> 1. Mr. Hurley—"Thousands of business men, especially those engaged in shipping, have shown anxiety about laws relating to our new merchant ships and have asked questions concerning policies on wages, ownership, operation, costs, competition and the like. Many of them believe that new legislation will be needed to keep our ships on the ocean.
>
> "The Shipping Board was created some months before our entry into the war. Its chief function is to build up an American merchant marine, and Congress gave it full scope for investigation and the recommending of further legislation. Therefore, the chief task today is to secure real information about the operation of ships, and create an intelligent American opinion on ships, so that if new legislation is needed it may be wise."

Please note from this statement that thousands of business men are worried about laws and future ownership, operating costs, Government competition, etc. Mr. Hurley reminds them that the chief function of the Shipping Board is to build up an American Merchant Marine; that Congress gave it full scope to investigate and recommend further legislation. Mr. Hurley believes that only through experience in operation can the Shipping Board create an independent American opinion on ships, so that, if needed, new and wise legislation may be enacted. Shipowners believe that that will be a costly experiment. The information he seeks is obtainable from the great exporting oil companies, United States Steel Corporation, the United Fruit Company, and the Dollar Steamship Company. They have had experience in owning, chartering, and operating both American and foreign ships: English, French, German, Dutch, Italian and Japanese. It was necessary for these truly American corporations, fighting in the markets of the world, to have cheap transportation, and it could not be had under the American flag. Their experience and book records surely are available to the Shipping Board.

> 2. Mr. Hurley—"One of the chief obstacles supposed to hamper us in the operation of our new ships is the La Follette law, also known as the Seamen's Act. I think it will be well to give my viewpoint on this much-debated law.
>
> "It is unfortunate that sea wages have occupied so much of our thought in connection with merchant ships. The La Follette act is a **high wage law,** and has, therefore, been a burning question. It seems inevitable that all discussions of American shipping must begin with a debate about a coolie and a bowl of rice, and in many cases never get any further. Read shipping testimony before Congress and this problem of wages dominates. Talk with shipping men and you will find it is ever-present in their thoughts.
>
> "The La Follette act has not yet been tested, by reason of abnormal conditions in ocean transportation caused by the war. Most arguments advanced against it, as well as for it, are now theoretical, and we need the light of practical experience to guide us in changes if they are necessary. I am even a little prejudiced in favor of that law because it raises human standards in the ocean transportation industry. I personally believe that good human standards are not only desirable, but also that they actually work better than poor human standards."

You will note that Mr. Hurley touches on only one phase of the Seamen's Act, naming it a **high-wage** law. There are many more faults to be found with this act, and the shipowners pointed them out in Washington before the La Follette bill became a law. Those records are available, and the Government finds the La Follette Act so bad that all of its provisions are not being enforced. Our Merchant Marine was top heavy with burdens before the "deadweight" of this bill was added. In 1810 ninety-one and five-tenths per cent of American goods were carried in American ships; in 1910 eight and eight-tenths per cent; after the La Follette Bill and just before the war, ninety-seven hundredths per cent. Then came our entrance into the war and billions were required to build our merchant marine. On the Pacific that merchant marine will have to compete with Japanese vessels. Can it exist under present conditions? Shippers and shipowners do not think so. However, the American shipowner may have no cause for worry, for Honorable Josephus Daniels, Secretary of the Navy, in a recent speech at the naval architects' dinner in Philadelphia stated that the Government of the United States is going to continue to own American ships, is going to operate those ships, and that our Government is going into the foreign trade to develop commerce for our country. This sounds very socialistic and we hope it will not come true.

3. Mr. Hurley—"Now it may be that they are right—that in the future, after we have made practical efforts to operate American ships with American crews, paid American wages and living standards, we shall need cheaper labor to hold our own in competition.

"But if that proves true, then the American Merchant Marine will run counter to most of our industrial experiences. We haul freight on the railroads and the Great Lakes cheaper than any nation in the world, and do it with American labor under American conditions. Most of our foreign trade in manufactured goods consists of products made by the best-paid American workmen—automobiles, typewriters and office machinery, agricultural implements, steel and other metal products. We have learned at home, as business men, that it almost invariably pays to raise living standards and wages, and I believe that this is as true upon the oceans as it is upon land.

"Wages are by no means the only factor in management. If you have an up-to-date plant and run it at high efficiency with a scientific cost system and can create a large, steady volume of business through intelligent sales work and good service to your customers, wages may be an entirely secondary matter—indeed, by utilizing these other elements of good management, you may be able to increase wages. This is true in manufacturing, and I believe it to be true of merchant shipping. Perhaps I am wrong."

Is Mr. Hurley's statement true that we haul freight on our railroads cheaper than any nation in the world? It was true under private ownership, and Mr. Hurley probably used private ownership statistics. According to Mr. F. H. Sisson, vice-president of the Guarantee Trust Company, in an address before the Essex County Bankers' Association at Newark, N. J., the first nine months of railroad operation under government ownership, cost almost two hundred millions dollars in excess of receipts in spite of greatly increased rates.

In regard to cheap freight rates on lake steamers, they would be cheaper still if under foreign ownership and manned with foreign crews.

The manufactured goods enumerated and on which we have highly specialized, all seek foreign markets by the cheapest route, and that is the foreign owned ship. England has specialized in shipbuilding and ship operation just as we have specialized in certain manufactured articles. England and other European countries run ships at high efficiency and with a scientific cost system, and, through their world agents, have created a large and steady volume of business.

> 4. Mr. Hurley: "It is natural for me to be guided by past experience as a manufacturer in approaching a new task, and so my thought on merchant marine policy has run in these directions rather than to cheap labor. There is so much opportunity for efficiency in the design and operation of our ships, the rearrangement of our ports, the building up of trade volume, the use of machinery in handling freight, and the saving of money by quick turn-around of ships, that we have studied these matters first. It was logical to turn to them during the period when we were building our ocean transportation plant, with its terminal facilities. Had we been apprehensive over the coolie and his bowl of rice we might have overlooked opportunities to incorporate economically new devices in the design of our ships and port machinery."

Mr. Hurley admits here lack of shipbuilding and ship operating experience and that his experience as a manufacturer guides him in approaching any new task.

(a) **Design.**—There is great opportunity for efficiency in design, and we are behind other nations in that respect; in fact, it will take us years to overtake the efficiently up-to-date designed and operating Diesel engined vessels of foreign nations, and while we are trying to catch up, they will not remain at a standstill.

(b) **Operation.**—The American shipowner operates as efficiently as any shipowner in the world under similar conditions. This may be proven by the records of the aforesaid American companies who have owned and operated foreign ships for years in competition with the world.

(c) **Rearrangement of Our Ports, Machinery for Handling Freight.**—Shipowners agree with Mr. Hurley's suggestion, but contend that the improvements, while an aid to a quick turn-around of American ships, will also be an aid to quick-turn-around of foreign ships entering American ports, and, therefore, will not give the American ship any advantage over a foreign competitor.

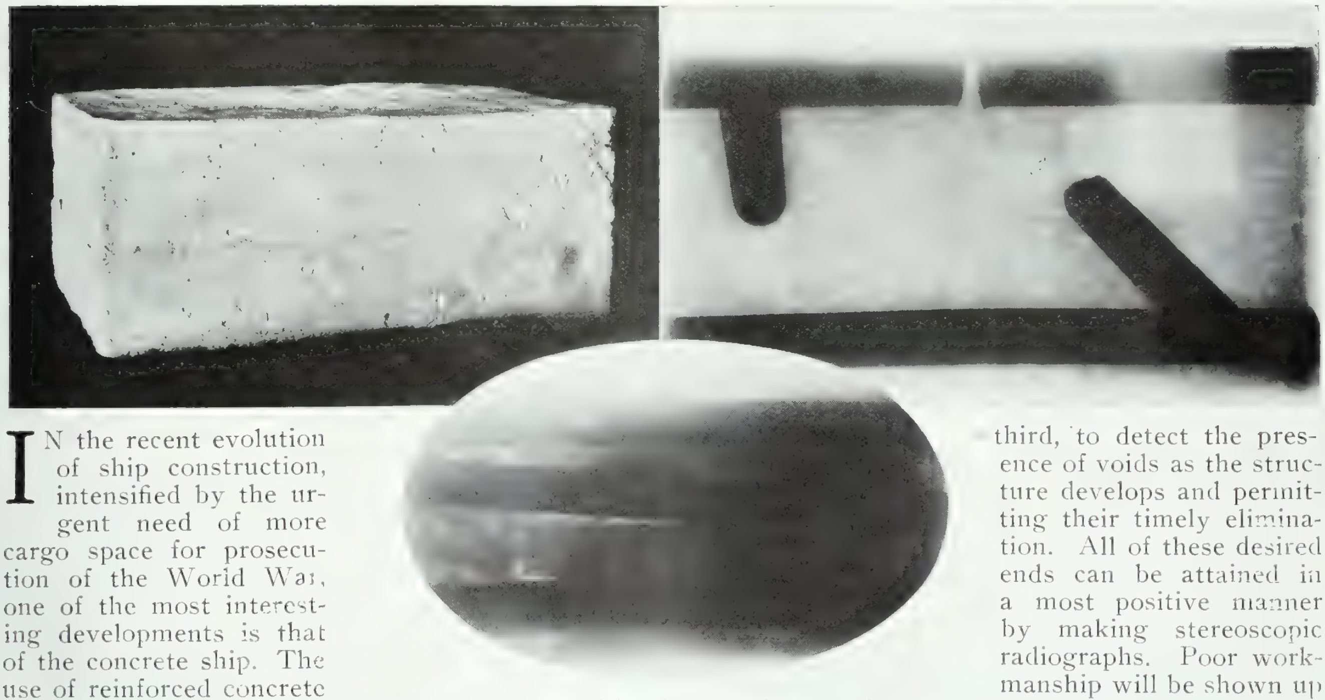
Inexperience is costly and has proven so throughout the war. Mr. Hurley is advocating acquisition of experience on the part of the nation as a shipowner, which will prove costly and add to the burdens of the already heavily taxed public. Should this experience prove costly, the Shipping Board will then ask for better laws. To acquire the experience in shipowning and operation under present conditions and laws, a Hurley-Pacific-Oriental steamship company could gather facts at first hand. Is it a fair proposition for Mr. Hurley to recommend the acquisition of government experience at great expense when, as stated in the first part of this article, thousands of shipping men believe the American ship cannot compete under present conditions? Congressional investigations have developed the fact that many mistakes have been made through lack of experience in the production of war essentials, but the war is now over, and we have time to consider.

Why does not the shipping Board lay all the cards on the table and tell the American people just what has been the cost of operation of the fleet under their control during the last year, and what they may reasonably expect to trim off that operating cost under competitive conditions? As stockholders in the corporation owning this fleet, who may be called at any time into a meeting to decide the future conduct of that corporation's business, the people are entitled to this information. Take the lid off now, remove the camouflage, and let us know just what we may look for from Government ownership. Far better to let us know the whole truth now than force Congress into further investigations, which are always very expensive.

M. S. Pedro Christoffersen

X-Rays Applied to Re-enforced Concrete Ship Construction

By Arthur C. Freeman, Jr.
District Plant Engineer, U. S. Shipping Board Emergency Fleet Corporation.
Radiographs by S. N. Rubins, U. S. S. B., E. F. C.



Four-inch block of reinforced concrete (one part of cement to two of sand and three-fourths inch bars) and two stereoscopic radiographs. The illustrations are highly interesting as excellent examples of radio-photography as well of technical interest to concrete engineers.

IN the recent evolution of ship construction, intensified by the urgent need of more cargo space for prosecution of the World War, one of the most interesting developments is that of the concrete ship. The use of reinforced concrete for constructing the hulls of vessels carrying their own propulsive power, is still experimental. Much has yet to be learned regarding the suitability for this purpose of a material hitherto employed mainly for non-mobile structures having a "terra firma" support, and only to a limited extent for barges and other tug-towed vessels.

The success of the concrete ship will depend in large measure upon the strict observance of every precaution that experience has shown imperative for securing perfect concrete. The utmost care must be expended in the selection of the materials and in their proper mixing and manipulation during construction. A mistake made at the time of building may mean failure beyond recall. The concrete hull must be a monolith, one hundred per cent perfect at every point.

To insure this result, the most careful and painstaking inspection must follow and control every step and stage of the construction. There must be developed a method of building which shall be constant in the reliability of its output. When such a method shall be attained, we shall have the nearest approach to a solution of the concrete ship problem.

Knowing the difficulties that attend our efforts and realizing that a prime condition of success lies in maintaining a constant standard of mixture and disposition of reinforcement, the writer has devised an application of X-rays as a means of determining the degree in which the requirements are being met. The procedure is, first, to show by means of a series of X-ray photographs that the standard of uniformity of mix and compactness is maintained; second, to observe any misplacement of reinforcing which, recognized in time, may still be remedied; third, to detect the presence of voids as the structure develops and permitting their timely elimination. All of these desired ends can be attained in a most positive manner by making stereoscopic radiographs. Poor workmanship will be shown up clearly, and with radiographs suitably taken at stated intervals during the progress of the work, we will be in position to scrutinize our performance and to control its results.

A radiograph is shown which was taken through sixteen inches of concrete, the bars being placed midway. Greater thicknesses of concrete are readily pierced by the rays.

A stereoscopic radiograph is shown of a four-inch-thick block of reinforced concrete, the mixture being one cement to two sand, with three-quarter inch bars placed longitudinally and transversely.

The radiographs were made on a Seed X-ray plate at a distance of twenty-two inches from the X-ray tube, which was operated on an induction coil having a mercury turbine interrupter and a current of ten milli-amperes sent through the tube, the potential difference across the spark gap corresponding to a ten-inch parallel spark gap between points.

The structure of the mass and the reinforcement can be seen very plainly with a fluorescent screen, thus saving the making of radiographs except when it appears advisable on detection of defects.

The outfit for doing this work is portable, weighing about ninety pounds, and its cost is not excessive.

The method here described will also be valuable for examination of vessels after actual sea experience, with a view of detecting any flaws or deteriorations that may be developing.

In connection with the experimental work necessarily involved in present-day ship construction, there is a large field of usefulness for the X-ray—in the case of the electrically welded steel ships as well as in that of the concrete ship.

Pacific Marine Review
The National Magazine of Shipping

SAN FRANCISCO, CALIFORNIA U. S. A.
Official Organ of the Shipowners Association of the Pacific Coast

Subscription Price, per year (Domestic) $3.00
(Foreign) $3.50
Single Copies . . . . 25 cts

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The Pacific Marine Review is sold at all leading News Stands
Entered as second class mail matter at Postoffice
San Francisco, Cal.

Published on the First of Each Month.
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WHY NOT MORE MOTORSHIPS?

THE letter from William Denman, former Chairman United States Shipping Board, which we print elsewhere in this issue of Pacific Marine Review, asks a question of the Shipping Board that should be answered. If it was possible in 1917 to have contracted with a responsible American firm for a fleet of motorships engined with Burmeister & Wain Diesels on a guaranteed delivery basis, it certainly would seem that the Shipping Board, to put it mildly, was very careless when it failed to close such a contract. The installations of Burmeister & Wain of Copenhagen have proven themselves in long service in such fashion that they may almost be considered standard practice among heavy oil marine motors. If it is possible now for a contract of the nature outlined in Mr. Denman's letter to be closed, then by all means let us get at it, for we will then be taking the most obvious method of beginning to put the American merchant marine on an equality with the merchant marines of other nations with which it will have to compete. When we consider that the fuel consumption of these Diesel engined ships, as proven in round the world voyages under the hardest conditions of freight tramping, is less than one-half that of the most economical steam plants afloat, and less than one-third that of the ordinary triple expansion engines installed in ordinary tramp steamers, then we only begin to see the possibilities of economy in operation with these ships.

To get the total comparative economy abailable we must consider saving of wages due to decrease in necessary engine room crews, stewards, etc.; space saved for bulky cargo due to elimination of boilers; time saved on long voyages and in port due to long power radius; and other items of which the aggregate is so large that it is impossible for a steamer successfully to compete with a motorship.

In the January "Motorship," an American monthly, which has for four years consistently worked to open the eyes of the American ship operator to the advantages of the crude oil motor power for ships, there is recounted in detail the record of the Danish motorship California. This vessel has been in active service for over five and one-fourth years with clock-like regularity, and after considering all the economies gained, "Motorship" concludes that the California has saved and earned for her owners during the five and one-fourth years not less than $3,000,000 over what could have been earned in the same time by a coal-burning steamer of the same dimensions.

Accept this figure as correct and apply the same proportional increase of net earnings to a fleet of carriers such as the United States Shipping Board is now operating.

The motorship California is of 8200 deadweight tons carrying capacity. The U. S. Shipping Board fleet is of approximately 6,000,000 deadweight tons carrying capacity. Three million dollars in five and one-fourth years for 8200 tons means $2,190,000,000 in the same period for 6,000,000 tons, or say four hundred million dollars a year, in round numbers, or five per cent interest on eight billion dollars. As we expect to have an American merchant marine fleet of 15,000,000 tons by the end of 1920, we might well stop and ask ourselves why not call a halt and convert a great proportion of the unfinished steamers to motorships.

Pacific Marine Review does not stand for any muck-raking, war record investigation policy. We hold that there are sufficient problems in the immediate future to absorb all the best energy and intelligence that this country can produce. We print Mr. Denman's letter not with any desire to have any investigation started as to the activities of politicians in the Shipping Board or the Emergency Fleet Corporation, but because we think its contents may be of value in showing the possibility of motorship construction in America along the lines of the best European practice.

LABOR AND SHIPBUILDING

ON April 1, 1917, there were working in United States shipyards less than 40,000 men. On January 1, 1918, there were close to 400,000 workmen in the yards, and in subsidiary industries probably as many more. Probably sixty per cent of the 400,000 men had no conception on April 1, 1917, of even the simplest form of shipyard work, and it is equally probable that a large proportion of that sixty per cent still have no conception of what they are doing to earn their pay. We have heard a lot of steam blown off during the war about the patriotism of the shipyard workers, their tremendous sacrifices to the cause of democracy. Now the fighting is almost over, we are still technically in a state of war, but shipyard labor is proposing to strike for higher wages. That seems to us in the circumstances a strange sort of patriotism.

We do not blame any man for wanting higher wages, but we have always had a lurking idea that the proper way to get higher wages was to fit oneself to earn them. Now what are the facts about shipyard workers in this respect? At least sixty per cent of them, possibly a much larger majority, have learned all they know about shipyard work during the last twenty-two months at the expense of the rest of the people in these United States who established schools for them and actually paid them to attend those schools a far higher wage per day than was ever before paid to the really skilled shipyard worker. Twice on the plea of increased costs of living these wages have been raised. Now when the people of the United States are just bracing themselves for the reconstruction period these shipyard workers are ready to tie up the industries of the country and are loudly calling for a general strike unless they are granted more wages.

Already the Emergency Fleet Corporation has cancelled many contracts for steel vessels in the Northwest on account of this strike, and if the strike spreads down the coast there is no doubt that all contracts for the Pacific Coast section will be cancelled. It is the only commonsense business attitude for the Emergency Fleet Corporation to take. But the effect on labor and on capital will be very disastrous.

Cannot these brainy leaders of the Pacific Coast Metal Trades Unions see that the interests of the men who have charge of the Emergency Fleet Corporation are all in the East? Cannot they see that Hog Island and Newark Bay and Bristol and all the other big East Coast yards must be kept busy, and that almost any excuse for diverting the Pacific Coast contracts to Eastern yards will seem to them a good excuse?

Cannot they see also that practically no private contracts for shipbuilding are being let in this country at the present time, and that it would not take a very great added strain put on shipbuilding affairs to have the Senate step in and stop the Emergency Fleet shipbuilding program? Business policy dictates that step right now, entirely apart from any labor troubles. With labor on strike there is no alternative.

Then exit labor, and some 250,000 to 300,000 men will be back in the wild scramble for an existence in all the various jack-of-all-trades pursuits, from making shirts in the sweatshops of New York's Ghetto to cow-punching in Texas or harvesting fruit in California, dropped from certain good wages at comparatively easy work, to uncertain intermittent hard work at low wages. "Eyes have they but they see not, neither hath it entered into their heart to understand."

Any thinking man conversant with the facts must acknowledge that the whole shipbuilding industry as built up in America during the war is now in a critical stage of its existence, entirely irrespective of any additional burden which Union Labor may seek to impose. We are at the present time paying in American shipbuilding yards for ordinary freight carriers at the rate of from $185 to $250 per ton; British yards are contracting at $125 to $150 per ton. Every phase of the situation is in favor of the British yard successfully bidding against the American yard for all shipbuilding work needed by private interests, including the American shipowner. Surely every man who is now working in a shipyard must be interested in the continuance of this industry and must see that the proposition up to organized labor, if American shipbuilding is to survive competition, is not so much a problem of raising or lowering wages as it is a problem of how will organized labor co-operate in raising the standard of efficiency among the various trades involved. There is no agency better able to do this than the trade union, and apparently there is no agency that cares less about this phase of the question.

It is sincerely to be hoped that labor and employers will get together and adjust their differences so that the Pacific Coast may have a little chance left of retaining its shipbuilding contracts. A payroll of $10,000,000 per month is certainly worth while retaining at any reasonable sacrifice of personal comfort, and any man can support his family much better at the present wage to shipbuilders than he can when working at any odd jobs that he may be fortunate enough to find while on strike.

AN IMPORTANT CONFERENCE

THE merchant marine conference, held in Washington in January at the call of Senator Ransdell of Louisiana, agreed on one primary point: An American merchant marine is necessary to the foreign trade of the country. What is described as a "voluntary patriotic organization" was formed to educate the public in maritime affairs.

No decided stand was taken in any of the more specific questions that are confronting the large merchant marine which we already have. Reports agree that the general sentiment of the conference was opposed to government operation; with this exception, there is little comfort for those who had expected the meeting to wrestle with immediate and pressing problems.

However, the committee on resolutions certainly presents a strong front, headed, as it is, by H. A. Wheeler of Chicago, president of the Chamber of Commerce of the United States, and including, among other well-known shipping men, P. A. S. Franklin, head of the International Mercantile Marine. If this committee is able really to carry on a campaign of education throughout the country, awakening the people of the inland states especially, without urging any particular policy other than the good of our shipping, the conference will have accomplished a great deal. On the whole, it may have been too much to expect it to do more at this time—particularly when it is considered that the conference was called by one man—Senator Ransdell—and scarcely had the necessary publicity for a thoroughly representative gathering. The Pacific Coast did not have the representation that a really national conference would demand, although C. E. Grnusky of San Francisco is a member of the resolutions committee. There was a belief among Pacific shipping men that existing agencies would prove adequate for the work to be done, although there was an appreciation of the fact that publicity in behalf of the merchant marine would be beneficial.

Senator Ransdell has an open mind, the conference learned, and will support the plan that seems most likely to bring results. Senator Fletcher of Florida, chairman of the Senate Committee on Commerce, did not advocate a policy of Government ownership, but was willing to accept that if it promised success. In discussing the proposal that the Government write off one-third the cost of the merchant marine, approximately $1,000,000,000, the Senator said that he did not see whence the capital would come to buy the vessels, since the $3,800,000,000 that would have been expended when the program was completed was $1,000,000,000 more than the value of all the merchant vessels of the world prior to the war.

That Government ownership will find rough going in the next Congress was evidenced by the attitude of William S. Greene, chairman-to-be of the House Merchant Marine and Fisheries Committee, who stood for privately-owned fleets. Senator Wesley L. Jones, who may succeed Senator Fletcher as chairman of the Senate Committee on Commerce, is not in favor of Government ownership.

JOHN D. PARR DEAD

John D. Parr, secretary-treasurer of the Parr-McCormick Steamship Company, died of influenza the latter part of January at his home in San Francisco. Mr. Parr was only twenty-seven years old, but he had been an official of the Parr-McCormick line since its incorporation in 1915, and prior to that had been freight agent and dock superintendent of the Dodge Steamship Company, obtaining thus a wide experience in shipping.

John D. Parr

Mr. Parr was born September 2, 1891, at Visalia, California. He is survived by his mother, Mrs. Bertha B. Parr; Miss [illegible] Parr and Mrs. Frank Cox, sisters, and Fred D. Parr, brother, all of San Francisco.

The city council of Oakland adopted the following resolution on the death of Mr. Parr:

"Whereas, John D. Parr was called from our midst by death on January 27, 1919; and whereas, by his untimely passing, Parr-McCormick Steamship line loses a strong leader, his business associates a loyal and true friend, and his family a loving and devoted son and brother;

"Now, therefore, be it resolved: That the council of the city of Oakland does hereby express its sorrow and regret upon his death, and extends to his mother and family its sympathy in in their bereavement, and further extends to the officers of the Parr-McCormick Steamship Line sorrow for the loss of their fellow worker;

"Further resolved: That the clerk of the council forward a copy of these resolutions to the family and the president of the Parr-McCormick Steamship Line."

The following letter was written by W. F. Sullivan to Fred D. Parr:

"Please permit me to offer my sincerest condolences to your family in your recent bereavement. Your brother John impressed me deeply in our weekly meetings of the Steam Schooner Luncheon Club, where only I had the pleasure of meeting him, as a modest, unassuming young man who had the highest standard as his aim in life and its duties and I know that we can ill afford to lose men of his character.

"The Luncheon Club and the Shipowners' Association have asked me to join them in this expression of sympathy."

PAID IN FULL

IN April, 1917, you went into a partnership with James Yeager, American.

You wanted protection for your family, your income and the privileges you deemed necessary to proper living.

Several thousand miles away an army of arrogant, outlaw millions had begun a campaign of ruthless world conquest accompanied by crimes against women, children and property. This horror was striding toward your home.

Yeager agreed to receive training, brave the submarines and fight this machine, which had taken on forms more terrible than history recorded. As your part of this partnership you were to remain at home, do your part in financing Yeager's crusade, see that his family had financial assistance and pay him $30 a month. You felt that you had a good bargain.

On October 12, 1918, near Verdun, Yeager, while performing his duties under the terms of the contract, was cut off with a few companions in an exposed position under heavy machine gun and artillery fire. He stood off the foe with his automatic rifle until severely wounded.

After lying seven hours with a companion, reinforcements arrived and two stretcher bearers came with only one stretcher. Your partner, Yeager, demanded that the other man be taken first. When they returned for Yeager he had been released from your contact—he was dead.

Next April, just two years after the signing of that agreement, you will be asked to carry out the final part of your stipulation by subscribing to the Victory Liberty Loan. Will you meet that obligation cheerfully or begrudgingly?

The National Merchant Marine—Its Significance to the Port of San Francisco

By J. J. Dwyer,

Manager, Department of Port Development, San Francisco Chamber of Commerce

THE dawn of peace has naturally put a quietus on many war activities, but not on the shipbuilding program. "Ships and more ships" was the cry all through the war. It remains one of the most urgent requirements for the rehabilitation and expansion of industry and commerce. Probably of all the lessons impressed on the minds of thoughtful observers of economic conditions by the exigencies of the great war, none has sunk deeper than the need of improved transportation on both land and water.

Long ago Macaulay said that next to the invention of printing nothing had contributed so much to the progress of civilization as inventions of transportation. This profound truth, while recognized, has been slowly acted upon with any approach to scientific thoroughness because of the inherent difficulties and costs. The war has given us a new measure for both. It should be a matter of national pride for the United States to be the first and most conspicuous in acting on the new scale. And nothing could be better for San Francisco than that she should see these things clearly, hold to them tenaciously and act upon them energetically and enthusiastically.

We are fond of talking about our manifest destiny, but nothing is surer than that we will miss it, that it will pass us by, as it does many an able dreamer, unless we work to attain it and fit ourselves for it.

The transportation problem admittedly is one of the gravest of economic problems, and while it is not possible to make a satisfactory solution of it without providing amply for both its two main divisions, land and water transportation, and arranging for their complete and intimate co-ordination, yet it is manifest that the progressive solution of each branch of the problem can be advanced in large measure independently of the other.

The ship program is much the simpler of the two, at least in its initial stages. The government has committed itself to the policy of a vast national merchant marine and legislation already on the statute books furnishes the machinery for its institution and conduct in a manner that insures a tremendous development in the near future. No signs of a change in public opinion on the wisdom of the new policy have appeared since the close of the war.

It is true that the debate is still proceeding as to how the merchant marine is to be controlled or operated, whether in public or private hands, or by a mixture of both, and it is not our purpose to touch on that phase of the question at this time, but to emphasize the fact which is of the highest possible significance to the port of San Francisco that the war has made a profound change throughout the nation in its attitude toward the merchant marine, and that the feeling is now very widespread and strongly entertained that national security as well as economic progress imperatively demand that we must have our own international carriers.

Indeed, the necessity is so apparent and so impressive that no patience will be manifested toward a policy of waiting for a substantial start until perfection has been attained in all details, whether of legislation or plan or otherwise. Having made a start, the public seems determined to keep it up vigorously. Amendments and improvements born of experience will suggest themselves and can be debated and enacted from time to time, but the ships we have will be kept going and the shipbuilding program will be continued more carefully indeed than was possible under the stress of war but with equal earnestness and energy.

If our people will adhere to their resolution that these things must be done, because of the imperious demands of the national security and the national welfare, a way will surely be found to do them effectively and satisfactorily.

The danger is that in the multitude of other cares and problems pressing on the minds and time of Congress, the interior of the country, which contains the larger part of the population, may cool off on the present keen interest in ship transportation and the forward impetus be slowed up accordingly. It has always been a hard task to show people living away from the coasts that their interests were intimately and largely involved in foreign trade, the result being that all efforts before the war to build up a merchant marine came to naught.

But the war has made a radical change in this attitude everywhere. Even before the war, it had come to be accepted as an economic truism that international trade is an absolute necessity of national prosperity, and that markets for our surplus products of factory as well as of farm must be found in foreign lands.

Education was also proceeding along the line that this export trade must be balanced by imports in order that ships might have cargoes both ways and that fair rates of exchange might be maintained in financial settlements. These principles having been firmly established, the next logical step forward manifestly was that we should match the policy and endeavors of all the leading maritime nations by building and maintaining our own merchant marine.

The war has made that step not only possible but comparatively easy.

The new policy has come to stay. It may be frankly admitted to be an experiment. But the national merchant marine is here now. It will grow apace. People of constitutionally timid minds will continue to doubt whether the new departure will pay, but they will not be listened to any longer. The point for San Francisco to appreciate to the full is that the experiment has been embarked upon and will surely be carried out to the fullest possible test by actual experience over a long series of years, and it is therefore the plainest dictate of prudence, which cannot be too strongly emphasized, that no matter what the ultimate result may be predicted to be or actually prove to be, it is at this moment a matter of the greatest possible urgency, because it is to our enormous financial advantage, to get the port of

San Francisco ready to grasp and hold all of this trade that we can while it is in the making.

Moreover, whether this so-called experiment of a national merchant marine succeeds or fails ultimately, or dwindles and goes along haltingly, it is as sure as fate that our international trade will develop enormously with the awakening of many new nations under new governments and the equally remarkable re-birth of old nations, all of which are keenly alive not only to the prime necessity of domestic rehabilitation, but as an indispensable means to that end, are already speeding up their foreign trade connections.

Another noteworthy change has taken place that amounts to a transformation. The rapid establishment of strong American branch banks in many foreign trade centers during the war will greatly stimulate and help our foreign business.

It thus becomes as certain as anything in trade can be that foreign commerce will expand with increasing momentum, and that if it is not carried in American bottoms it will be carried in foreign bottoms.

Either way, or both ways, we must be ready for it with our harbor facilities. No city in the country is more vitally interested in this movement than San Francisco. California is generally heralded as one of the great agricultural states of the Union. This is true. But will not a large part of the public be surprised to hear that the total value of California's manufactures exceeds annually the agricultural yield? Last year the agricultural total was nearly one billion one hundred million and the manufacturing total exceeded this by three hundred millions. When we add to this wonderful output that the mineral production was over two hundred millions, manifestly all the elements are present for a permanent and rapidly enlarging basis for international trade.

San Francisco's favorable location with reference to this has been too often expatiated upon to require explanation again here, but these huge figures show that all the factors are present to realize the manifest destiny of San Francisco as the leading commercial and manufacturing city of the Pacific Coast and one of the largest cities of the world in the near future, providing only that these material factors are supplemented locally by the indispensable human factors of energy and enterprise.

A word on the Panama Canal. Within a year of its opening in 1914, five large companies started business through the Canal between San Francisco and Atlantic ports. All were soon discontinued, but only because the necessities of the war drafted the ships elsewhere. Undoubtedly all this trade, and more of the same kind, will speedily return with the progress of readjustments. Before this generation passes, ships will be waiting impatiently at both ends of the Canal in large numbers for their turn to pass through, and another canal will become a necessity.

Water-borne commerce will also expand in due course in other departments—the coastwise trade and the bay and river trade.

What is the lesson for the port of San Francisco? Simply that we must improve our present port facilities to the utmost by all the latest and best cargo-handling appliances, and push new constructions in new territory with all the energy and means at command. And if the means are not available they must be sought and got.

"Full speed ahead" should be the watchword. When we consider the practically full occupation in recent years of all our port facilities under adverse war conditions, and reckon the long time necessary to build new terminal units, consisting of piers, railway connections and yards, warehouses, etc., the wisdom of anticipating future needs by the utmost effort in new and additional constructions becomes undeniable.

The Harbor Commission has started on a program for improved mechanical handling of cargoes and undoubtedly will prosecute it vigorously.

The whole of the water front north of the Channel around to Hyde street has been covered with piers and wharves. No space in that stretch, which up to the present time has constituted substantially the whole of the active water front, remains for pier construction. The time has now arrived when it is imperatively necessary to go farther south. There is simply no other choice, for there is no other vacancy along the sea-wall.

Naturally the next in order are China Basin, between the ends of Second and Fourth streets, and the Channel, both of which, being located immediately next adjacent to the existing improved water front and in the center of activity of all the transcontinental railways, deserve the earnest and immediate attention of our port authorities.

Such improvements may go on at the same time that a start is made in the Islais Creek region.

All the piers that can be built in either district will be occupied as soon as finished, if the signs of the times above outlined are not the "baseless fabric of a vision." We believe they are vivid realities and our only danger is that we may be caught unprepared.

The development of cheap industrial areas in connection with, and close proximity to, improved railway and port terminals is, of course, vitally bound up in the same subject. No great city can be built simply on a foundation of through transit business. The main basis of the city's growth must be the development of local industries, but port facilities are prime instrumentalities for building them up.

SOUTHERN PINE LUMBERMEN MAKE GOOD

SOUTHERN pine lumbermen have gamely surmounted all obstacles and by extraordinary efforts have made good in production and delivery of great quantities of timbers needed for the construction of hundreds of wooden ships for the Government, according to a statement just issued to the press at Washington by the United States Shipping Board.

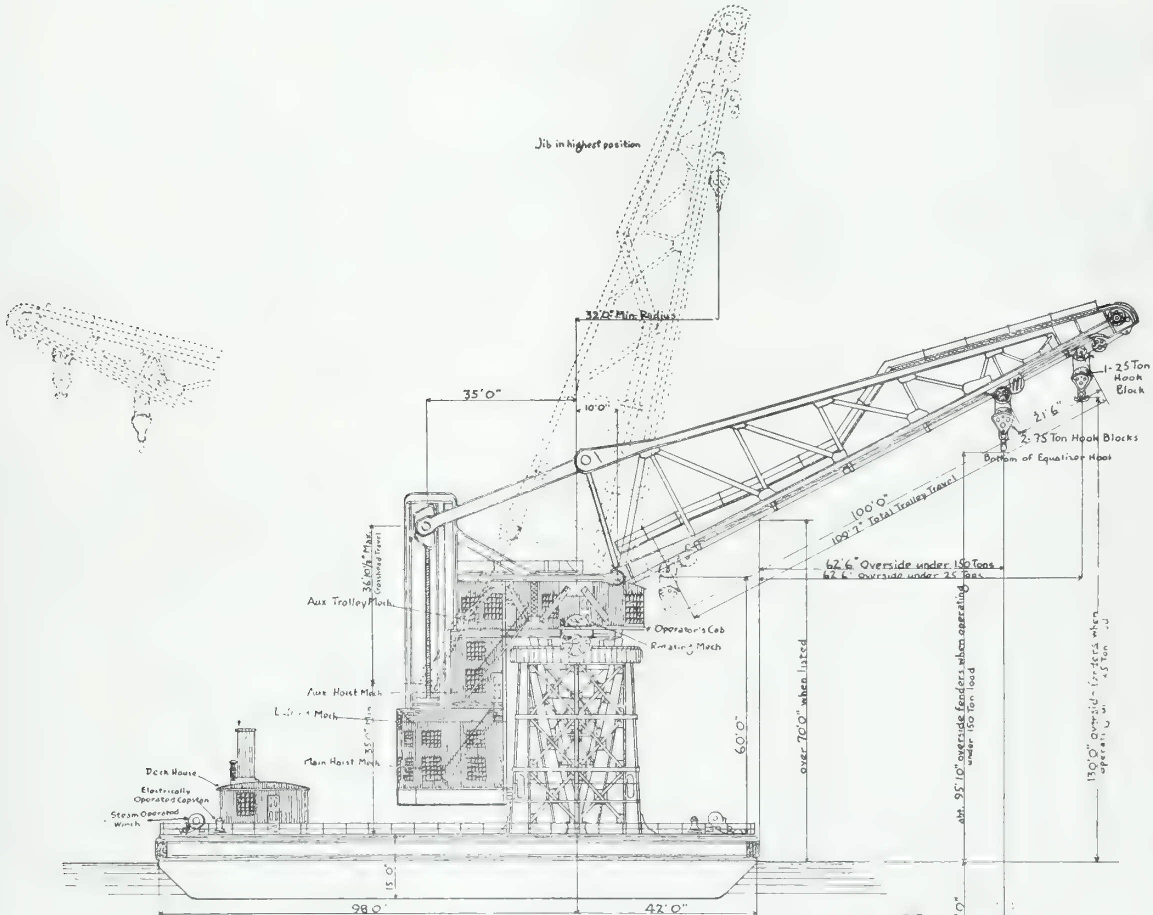
"Nearly 400,000,000 feet of yellow pine lumber," says the Board, "have been cut and transported by rail and water to shipyards on the Atlantic Coast and the Gulf Coast for construction of wood vessels under the direction of the United States Shipping Board Emergency Fleet Corporation. With this amount of lumber we could span the Atlantic to the French coast—3,000 miles or more—with a bridge floor 25 feet wide and one inch thick and have about 4,000,000 feet of yellow pine to spare. This is only half the story, as it does not include lumber shipped to Pacific Coast shipyards.

Great Floating Crane at Mare Island

A ONE HUNDRED AND FIFTY ton pontoon crane identical with that shown in the drawing has just been installed at Mare Island to take care of the placement of boilers, engines, guns and armor on the many naval vessels now building or to be built there. The pontoon upon which the crane floats was built by the Navy Yard, while the crane is the work of Wellman-Seaver-Morgan Company of Cleveland, Ohio.

Power is generated on board from an oil-burning and compound engine driving a 150-k.w. generator. All of the electrical equipment is Kestinghouse. This crane is a dpulicate of the one which has been for some time in successful operation at the Norfolk Navy Yard, except that the latter has a boiler fitted to burn coal.

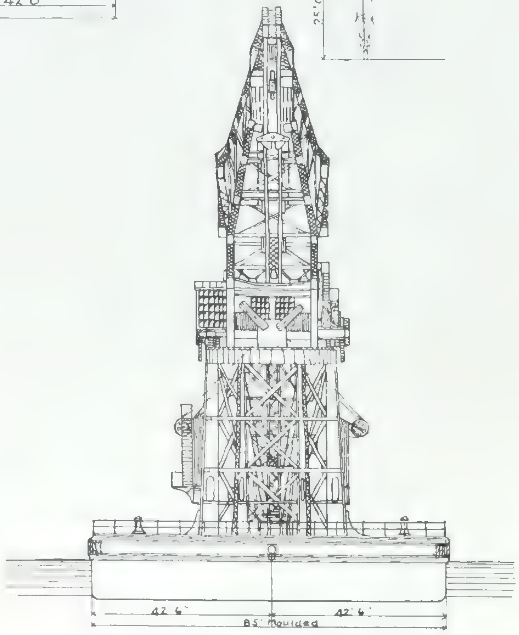
Mare Island is fast becoming one of the finest naval repair and building establishments of the United States, and will undoubtedly have a large part to play in the increased naval building program now planned.

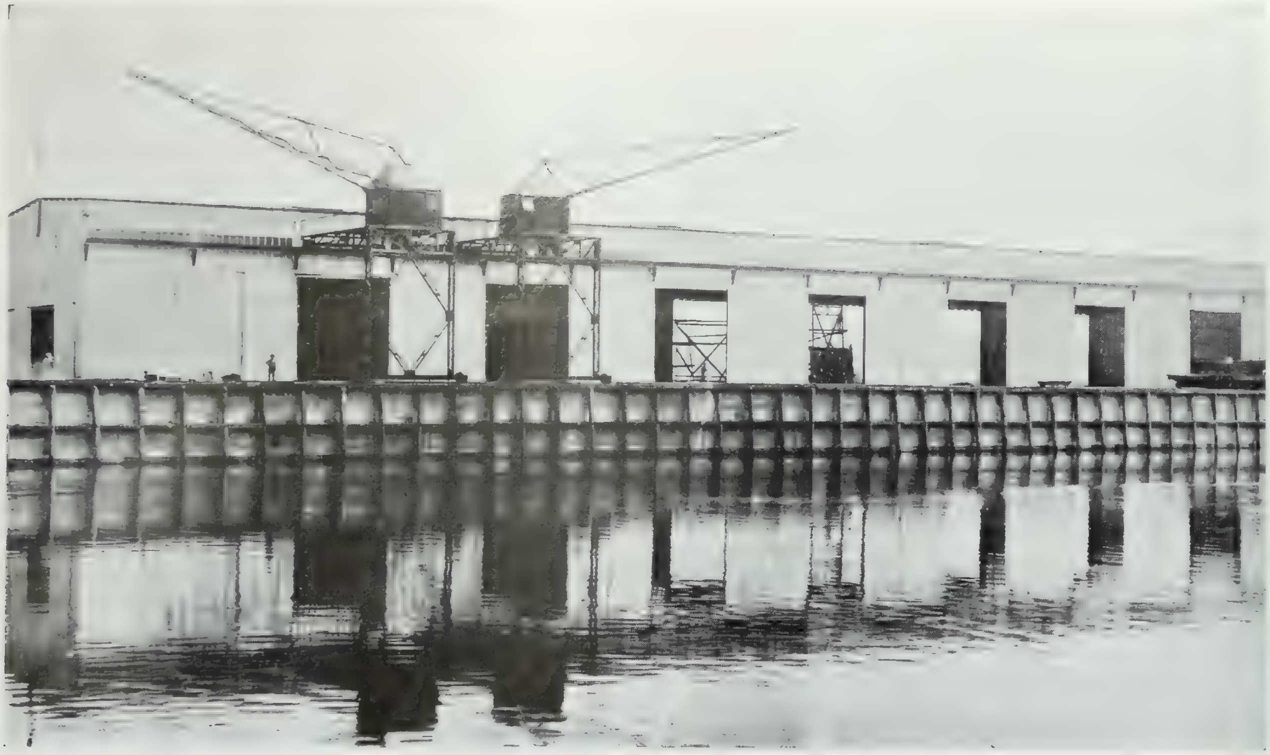


150-Ton Revolving Crane

The drawings shown on this page give more accurately than a photograph some indication of the size of this type of crane and of the elaborateness of the machinery needed to operate the turret and hoists.

The advantages of such cranes in strictly commercial marine activities will be at once apparent.



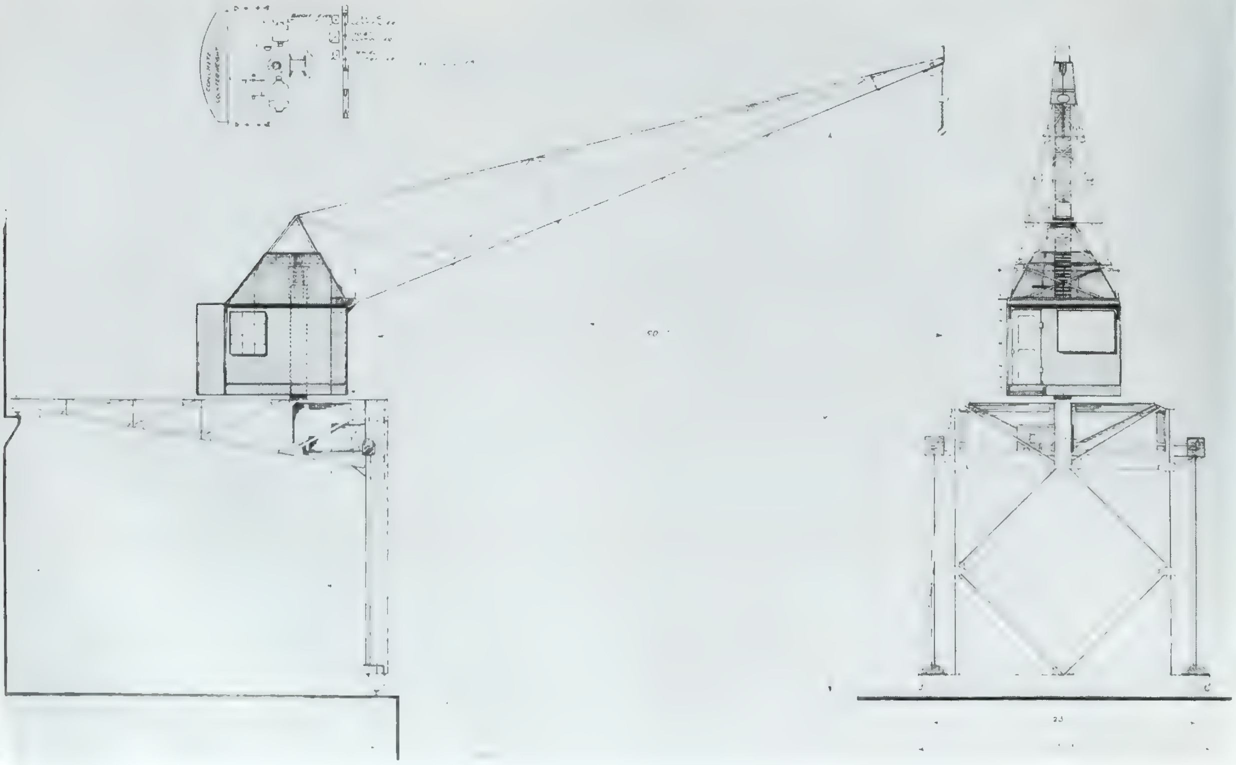


Modern Terminal of Beaumont, Texas

BEAUMONT, Texas, situated fifty-two miles from the Gulf of Mexico, had only a seven-foot channel to the Gulf until one of twenty-six feet was dredged a few years ago. A marine terminal of modern design and permanent works was constructed, fireproof, rat-proof, having concrete quay walls, with coördinated railway tracks between the shed and end of the quay, steel shed and latest mechanical appliances—external gantry jib cranes for discharging and loading and internal cross-traveling cranes for distributing and tiering freight.

The terminal was earning four per cent at the end of the first seven months. During the nineteen months hitherto veiled by the war censorship, 552 steamers handled more than 2,000,000 tons of cargo. Distribution was: Foreign ports, 167 steamers, 661,310 tons of freight outbound, 73,280 inbound; domestic ports, 385 steamers, 1,075,625 tons outbound, 221,875 tons inbound.

H. McL. Harding was the designer and engineer in charge of construction.



Freight Movements for Foreign Commerce at Ocean Terminals

By H. McL. Harding,

Member Advisory Board, Port and Harbor Facilities Commission, United States Shipping Board

TO be able to adapt and to apply standard machinery to the transferring and handling of miscellaneous freight at marine terminals, it is essential not only to know and fully understand the movements of the freight under the usual commercial traffic conditions, but also the reasons therefor.

Unless there is this knowledge, it is difficult to comprehend how machinery can be correctly adapted to the proposed work, so as to attain the desired speed and economy, and to compete successfully for foreign trade.

As a general proposition, it may be said that there must be a continual succession of rapid mechanical movements without congestion and without manual rehandling and by machinery, serving horizontally every square foot of area and vertically every cubic foot of space.

It is preferable to consider separately the freight movements on the quay and on the pier, and finally some of the movements on the pier combined with those on the quay.

By thus separating the movements, the operating methods are more clearly set forth and defined. By transference is signified freight movements from one place to another, as between vessel and shore, and by handling, the assorting, distributing and tiering, chiefly on the shore and within the shed. Stowing refers to the placing of freight within the vessel. The first series of movements described are those of the quay pertaining to the inboard freight.

Quay Inbound Transference

This comprises the following freight movements: From vessels (ships or barges and lighters with or without masts) to the shore and to other vessels; from the vessel to the railway car or dray, stationed near and along the quay wall; from the vessel to the open quay areas or to the quay transit shed; secondary movement for further transport from the transit shed to railway cars or drays, located in front or to the rear of the shed; from the transit shed to the terminal warehouse; secondary movement from the warehouse to railway car or dray for inland destination.

Quay Outbound Transference

This transference consists in the movements from the terminal warehouse to the transit shed; from the transit shed to the vessel; from railway cars or drays to the warehouse; from railway cars or drays to transit shed; from cars or drays to open quay areas; from cars or drays directly to vessels; from inbound vessel to outbound vessel; as between ships, barges and lighters.

Quay Inbound Handling

This refers to longitudinal and transverse traverse within the shed or on the open quay areas, including freight movements in many directions for the assorting, distributing and tiering, all according to the marks or cross marks, for still further transport (after this handling) by railway car or by dray or by transshipment.

Quay Outbound Handling

There is much less handling of outbound freight than of inbound, and in many instances the freight can be transferred directly from railway, car or dray to vessels without handling. Provisions, however, must be made for the longitudinal and transverse traverse with the assorting, distributing and tiering on the quay within or without the shed.

The above represent the principal freight movements in connection with the quay. The following pertain to the movements where there is a pier with berths at the two sides and at the end of the pier.

Pier Inbound Transference

These freight movements either are from vessels berthed at the two sides or at the end of the pier to cars on the pier; from vessels to open pier areas; from vessels to pier transit sheds; from vessels to open quay areas; from vessels to railway cars or drays on the quay; from vessels to other vessels berthed on the opposite side or end of the pier or alongside; from vessels to terminal warehouses on the quay; from the pier shed by secondary movements to cars and drays on the pier; from the pier shed to the open quay areas; from the pier shed to cars on the quay; from the pier shed to the terminal warehouse on the quay.

Pier Inbound Handling

There are the longitudinal and transverse movements for assorting, distributing and tiering on the open areas or within the pier shed.

Pier Outbound Transference

These are the longitudinal and transverse moveon the quay to pier open areas; from warehouse to pier transit shed; from warehouse to vessels berthed on the sides and end of the pier; from cars on the pier to the pier shed; from pier shed to vessels; from vessel to vessel, as from ship to ship, or from barge and lighter to ship alongside or across the pier.

Pier Outbound Handling

Where the freight is to be held temporarily for shipment, it may have to be assorted, distributed and tiered. This is accomplished by longitudinal and transverse movements often in the pier shed, on the open pier, or the shipment is made up in the warehouse instead of in the shed. In some cases there is little outbound handling, but provision must be made to prevent congestion.

Warehouse Movements

In addition to the above there are various freight movements within the warehouse, and not only, as described, to and from the warehouse.

These movements are a transferring between the different floors of the warehouse and handling on the different floors.

The warehouse is for long storage, often for many months, so the mechanical movements of handling are not nearly so important as in the transit shed, where freight should be moved within twenty-four to seventy-two hours.

The movement between the warehouse and the vessel must be performed with great rapidity.

Freight Movements on the Vessels

Besides all the freight movements which have been described, there are those of the inbound freight on the vessel from the "breaking down" of the stowed cargo, the movement between decks and through and above the hatches of the ship including the burtoning. There is also the burtoning of the outbound freight, the lowering within hatchways, the movements between decks and the final careful stowing.

It would seem as though the number of movements as enumerated is very large, and although the weighting, and customs inspection, held over or held up freight, damaged, dangerous and customs rebate freight have not been mentioned, nevertheless such movements must receive consideration.

Dimensions and Weights of Loads

The above is intended to comprise freight movements of every kind, nature and description and of such dimensions and weights as are usually limited by the ship's tackle and will pass within the doors of the standard freight cars.

In addition, provision must be made for freight of greater sizes and weights, but such freight can be lifted, transferred and handled at a much slower speed.

Character of Freight

The usual miscellaneous freight will be the same as is generally transported on the railways, being packages, bales, boxes, barrels, long pipes, rails, lumber, girders and more or less bulk freight. The machinery is for a public terminal, giving service to manufacturers and dealers in every commodity, and every class of merchandise.

Terminals devoted exclusively to one special commodity require special machinery.

Universal Service Machinery Very Desirable

It is, however, even at public terminals, or those which transfer and handle all classes of freight, desirable that there should be few types of machinery and these should be of a universal character.

There should be a co-ordinating of the different freight movements and no movement should be considered as operating independently of the others. All are more or less connected and by their articulation unite in securing speed, economy and great terminal capacity.

All of the above movements can be performed mechanically, thereby obtaining a great commercial success.

Some Opinions on Maritime Congress

THE suggestion made in our editorial columns that a Maritime Congress be held to discuss merchant marine problems, and work out legislation more advantageous to the future operation of the American ship, has brought much hearty endorsement from many sections of the country. Some of the replies contain valuable suggestions, and we are taking the liberty of printing extracts from a few so that our readers may get the benefit of wise counsel.

American International Corporation

If the United States is to have a merchant marine in normal times, one of two things must be done:

Either repeal all legislation of a regulatory, restrictive, burdensome character that places the ship owner of this country at a disadvantage to the ship owner of other countries, and leave him free to operate his ships under competitive conditions as his best judgment will dictate in competition with foreign ship owners; or else,

If the qualifications of seamanship and of wages and of conditions required by the labor leaders of this country are to be maintained in our merchant marine, the Government must make up the difference in the form of ship subsidies or otherwise, so as to enable men to own ships under the American flag and operate them under the American flag. With the present legislation, particularly the qualifications of citizenship, seamanship and wages required by the Seamen's Act, no man can own a ship and operate it under the American flag."

Shipping being a matter of national interest, why should it not be placed in the same condition, insofar as governmental connection is concerned, as have been and are the manufacturing industries, which have required protection of the Government, whereby all the people have contributed to the aid of the manufacturers to enable them to pay high wages and yet compete with manufacturers paying lower wages in other countries. P. O. Knight.

Suggested Plans for Maritime Congress

If a Maritime Congress is to be called, it seems to me the first thought should be in regard to creating a committee on the Atlantic, one on the Pacific (and one might be designated for the Gulf), to get together and formulate some definite plan—just what they have in mind accomplishing at such a congress and what interests they desire to have represented at the meeting. In my judgment the plans would have to be pretty well matured and the recommendations cut and dried with a force sufficient behind it to put through such reasonable plans as the committee themselves thought wise to advocate. I can conceive of a lot of shipping men from all over the country, farmers, shippers, brokers and business men generally, getting together, all entertaining different notions and views besides the principal shipping men knowing what really ought to be done, and out of it all growing such a diversity of views that when it is all over recommendations will be submitted to Congress of such a nature as to make it necessary to employ experts to dissect their intent and eventually leave to Congress the work of determining what we do want.

I have always been an advocate of limiting the size of your meeting as much as possible and having in attendance those few constructive men who know their business and whose standing in their communities is such as to carry weight. Therefore, I think if the Pacific Coast shipping people were to take this subject up on their own account, select a committee of three or four men who had the time and disposition to devote to the subject, and then let that committee communicate with men like Mr. H. H. Raymond, president of the American Steamship Association, and Mr. P. A. S. Franklin, president of the International Mercantile Marine Company, and urge them to have the shipping men on the Atlantic appoint a similar committee to confer with the Pacific Coast crowd (and again I will interpolate to say a Gulf committee might also be selected) and let these men, after a conference, determine whether or not a maritime congress should be called or whether these joint committees should get up a comprehensive set of recommendations and submit same to their respective localities for endorsement. I really believe that this plan, if put into actual operation, and with the earnest support of local communities, would go a long way towards meeting the difficulties confronting us. Something ought to be done, and so far as I, in my humble way, may be able to aid the cause, you can count upon me. Edwin H. Duff.

Chicago Attorney

You must recognize that labor is entitled to more recognition. The tendency of the mass is more and more in the direction of permitting the man who performs the work to share to a greater extent in the profits that are derived from that work. In other words, capital will have to recognize that labor is entitled to share with it in the enterprise and the profits arising out of it.

The difficulty is not here, but lies in the fact that foreign ships are built cheaper and manned cheaper and that the United States must of necessity provide compensation which will offset the difference. If at the time that Senator Hanna had his bill passed, Congress had enacted it into a law, we would have had in 1914 a fair-sized merchant marine and it would not have been necessary to appropriate the sums of money to build ships.

I think that the congress you speak of will be of advantage to it and the men in the United States who are interested in shipping and shipbuilding. I think that they could greatly aid Congress in making proper provision for the building up and maintenance of a first-class merchant marine.

There is no reason why we should not have the largest merchant marine in the world and certainly we can take no place less than second place as a shipowner. If I can be of any service or use, I shall be glad to do what I can to help on the movement. C. E. Kremer.

A Voice from Sansome Street

Of course, I would like to see the ships of the American merchant marine maintained on the high seas, provided they are to pass into private ownership, as I would consider them a grave menace to the future peace of the country if handled as a government-owned fleet.

I agree most heartily with Capt. Dollar's views, and saw much to be approved in the lecture of Mr. Slechta, which calls attention to many truths.

That we should have a merchant marine must be patent to almost every thinking citizen in these days. If so, why not copy the law of the leading maritime nation, Great Britain; adopt their formula for a board of trade and write into our laws the entire maritime laws of Great Britain; sell the fleet now owned by the Government at their fair values, on the easiest possible terms, to American shipowners, to operate under these laws? The rest will take care of itself.

It would not be necessary, in my judgment, to lower the scale of provisions, or the wages of those Americans who were looking for a legitimate opportunity to work on American ships.

It is not possible for us to maintain the American flag on the ocean in foreign trade competition with others under our existing law. That is patent to anyone who understands the least thing about the business. We must take our choice of amending this law or going without the merchant marine.

I regard Government ownership and operation as entirely impracticable and very full of fireworks, if tried. John Barneson.

The Shipping Board Speaks

In the absence of the chairman, who has gone abroad, your letter has been referred to me for reply, and I have read the article reprinted from the Pacific Marine Review with very much interest.

I think I can speak for Chairman Hurley and say that he agrees fully with the idea that interest in the merchant marine and its future, together with all the difficulties and problems that confront it, must be aroused in all of the people, and, especially, that great majority that has had no interest in or knowledge of the subject up to this time.

As you are doubtless aware, the Shipping Board is charged by the act creating it with the duty of investigating various questions such as the relative cost of construction as compared with that in other countries; relative cost of operation, advantage and disadvantage of being under United States registry; classification and rating; marine insurance; navigation laws, including the Seaman's Act, and investigation of the laws that relate to lien securities on ships.

These investigations are under way and in due course the Shipping Board will file report of the results of the investigations and make recommendations to Congress.

The real question is: Do the American people feel that this country should have its own merchant marine? If this question is settled affirmatively, some means will be found for maintaining and operating our overseas shipping, and this is our belief, and from your letter and article enclosed, we feel that it is yours and that of the writer of the article. Henry M. Robinson,
Assistant to the Chairman.

A Pacific Coast Manager

Replying to your letter, it is my belief that no more appropriate action could be taken to insure the stability of the future American merchant marine and its appropriate expansion in foreign trade than the formulation of a National Maritime Congress such as you advocate. In this connection, it is unthinkable that the United States Congress will not repeal the La Follette Seaman's Bill without delay, in order not only to remove the handicaps placed on shipowners and operators in competition with the Japanese and other foreign fleets, but to insure the retention in the service of the American boys who have entered it during the past emergency, and who in a number of respects cannot comply with the qualifications of the present law; although, in my opinion, on the average, these young Americans are much better qualified to render thoroughly efficient service than was the average American seaman of the pre-war period.
E. F. DeGrandpre.

The Peninsula Type Cargo Vessels

The "Peninsula" type cargo vessel built by the Peninsula Shipbuilding Company, Portland, Ore., is of the following general dimensions:

Length over all	287′
Length between perpendiculars	269′
Breadth, moulded	48′ 8″
Depth, moulded	27′ 9″
Capacity	4000 tons d.w.

Timbers used in the construction of this vessel are from the Douglas fir forests of Oregon with the exception of the rudder post and rudder stock, which are of Australian ironbark.

The vessel has several special features, including the following:

Keel and keelson timbers, which are 24x24 and 20x22, running from 76′ to 92′ in length.

The keelson, in order to insure greater stiffness, is reinforced with ⅝″x23″ steel plates on each side, with 6″ angle bars riveted to each edge, and sister keelsons fitted against these girders, thoroughly fastened with cross bolts passing through and clinched on both sides of sister keelson.

Clamps and waterways 14x14 and 15x15, respectively, running from 60′ to 80′ in length, with long scarphs which are fastened with 1¼″ bolts, one to each foot in length.

The ceiling, 11″ in thickness, extends to the 'tween deck beams, with an average length of 55′, scarphs 8′ long, and edge fastened with 1″ bolts.

Above the 'tween deck beams shelf strake and waterway with three strakes of 15x15 ceiling, averaging 55′ in length.

Above this to the main deck clamps of three strakes 13x14 with an average length of 60′.

Waterways above main deck 12x16 and 14x16, average length 60′, with extra long scarphs.

All ceiling is edge-bolted with 1″ iron with 2½ drift in length.

Douglas Fir Is Hand-Picked

Beams at hatches 24x16. All main deck and 'tween deck beams kneed off with 14″ natural fir hanging knees and 9″ lodging knees in the wake of hatches. There is a total of five hundred eighteen knees in each "Peninsula" type ship.

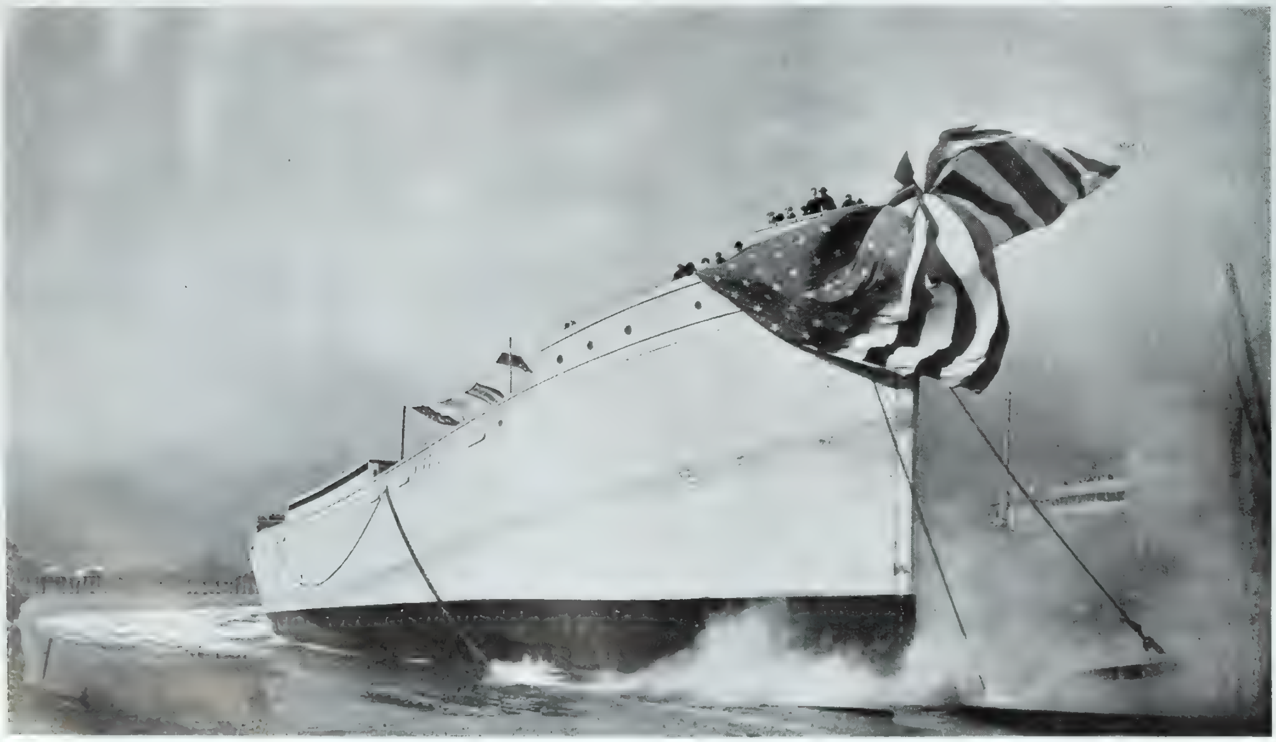
The main deck beams have a deck stringer both top and bottom of 14″x20″, in long lengths averaging 60′, extending from stem to stern.

Additional strength and rigidity is secured by steel diagonal strapping, the upper belt strap being 12″x¾″ extending the full length of ship. To this strap are rivited 4″x½″ steel straps running diagonally at an angle of 45° to the bottom and fastened to the end of floor timbers. These diagonal straps are 4′ between. At intersections in frame spaces these straps are riveted with 1″ rivets and two 1″ bolts in each frame drifted into the wood.

All Douglas fir going into the vessel may be termed as hand--picked, as it goes through the most rigid inspection at the sawmill plant on the premises before being checked in as sufficiently good for vessel construction.

Careful deck readings before and after launching show a change in keel alignment of but little more than 1″.

The vessels are equipped with 1500 h. p. Westinghouse turbine engines with double reduction gears, and Scott marine water tube boilers. These engines and boilers, together with all auxiliaries, are placed amidships.



Launching of the steamship Braxton at Peninsula yards

Forepeak and afterpeak are used for reserve water tanks and the space under the bridge deck for cargo.

Leaves Small Wake

The overhang at stern of this vessel is especially strong, being supported by horn timbers of large dimensions securely fastened to keelsons, deadwoods and stern post. The built-up rim is moulded to graceful lines and gives a pleasing appearance of strength and beauty.

Aside from the Gibraltrean strength of the "Peninsula" type ship, the most prominent features are its lines. A lean after body with lines faired to such proportions as to insure the maximum volume of water for its 14′ propeller, the ship leaves waves in its wake so slight as to be hardly noticeable.

No difficulty will be experienced in loading the "Peninsula" vessel to a proper trim, the lines being so proportioned as to insure about 24″ greater depth at the stern than at the forward end.

A Skipper's Testimony

Motorship "Adrien Badin,"
At Sea November 1st, 1918.
Lat. 28 North, Long. 156 West.

Mr. F. C. Knapp, President Peninsula Shipbuilding Company, Portland, Oregon.

Dear Sir:

I have commenced to write a letter to you and I am not half way across, but I thought I would give you my experience and add to it day by day so you would get the whole account.

Well, as you know, I got to San Francisco all right. I did what has not been done before with this type of vessel—I came in through the North channel. I refused a pilot, then a towboat wanted to hook on to me, but I would have nothing to do with it, then a launch wanted to run lines for me. I also refused that and I made one of the prettiest landings that could be made. That shows you the engines can be trusted.

When about to leave, a pilot came aboard to pilot me to sea. I asked him who sent for him. He said his association sent him down to take me to sea. I told him to get ashore, as I didn't need any assistance as master of this ship. So I saved in all about $1000.

I will cut across by way of Midway Islands, thereby saving at least 1000 miles. I suppose that folks will think that when we are clear of the land that we just naturally take it easy. Well, for my part, I am always scheming how to cut the distance short, also sailing the vessel for all that she is worth.

Interior of wooden hull
Built by Peninsula Shipbuilding Co., Portland

We had a pretty good blow in the nature of a mild cyclone. I was on deck all night. We were under reefed fore and main sail. The vessel was all that was to be desired for a seaboat and done excellent.

Well, we have averaged 170 miles a day since leaving and at present we are reeling off 200 miles. Since we got a fair wind I expect to see her going ten miles an hour yet. I am trying to make the trip in 35 days from Frisco, so you will see at the end of this letter if I am a good guesser or not. It will be a record that has not been equalled by this type of vessel and should be a big advertisement for your company.

It will surprise you to know that we don't burn the fuel that we thought we would. We only burn 15 barrels a day, 10 barrels less than we thought. The engines have given every satisfaction, also much cleaner than the ordinary steamer, and I firmly believe that they are the coming means of sea transportation.

I am getting some films developed of the vessel under full sail taken from the after deck, so will send a couple on to you next letter.

We arrived at Shanghai November 27th, 36 days from San Francisco.

I will write you tomorrow again, as I am very busy on arrival getting things under way.

For the present, I remain,
(Signed) Robert Ferguson,
Master "Adrien Baiden."

Shanghai, Nov. 28th, 1918.

"NO BARNACLES ON US"

There's one Pacific Coast shipyard that doesn't worry about the ravages of barnacles on piling. It's the plant of the Pacific Coast Shipbuilding Company, situated on Suisun Bay. There ten 9400 deadweight ton steamers are being built in the shadow of Mount Diablo and near the confluence of California's chief rivers, whose waters freshen those of the bay and dispose of the borers.

"Full Speed Ahead," the yard paper of the plant, explains the matter thus, under the heading "No Barnacles on Us":

"Much interest has been shown in a new device that protects piles from boring worms. That interest isn't shared at Bay Point. We're among the very fortunate folks in the matter of teredos and barnacles, and the little limnoria which nibbles away at the outside of the San Francisco bay piling won't even look at us.

"This plant is so near the confluence of the San Joaquin and Sacramento rivers that their currents freshen the waters of Suisun Bay along our half mile frontage, and of course the adjacent waters, too. And these little marine pests don't like fresh water.

"At San Francisco and in the salt water bays, the untreated pile lasts on the average from nine months to a year, and even with treatment the life of the timber varies only up to twelve or fifteen years. But with us it will last practically indefinitely.

"Let the toredo bore in and up and down where he will; we should worry."

A New Type of Heavy Oil Engine

By K. P. Radovanovitch, M. E.

THE development of the high-pressure marine oil engine, especially the larger units for large commercial ships, has greatly suffered, if it has not come to an entire stand, through the European war. Germany, the original country of the Diesel engine, and the largest producer of great units, has been cut off from the world market. The manufacture of the well-known Belgian engines naturally stopped through German invasion; France, England and Italy were too busy with war work to devote much time to the oil engine. There were only neutral countries left for the manufacture, but there was little demand for it. The United States, even before it entered the war, was very little engaged in the building of large marine oil engines, and was too busy with rush work for the Allies, the Emergency Fleet Corporation was in too great a hurry to turn out boats, and naturally this organization took to the steam engine.

The war is over and things will, or rather have, already started to change. The whole world will have to be managed in a very economical way, especially in the use of food and fuel. And if there is a place where economy of fuel will play a great part, it is in the operation of prime movers, and still more in the prime movers for the merchant marine. That the oil engine has beaten the steam engine as to commercial efficiency has been proven too many times to be dealt with. The many recent successes of the heavy oil engine have demonstrated beyond the question of a doubt that it is the ideal prime mover for ship propulsion. Its many advantages of economy of fuel, space, attendance, low cost of operation, small fire risk and ease of taking on and storing of fuel will make it the inevitable power for marine purposes.

I am only mentioning one example and give actual figures as obtained from two boats. Total fuel expense for a cargo load of 8500 tons for transportation on a trip of 27,818 miles at a speed of eleven knots with a 8720-ton steamer, costs $30,000. The same load over the same distance and same speed can be transported with an oil engine ship of 9700 tons for $9900—the price of fuel being $5.40 per one ton coal and $8.06 per one ton oil. These figures speak for themselves.

Another fact is, that there will not only be a demand for the development of marine oil engines, but an urgent necessity to produce large units. Europe has long years' experience in the manufacture of large Diesel engines, while this country is comparatively very young on experimenting. And if there is a time when one can say without exaggeration that the United States has to give this matter a very serious consideration, to engage in the research and development work of large oil-engine units, it is this very moment. Germany has been cut off and will be so for quite some time to come. Belgium and France will need all their strength and force to rebuild their own countries. The foreign competition is reduced to a minimum, and it is up to this country to build commercial oil engines of the largest type and thus taking the lead while times are opportune, just like it did in building the greatest merchant fleet in the world. Both will go hand in hand.

In the development of large units, the four-stroke cycle will automatically be cut out. The two-stroke cycle engine, and maybe the double-acting type, will be the future prime mover for marine purposes. There are two-power strokes in the two-cycle as compared to one in the four-stroke cycle, and as the output is nearly twice as much, the result is a more compact, lighter and cheaper engine, developing the same horse power. On account of its high specific output, the two-stroke cycle motor is more adaptable for large units, for which the four-cycle will get too heavy and requires too tremendous a space.

With three points in view, to build a light motor at low cost and increased output, the author

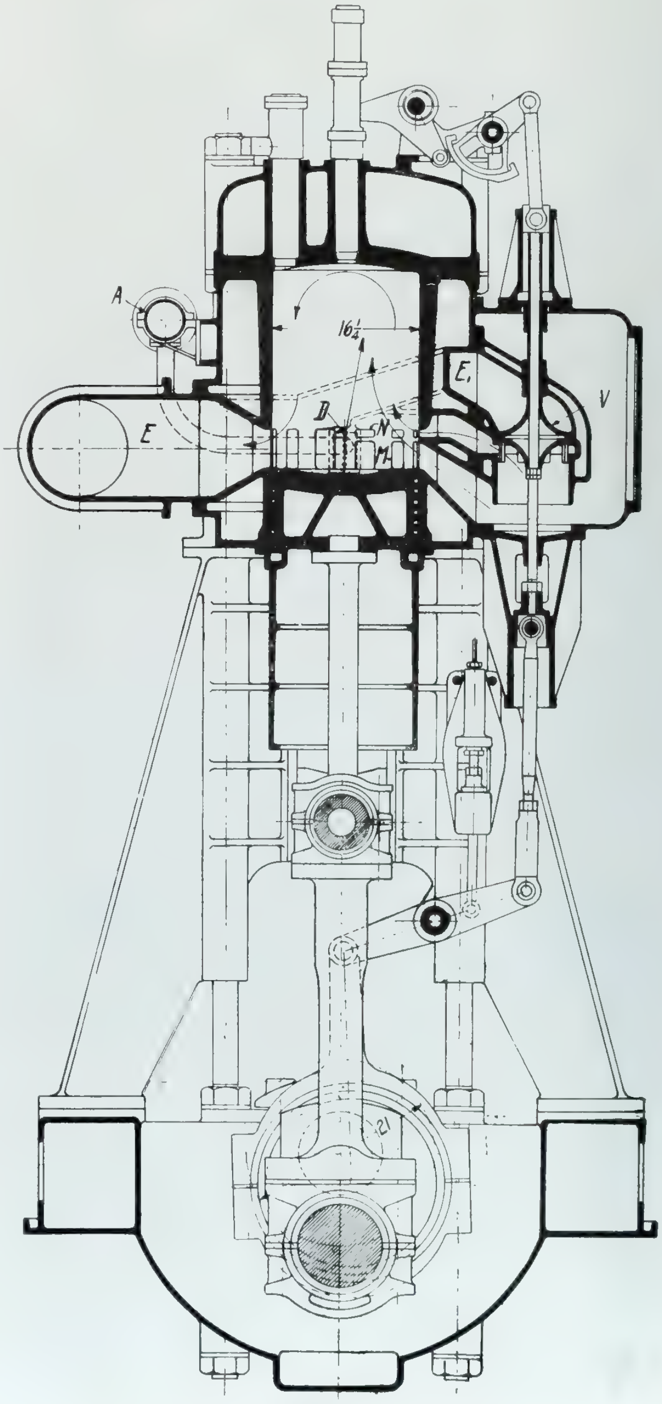


Figure 1

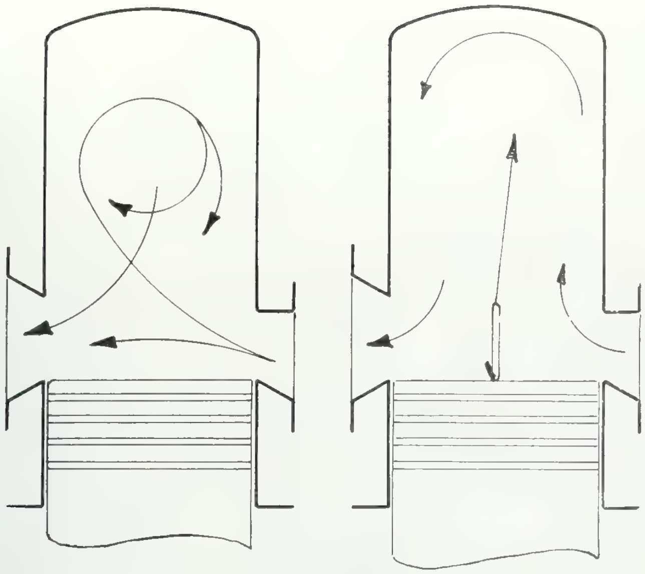


Figure 2

has developed a new type of two-stroke cycle engine, which embodies three basic features and which will be of interest to motor manufacturers.

Feature No. 1: In Figure 1 it will be seen that there are no scavenging valves in the head, the scavenging air rushing into the cylinder through ports in mid-cylinder. This has been adopted on larger motors, because it implies great advantages. The cylinder head is of simple construction, allows an efficient cooling of the same, and is immune against cracks. Scavenging valves in the head, when they become leaky, will permit high cylinder pressure to reach the air line and this can lead to severe accidents, as the air receivers are not figured for such pressures. With the scavenging ports controlled by the piston, a communication between working cylinder and air receiver is only possible after the pressure in the cylinder has dropped to the atmosphere. Furthermore, with scavenging ports in mid-cylinder, it is possible to increase considerably the area for the air, which reduces the friction and pressure loss of the same—a condition impossible with valves in the head, as the increase of their dimensions is limited by the cylinder diameter. Engines with scavenging ports opposite the exhaust ports have the disadvantage that a great amount of the inrushing air escapes across the cylinder through the exhaust without properly cleaning the head. To prevent this, a row of holes, D, Fig. 1, has been provided in the cylinder wall between the exhaust and scavenging ports. Air compressed to about twenty pounds per square inch rushes into the cylinder through these holes, after they have been uncovered by the piston, and forms a wall across the cylinder between the inlet and exhaust ports. This wall deflects the scavenging air and will cause it to reach way up to the head, insure a perfect cleaning of the cylinder, prevent eddy-currents, and consequently will greatly shorten the time for scavenging. The air to build the wall is either furnished by a special air pump or can be taken from the low-pressure stage of the air compressor after passing a pressure reduction valve, and is fed to the engine through pipe A. The action of the air wall is obvious from Fig. 2, which compares two types of engines; the one at the left without the air wall, at the right with the air wall. It also is clear that in filling the cylinder at the beginning of the compression stroke with air somewhat higher in pressure than the atmosphere will result in an increased output of the motor.

Feature No. 2 consists of the valve V and the ports N. It is a proven fact that two-stroke cycle motors with exhaust ports occupying only the half circumference of the cylinder have the great disadvantage that these ports, in order to obtain the proper area for the exhausting gases, have to be made very high, about 27 to 29 per cent of the engine stroke, which of course means a loss on power stroke. This disadvantage has been done away with through the ports N and valve V. The ports N are used as additional exhaust ports when the piston is on its downward stroke, and when valve V is in its lower position. The exhaust gases can escape through the auxiliary exhaust line E, around the cylinder into the main exhaust manifold E. After the pressure in the cylinder has dropped to the atmosphere, valve V is lifted and ports N are used as additional scavenging ports, as the air receiver is now connected to the working cylinder. The valve V is in no way exposed to the high temperature and high explosion pressure and is besides in a water-cooled housing.

The advantages obtained through these two features are demonstrated in Fig. 3. The angle re-

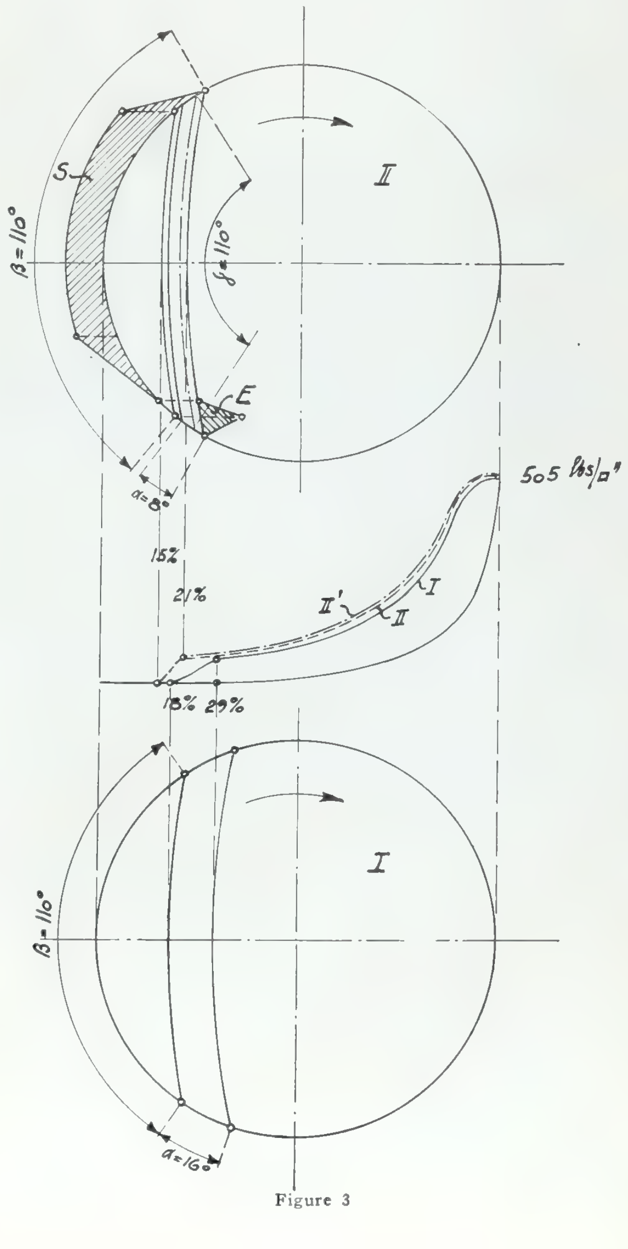


Figure 3

quired on the crank circle for the exhaust, that means for the drop of pressure of the combustion gases to atmospheric pressure, is eight degrees when exhaust ports are provided on the whole circumference of the cylinder, and 16 degrees when occupying only part of the circumference. There will be a longer power stroke in the first case and consequently a greater output. Diagram I is taken from a motor with exhaust and scavenging ports opposite and each extending over one-half of the circumference. Diagram II is that of an engine with exhaust ports all around the cylinder and shows a considerable increase in area. This results from the fact that the height of the exhaust ports in I is 29 per cent of the engine stroke, as compared to 21 per cent in II. In I the scavenging ports open 18 per cent before and close 18 per cent after lower dead center. In II the same ports open 15 per cent before and close 21 per cent after lower dead center, the effect of which is a better charging of the working cylinder with fresh air. Diagram II' is a combination resulting from feature No. 1 and No. 2. Diagram I has a mean indicated pressure of 91.5 pounds per square inch, Diagram II 108.8 pounds per square inch, and Diagram II' 117.2 pounds per square inch, which means an increase in output of the motor of 28 per cent as compared to Diagram I. E is the additional exhaust area, S the additional scavenging area as resulting from feature No. 2, and 8 is the angle during which the holes D are uncovered by the piston for the building of the air wall across the cylinder.

Feature No. 3, which is the most striking one, and which will appeal the most to marine engineers, is the absence of a camshaft. The scavenging valve V is operated by an eccentric mounted on the main shaft. The same eccentric actuates through the valve stem and by means of a swinging cam the fuel valve in the cylinder head. The starting valve is operated pneumatically by a distributor on the main shaft. The reversing of the engine is very simple, as only the distributor, operated by cams on the main shaft, has to be connected either to the cam for ahead or to the cam for astern. That the fuel and scavenging valve can be operated by one eccentric is demonstrated in Fig. 4, where it is shown that both have the same symmetry axis. S_1 is the axis for ahead and S_2 for astern. The eccentric is mounted on the main shaft in such a manner that it can turn over an angle of 30 degrees, which is necessary for reversing. It will move automatically in its right position, as soon as the sense of direction of the engine has changed, that means the crankshaft will turn alone through an angle of 36 degrees before taking the eccentric along. Fo is the opening and Fe the closing of the fuel valve. Eo the opening and Ec the closing of the exhaust ports controlled by the piston, Ec' the closing of the additional exhaust ports N controlled by valve V. So is the opening and Sc the closing of the scavenging ports M, controlled by the piston, So' the opening and Sc' the closing of the additional scavenging ports N controlled by valve V. E again represents the additional exhaust area and S the additional scavenging area.

The engine has a bore of 16¼ inches and a stroke of 21 inches and will develop in four-cylinders at [illegible] r. p. m., according to diagram II', 1040 i. h. p. The aim of marine motor builders is to reduce the speed, in order to get maximum combined efficiency of propeller and engine. The whole appearance of the motor is similar to that of a steam engine with the valve chest on the side. It has a cross head and is of the open type, every part being accessible for inspection during operation. Each cylinder has its own fuel pump driven by one eccentric which operates the whole distributing mechanism.

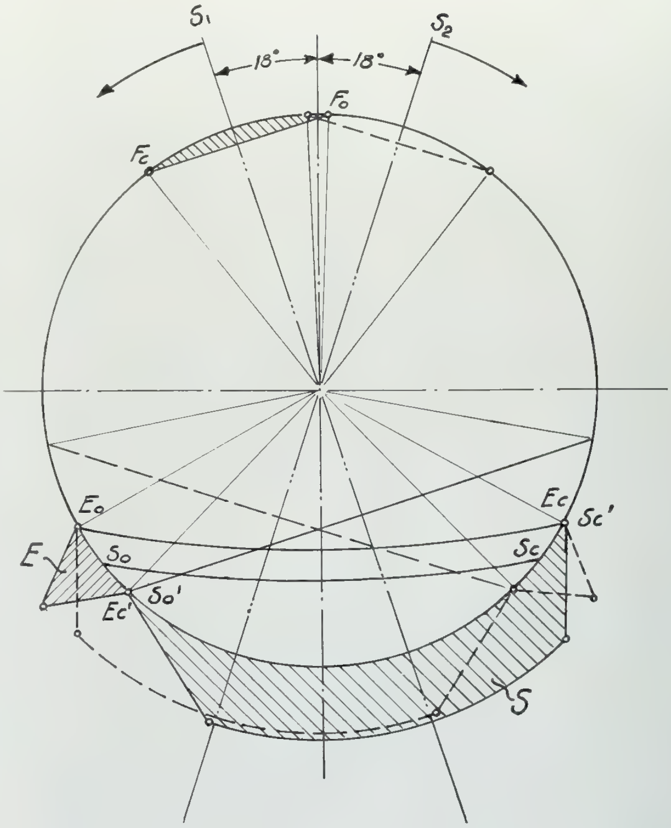


Figure 4

The auxiliary consists of one double-acting scavenging pump, one three-stage air compressor and one small single-acting air pump to furnish the air which builds the wall across the cylinder, mounted on top of the scavenging pump.

GOES TO HEPPENSTALL COMPANY

Floyd Rose, who has been appointed secretary of the Heppenstall Forge and Knife Company, Pittsburgh, Penna., has been in Pittsburgh practically his entire life. Graduating from the University of Pittsburgh, he entered the employ of the Carbon Steel Company, Pittsburgh, and remained eleven years, in which time he acquired valuable experience in the open hearth department, universal mill, plate mill and forge, and was appointed assistant general superintendent in 1905, which position he filled until 1907, when he accepted the position of general superintendent of the Portsmouth Steel Company, Portsmouth, Ohio.

Mr. Rose returned to Pittsburgh in 1909, engaging in the engineering business, as Floyd Rose and Company, inspecting and metallurgical engineers, with offices in the First National Bank building. In May, 1918, he entered the United States ordnance department, as manager of the artillery division, Pittsburgh District, having charge of all gun forgings, manufactured at the various plants in the Pittsburgh district.

The Economical Record of Motorship Apex

By **L. A. Smith**, Chief Engineer Motorship Apex

THE possibilities of the motorship as a dependable carrier of commerce when equipped with carefully designed and well-built engines has been exceptionally well demonstrated in the performance of the 155-foot cargo ship "Apex," owned by the Wilson Fisheries Company of Seattle.

The vessel was launched about a year ago by the National Shipbuilding Company at Seattle, and was powered with a 350 b. h. p. Diesel engine of the reversible type manufactured by the Atlas Gas Engine Co. of Oakland, Cal. She is 155 ft. long and has a beam of 36 ft. and carries 1,500 tons of cargo. She has been in commission for a little over six months, and during that time has been operated constantly between Puget Sound and Alaska, where the company have a number of salmon carriers. On her northern trips she has carried up a full cargo of cannery supplies and has returned to the Sound with a cargo of canned salmon, her loads averaging about 1,475 tons. She has made a total of six round trips, in addition to making the rounds of the canneries in the north and a number of trips with freight about the Sound covering close to 20,000 miles all told.

Owing to the fact that experienced Diesel engineers were not available, we were forced to break in a crew made up entirely of gas engineers from the company's fishing boats and cannery tenders. In spite of the fact that none of these men was specially trained, we had no difficulty in operating the motors, were not delayed at any time by engine trouble and have not had to spend a cent for repairs, a rather remarkable record under the circumstances which we believe our crew has a right to be proud of.

Ever since the Apex went into commission I have kept a careful record of her cost of operation, and I believe that the figures will prove of interest to engineers and shipping men generally. The average fuel consumption per hour covering the entire period for the 350 b. h. p. engine has been 12⅞ gallons of Calol, which at 4½ cents a gallon has brought the fuel cost of the Apex down to the extremely low cost of $13.68 per 24 hours. The lubricating oil consumption has only been 4 gallons every 24 hours, which brings the total cost of fuel and lubricating oil up to $14.96.

The total cost of operating the boat for an hour was 61 cents. She averaged 8¼ knots per hour in speed and carried 1,475 tons of freight. By process of a little mathematics, we find that it cost her to operate 7.4 cents a mile, carrying 1,475 tons of freight, and by further division, we find that the cost per mile per ton of freight was only .005 cents, which is getting cargo carrying down to as near a minimum cost as is possible with any known means of propulsion.

The motorship Apex

A steamer used on practically the same service, and a considerably larger boat than the Apex, carried, on account of her boiler and bunker space, 275 tons less of freight. The Apex had only three engineers and three oilers, with no firemen, bunker men or wipers, and thus made a saving, as compared with the aforementioned steamer of seven men whose wages, during these times, about $100 a month. In other words, there was a saving with the motorship of $700 a month in labor, of $80 a day, or $2,400 a month, in fuel and oil, and an increase in the freight capacity of 275 tons. It can readily be seen from such a comparison that the difference in the cost of these two vessels would pay for either one of them in a comparatively short time.

Another one of our vessels, the cannery tender and tug Ajax is powered with a 110 h. p. Atlas Diesel and has made an equally remarkable record. She is a 75 footer and has a towing capacity equal to that of any 150 h. p. gas tug in the north, yet she operates on 5 gallons of Calol per hour at a cost of 4½ cents a gallon, or a cost of 22½ cents an hour, or $2.70 a day.

Operation of Diesel-Engined Ships

By L. K. Siversen

WITH the ending of the great war we shall find that every commercial pursuit and endeavor will gradually revert back to the normal conditions which existed before the precipitation of the world conflict.

In the November issue of the Pacific Marine Review, we read with great interest an article by Jos. J. Slechta, which served to remind us that it will be necessary for us to wake up to the realities which confront us.

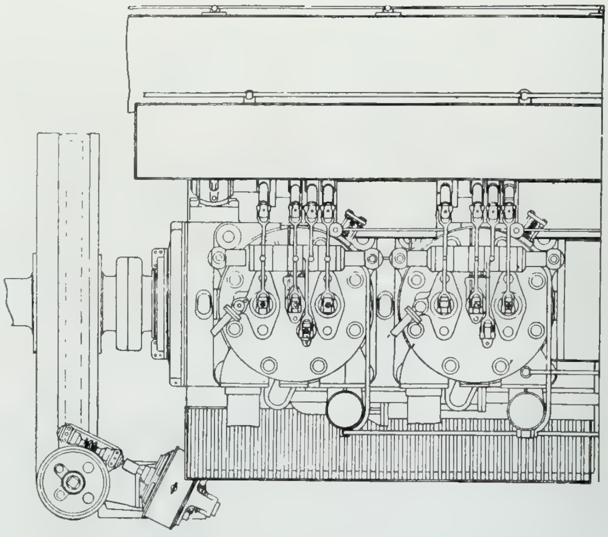
During the present emergency we have built up a large merchant marine. This became necessary in order that we might assist in overcoming the ravages of the U-boat, carry food, supplies and men to Europe, and, in short, win the war.

In creating this new merchant marine we met with many difficulties, which, thanks to American resourcefulness and ingenuity, have been nobly conquered. We are now confronted with the fact that if this merchant marine is to survive in time of peace it will be necessary for us to **compete** with the merchant marine of the world.

The many perplexing problems which confront us in this effort to successfully compete for the world's trade, and still pay adequate dividends on the capital invested, were ably dealt with in Mr. Slechta's article.

When we find that our competitor is getting the best of us in spite of all our efforts to meet his cut in freight rates, we find it necessary to sit calmly down to consider what can be done to bring us back on an equal basis. In our quest we naturally look for every economy of operation and every possible comparison. This brings us to the question of the employment of "Diesel engines" as motive power in our ships instead of steam.

The four-cycle full Diesel engine, such as has been built in Europe, has proven its success beyond a question of doubt. We have seen large European freighters and passenger vessels, equipped throughout with this machinery, enter our port, quietly discharging cargoes ranging from 4500 to 11,500 tons, load again in the same quiet way and proceed on their voyages around the world.

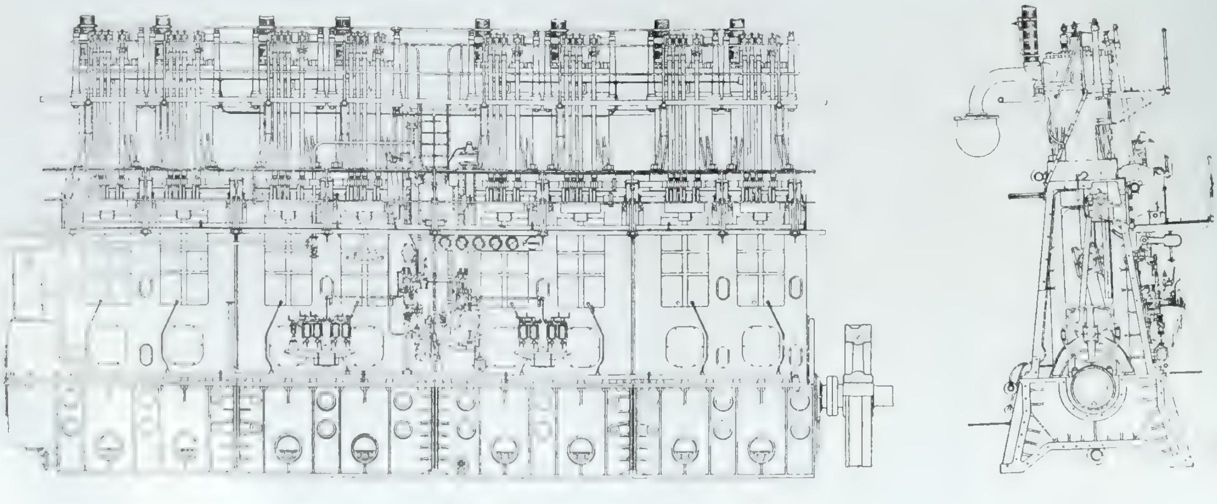

Flan of pair of cylinder heads, showing barring gear

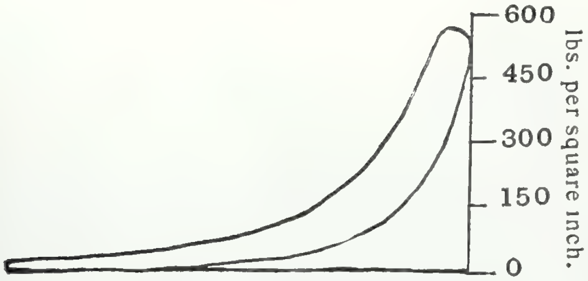
The writer has had opportunity to observe these ships and to go on board of all of them while they have been in our harbor, and has noted that after making non-stop runs of upward of sixty days they have spent only from $50.00 to $500.00 for repairs. Many of these ships have come in here and have spent no money except for miscellaneous engine room stores.

The modern Diesel-engined ship has been described so often in the past that it would seem superfluous at this time to enter into any description of the engines or how the vessel is fitted up. Let us rather look into the expenses of operating this ship as compared with a steamship of about the same size.

The writer recollects one ship in particular at this time where, in discussing the fuel consumption and operation expenses, the chief engineer proved with figures from the log book that the vessel had made a round trip voyage from San Francisco to Australia with an average fuel consumption of .38 pound of oil per horsepower hour, or about 70 barrels per day, at a speed of 10.5 knots, using California fuel oil.

This ship loads 10,500 tons of cargo and has the


Elevation and section of a Burmeister & Wain engine



Typical diagram, Burmeister & Wain engine

following dimensions: Length 425 feet, beam 55 feet 3 inches, depth moulded 27 feet 7 inches, draft about 27 feet.

The engine room crew in this Diesel-engined ship would consist of about the following officers and men: One chief engineer, three assistant engineers, three oilers, three wipers (daymen), one machinist (dayman), one electrician, and one storekeeper—in all, thirteen men. For a steamer of the same size (burning oil) we have: One chief engineer, three assistant engineers, three oilers, three water tenders, three firemen, three wipers, one deck engineer, one storekeeper—a total of 18 men.

If the vessel burns coal this number is further increased by six more firemen and three more coal passers.

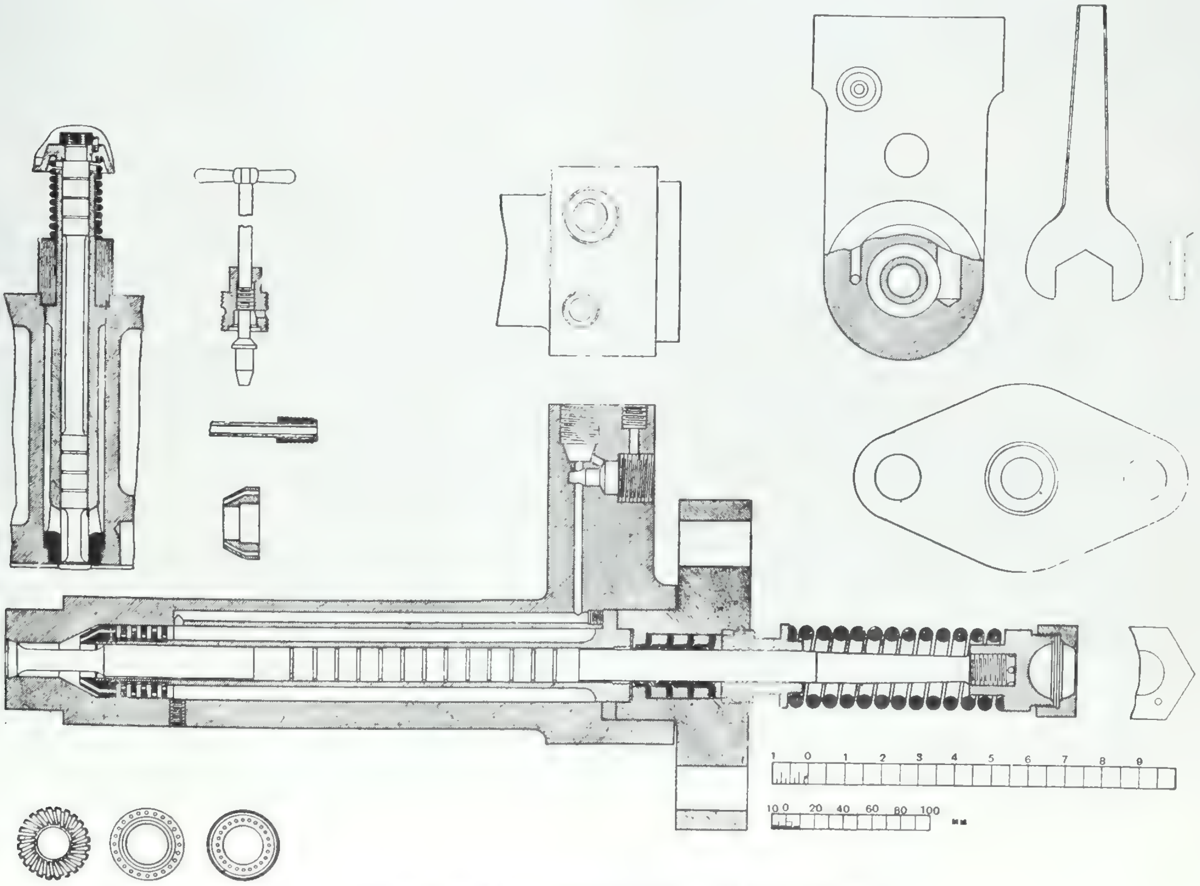
In the case of the Diesel-powered ship there is a difference of five men less than the oil-burning steamer and fourteen men less than the coal-burning steamer. The daily wage of the men employed on the different vessels may be taken to be the same. We have here a saving of the wages of five men (in the case of the oil burner), together with their subsistence, as well as additional quarters, linen, bedding and additional help in the steward's department caused by the increased number of men. This would mean a saving of about $600 per month.

If we consider the question of fuel, we will, for convenience, assume that the vessels are equally powered and that the steamer has a very economical type of steam generator and steam engine—the steamer, then, will be found to consume not far from 225 barrels per day, whereas the motorship will consume 75 barrels per day, a difference of 150 barrels—at $1.60 per barrel equals $240 per day, or $7200 per month.

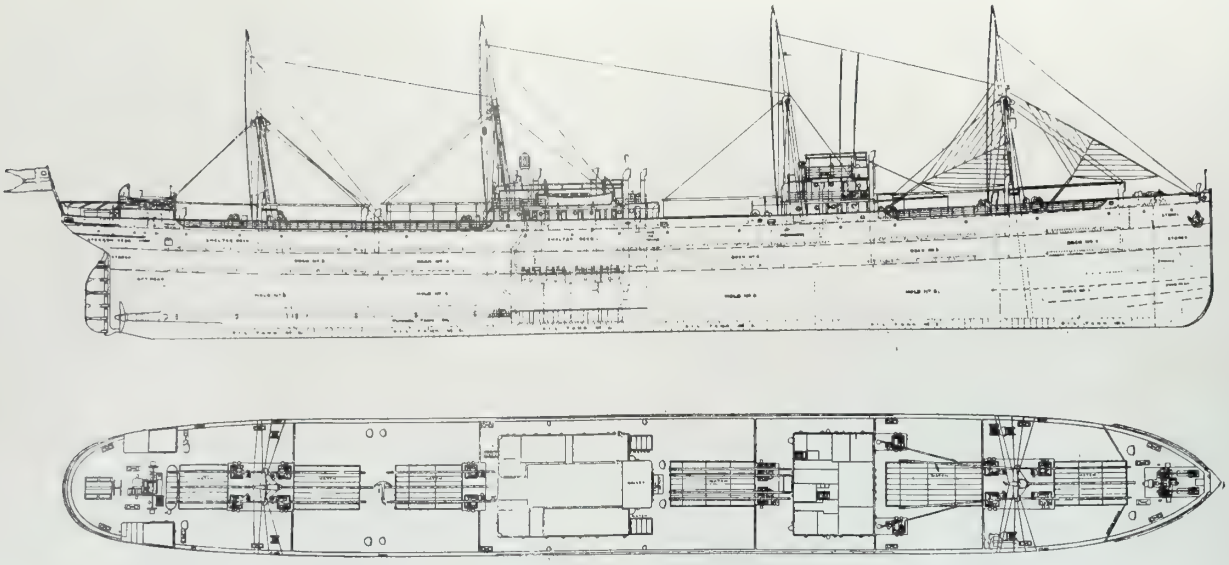
This, together with the saving in the crew already calculated, will make a total of $7800 per steaming month. It was found by a European firm that in removing the old steam plant on a 7000-ton ship and fitting Diesel engines, for every $10 spent in operating the vessel with the steam plant, but $4 was spent after she had been converted into a motorship, and an additional 800 tons of cargo space was gained.

We have a further decided advantage in the Diesel-powered ship which is probably the greatest of all, and that is, for a given bunker capacity the Diesel ships have at least three times larger radius than the steamer. If this space is not needed for fuel it can be utilized for cargo space and thus increase the earning capacity of the ship.

The writer has known vessels of 9500 tons burden to take fuel in San Francisco, call at ports all along the Chilean coast, discharging and loading cargoes, go through the Straits of Magellan, call at ports along the coast of Argentine and Brazil, where they also load and discharge cargoes, thence to Scandinavian countries, discharging and loading for the return along the same route, without replenishing the fuel supply from the time they leave San Francisco until they return.



Injector and starting valve, Burmeister & Wain Diesels



East Asiatic motorship Siam, engined with Burmeister & Wain engines. She was the first motorship to call at San Francisco

Another advantage in this connection is that on a trip such as that described above, and with the steamer and motorship running at the same speed, the steamer will probably lose from five to six days, stopping at various times and places to replenish her fuel. This is a matter of grievous concern to the shipowner, as it is often necessary to go a considerable distance out of the way to get to the coaling station, while the operating expense continues the same as if the ship was going on her straight course.

From the above it appears that the Diesel-powered ship has a decided economic advantage over the steamer and will be a keener competitor for the foreign trade.

For the reasons set forth in this article, the writer strongly advocates the adoption of the Diesel-powered freighter to compete for the world's commerce. The American engine builder should start to build and install some European engines which have proven their worth beyond a question of doubt. There are not many to choose from.

To this some critic will say, "Why not build an American engine?"

The answer is obvious: We have always been in the habit of profiting by other people's experience, and this principle is perfectly applicable in the case of the Diesel engine.

Engineers in Europe have been building "Diesel" engines for the past thirty years, and in this time they have gained experience which it would probably take us the same length of time to gain if we were to commence at the same place they did. These people have spent millions of dollars in money and years of time to learn what they know now. They have tried and failed and learned and improved—and repeated the operation. One firm after another has gone broke and new capital has been put in and spent until today it can be safely said that they have reached a stage of perfection in Diesel-engine designs beyond which it is hardly possible to go without expenditures of [illegible] sums of money.

The argument, then, in favor of adopting the European-built engine is this: The time and the money which it was necessary to spend to perfect a Diesel engine has already been spent by our European brothers. An engine of undisputed merit has been developed; why not profit by their experience and start to build this engine right away?

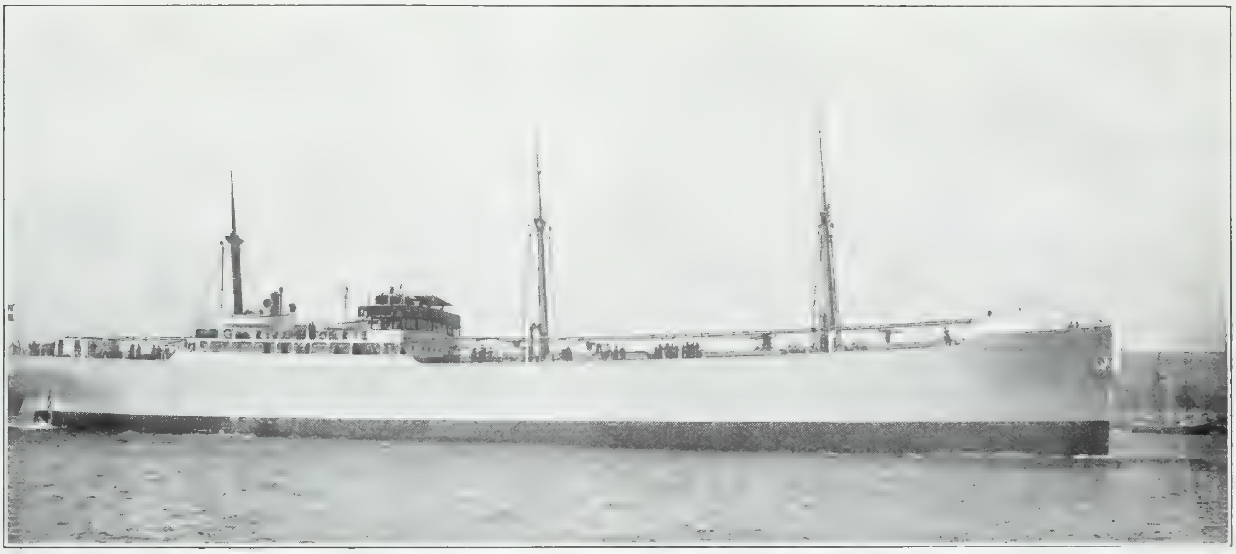
Let them tell us of all the difficulties which they have encountered and overcome and let them tell us how it was done. Let us pay them for this knowledge, as it will be an infinitely smaller price than we shall have to pay for making our own experiments, and we shall be enabled at once to start to build engines of any size and horsepower desired.

The European builders are now building their Diesel engines just like we build our steam engines—that is, the engine is finished and installed in the ship, no uneasiness is felt as to how it is going to work. They have built so many that they are absolutely sure of the result. If we feel that it is necessary to carry on experiments we should not start where the European engineer started, but we should learn what he knows and commence our experiments from this point.

While these engines are being built, we shall have to train the men necessary to operate them. It is not possible to take an engineer from a steamer and put him on board a Diesel-powered ship and tell him to take charge, in the same way as is being done at the present time in steamship practice. The successful operation of the Diesel engine requires that the man in charge is thoroughly familiar with the construction of the engine to the smallest detail as well as an ardent student of the theories and principles which govern the successful operation of this efficient machinery.

For this reason it is recommended that a school of instruction for Diesel engineers be immediately started for the purpose of educating the men that will be necessary to operate the Diesel-powered ships. The applicants or men selected to receive these instructions should be men of the highest mechanical and engineering qualifications and should be well versed in machine shop practice, as they may be called upon to explain to others or to personally carry out repairs or adjustments which they can trust to no one else.

Motorship California



Motorship Kronprinsessen Margaretta

Motorship Siam

Three splendid motorships, of the type that has been making marine history very rapidly of late. The Siam was the first motorship to call at San Francisco, which, through her, learned of what the Danes are doing

Diesel-Engined Motorships

By Geo. A. Dow

IN 1911 a vessel flying under the Danish flag entered our harbor and discharged cargo at one of our docks. The newspapers announced that a new ship propelled by a new type of engine had entered our port after making a most successful voyage from Copenhagen, Denmark. This new vessel, called the motorship "Siam," was a sister ship to seven other similar motorships belonging to the East Asiatic Company, equipped with a similar type of engines, known in Europe as the Diesel engine. The local shipping world and the engineering profession crowded into the engine room of the "Siam" to get acquainted with the new oil engine. Thus the shipping men of the Pacific Coast were introduced to the Diesel.

Every few months, and later every few weeks, a vessel propelled by the Diesel type oil engine visited our coast, and our interest was stimulated to the degree that we learned that the Diesel engine used in marine propulsion burned heavy oils directly in the cylinder by ignition through the temperature produced by the high compression of confined air, thereby effecting a fuel economy of approximately one to six over the steam-driven vessel. We also heard that the motorships made their way from Denmark and Sweden to the Pacific Coast and thence to the Orient and back again without any trouble and in a perfectly satisfactory and efficient manner.

We soon decided that the European-built Diesel-driven vessels which visited our shores had passed the experimental stage and were a success, and would soon bid fair competition to our steamships as cargo carriers.

In 1916, when the demand for bottoms was so very urgent and every possible means was bent toward producing ships and equipping vessels to carry our products to Europe and to build still more ships to overcome the German submarine menace, the great problem of obtaining machinery presented itself. Ships had to be built quickly, with the material available. Ships were desired which would operate economically, giving large cruising radius. Engine manufacturers were building steam engines and steam boilers for large steel ships and could give no time to the building of smaller engines for smaller ships or for commercial interest in general. The average ship owner was glad to get whatever he could.

The wooden sailing vessel was decided upon to meet the great emergency, and the so-called semi-Diesel type of engine was adopted as an auxiliary, but subsequently used as a full-powered propelling unit, as the case may have been. Thus a practice new to the shipping men of the Pacific Coast and untried by the manufacturers came into vogue. In the mad rush and excitement of the moment, the semi-Diesel proposition associated ideas with the successful full Diesel practice of the Europeans. The term Diesel suggested economy and the use of our plentiful supply of heavy oil as a fuel, with the result that the semi-Diesel gained great popularity.

The Diesel engine practice is not that of the gas engine nor of the steam engine (although the Diesel indicator card is more nearly like a steam card than a gas engine card); it is positively and absolutely Diesel engine practice — a field in itself. American engineers acquainted with the gas engine are apt to consider the empirical formulae of the gas engine applicable also as empirical formulae in Diesel engine design.

In many cases engineers who were new at the Diesel game possessed the idea that they could make great improvements over the standard accepted European practice, chiefly in lightening parts, cheapening material and eliminating certain expensive processes in manufacturing. In the Diesel engine design the European engineer is still our master and we must accept his practice until our experience warrants reasons for changes.

The lack of properly trained operating engineers has caused considerable trouble, although the Dow Pump & Diesel Engine Company has proven that any marine engineer who is young and who is willing to accept new ideas, or reason old ideas in a new light, as applied to a new prime mover, will, with very little difficulty and in a comparatively short time, be made into a very efficient and successful operator of four-cycle full Diesel engines.

The failure of one has affected the successes of others, for the good suffer as well as the bad in new fields of endeavor. For this reason largely the shipping world has been prejudiced in the adoption of the internal combustion engine as a means of ship propulsion. Shipping men must recognize the distinction between the so-called semi-Diesel and the full Diesel principle and judge accordingly. The term semi-Diesel was invented for commercial reasons only, as in the hands of salesmen it linked up the idea of semi-Diesel to the full Diesel and caused the buyers of marine equipment and shipping interests in general to believe that the semi-Diesel was a modified or improved type of the Diesel principle, when as a matter of fact it approaches this principle in no way.

The shipping world has had its experience with hot-head engines and with auxiliary powered ships. A good many types of American-built Diesel engines have been installed and tried out and have shown their weak and strong points. Marine engineers have had their opportunities to prove their skill in operating them. The time is fast approaching when the fair-minded ship owner can see that, after all, the American-built internal combustion engine will win for itself a front rank position as a prime mover in ship propulsion.

An installation watched with unusual interest on the Pacific Coast is the motorship "Libby Maine." The "Libby Maine" is a 2000-ton wooden ship of very rugged, heavy construction, built especially for severe Arctic service. She is 240 feet long, 43-foot beam, 24-foot moulded depth, and has a mean draft of 22 feet 8 inches. She is engined with a pair of 425 I. H. P. Dow direct reversible heavy duty marine full Diesel type oil engines, connected to Falk reduction gears through Nutall flexible couplings. Each unit is tied to an engine bedding designed to give the maximum stiffness and greatest security against deflection. Heavy timbering securely bolted to the ship's frames run in single lengths the entire length of the engine unit. The

Nutall flexible coupling is placed between the main engine and reduction gear to relieve any possible strains between these units, as well as to act as a float. The reduction gear and thrust block are bolted to a single heavy cast-iron sub-base. By the use of the reduction gear the most efficient engine speed of 250 r. p. m. and the most efficient propeller speed for this size of ship, 100 r. p. m., is obtained. The Nutall flexible coupling possesses the particular advantage that in case any or all of the driving springs are broken, the coupling still serves its purpose, in that the drive may operate through the then engaged spring lugs.

The builders of these engines, the Dow Pump & Diesel Engine Company, are the pioneers of the Pacific Coast in the Diesel engine field. The original Diesel patents were obtained from Willans & Robinson of Rugby, England, together with their fifteen years of manufacturing experience with Diesel engines. Willans & Robinson have justly earned great renown for their excellent designs and skilled workmanship. For the past six years the Dow Company has been building engines of this type, and have proven them to be a success and well adapted for burning our California crude oil for sixteen and seventeen gravity as a fuel. Two years ago the marine type of direct reversible engine was perfected, using all the highly developed and specialized features and construction of the original Willans & Robinson design. It is engines of this type with which the "Libby Maine" is equipped.

The engines installed in the "Libby Maine" are of the five-cylinder open "A" frame type of construction. Six cylinders were used in order to give maximum flexibility and positive starting positions, and the "A" frame design was adhered to because it afforded the greatest accessibility to the bearings and pins. Marine engineers are anxious to know where their pins and bearings stand and feel more secure when they are able to "feel" parts subject to heating.

The cylinders are separate cylindrical castings; cylinder heads are of standard box construction and pistons are of the long trunk type. The crankshaft is in two sections, the forward and after section being interchangeable. The lubricating system is controlled by drip oilers, the oil being measured into individual, positively-timed oil pumps attached to each "A" frame. One plunger of this pump supplies the piston lubrication and the other the piston pin. The main bearings are lubricated by ring oilers and the crank pin by centrifugal oil rings.

The operation of the entire engine is controlled by three levers centralized at one station. A novel feature of this installation is that one man is able to control both engines from one platform. Even in the treacherous waters of Bering Sea this control was absolutely responsive to the captain's wish.

Two levers are used to govern the action of the engine, while the reversing mechanism is manipulated by the third lever. Reversing is accomplished by the single movement of a vertical sliding cam actuated by an oil compensated air piston, which automatically lifts the cam rollers clear of all the cams, then slides the camshaft to the desired position and finally returns the cam rollers to the cams, thereby giving the proper timing of the valves for the new direction of rotation.

Air pressure is then applied to the pistons of the engine through the air-starting valves by a single movement of the control lever until momentum is acquired, when another single movement of the same control lever automatically cuts off the air pressure and admits the fuel oil to the cylinders. The entire mechanism is thoroughly interlocked to guard against any false move on the part of the operator. Automatic locking devices block the execution of any movement not made in the proper sequence. The speed of reversal is controlled by the pressure of the air applied to the air piston of the reversing cylinder and the regulation of the velocity of oil displacement from one side of the piston to the other.

In order to obtain flexibility of operation, economic use of starting air, and added security against a shut-down of the entire unit, two control levers are provided, one lever for each set of three cylinders.

The general characteristics of the engine are: I. H. P., 425; bore, 12 inches; stroke, 18 inches; crankshaft diameter, 7½ inches; speed, 250 R. P. M.; floor space, 20 feet by 5 feet 1 inch; approximate net weight, 125,000 pounds.

Before installing in the ship the engines were completely erected in the shops and very thoroughly tried out. A 72-hour continuous test run was given each unit, during which the fuel economy averaged .412 pound per B. H. P. hour, or .308 pound per I. H. P. hour.

After installation at the Standifer Construction Company's yards at Vancouver, Washington, after only a few hours dock trial, the "Libby Maine" proceeded to Seattle and loaded her cargo for Bristol Bay. A non-stop record run was made to the entire satisfaction of Capt. Herre, the engineers, and the officers of the Libby Company. Some very difficult maneuvering was necessary in the dangerous Arctic waters, but the greatest ease of control was experienced at all times.

An ideal trip from Seattle to Honolulu and return to San Francisco was experienced and a record in fuel economy made. Extracts from the official log indicate the following.

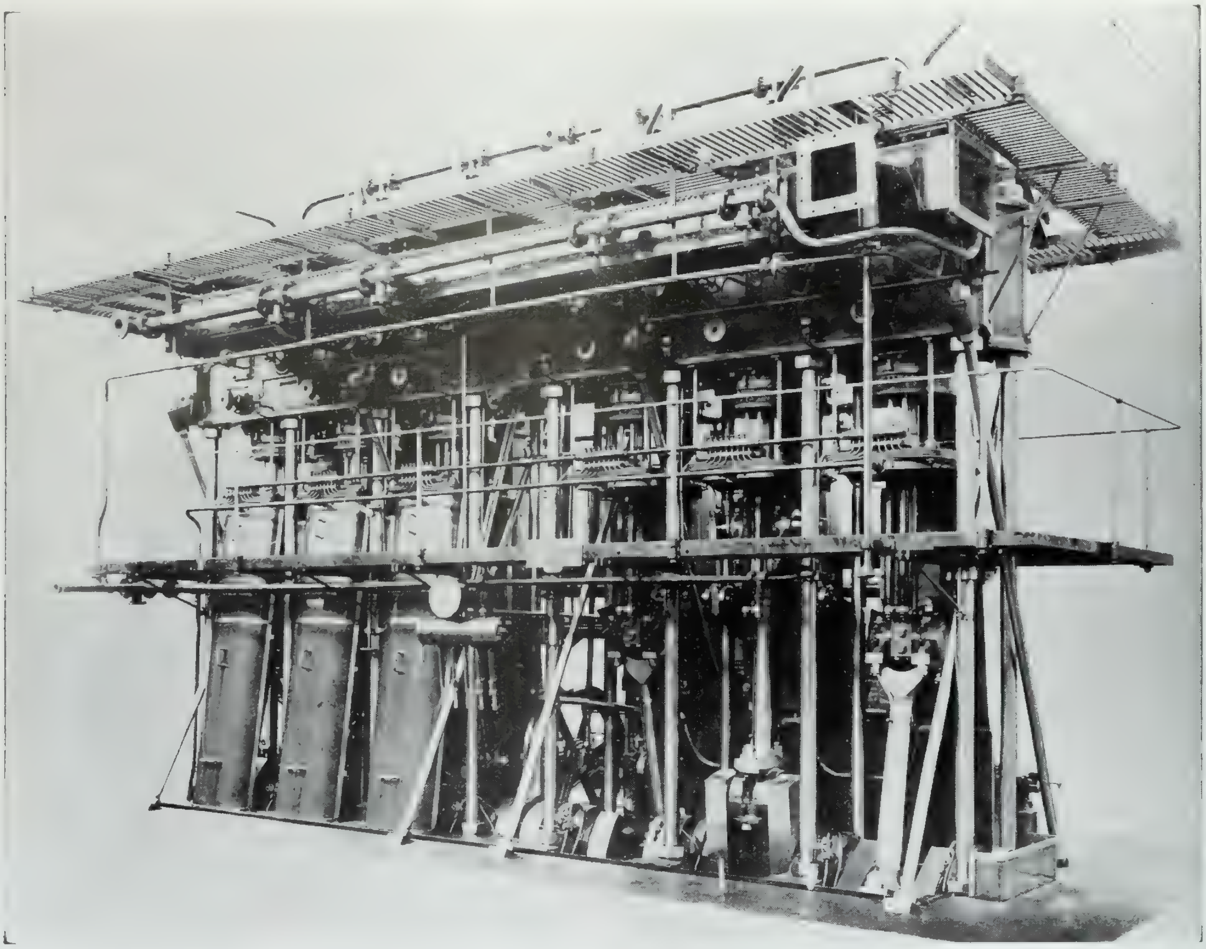
Fuel oil consumption, 259.5 barrels.
Total distance, 2440 miles.
Time of voyage, 14 days, 18 hours, 15 minutes.
Average economy of 4.46 gals. per nautical mile.
Average speed, 7 knots per hour.

From San Francisco to Seattle very heavy weather was encountered. The chief engineer reported that the screw was out of the water half of the time, but no racing occurred at any time, due to the perfect action of the governors.

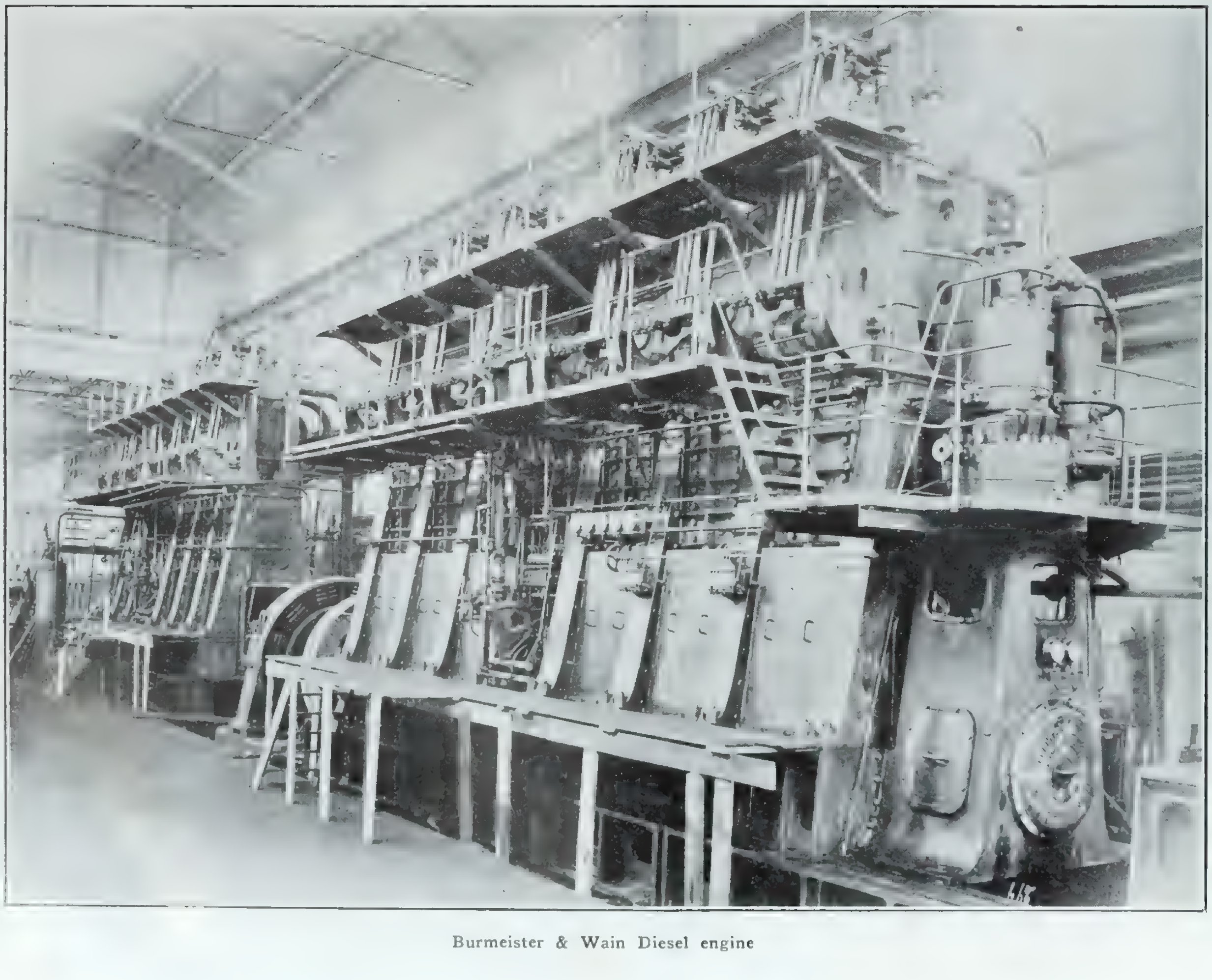
Not at any time in 15,000 miles of travel had a tow line been drawn from her decks, but the law requires a tow in bringing a vessel up the Oakland Estuary, so here the "Libby Maine" suffered her first humiliation.

In all of the six years of Diesel engine experience of the Dow Pump & Diesel Engine Company not one single cylinder head, nor one single piston, has proven defective or given the least trouble.

The engines of the "Libby Maine" are an example of approved European practice adapted to the needs of the Pacific Coast and stand as a milestone of progress in the use of the internal combustion engine as applied to marine propulsion.



Werkspoor Diesel of the type which will go into some of the motorships contracted for by the Shipping Board



Burmeister & Wain Diesel engine

Internal Combustion Engines for Marine Propulsion

By J. H. Hansen, Member A. S. M. E.

ALTHOUGH more than twenty-five years have passed since the first engine capable of burning heavy crude oil in the cylinder was invented, it is only during the last ten to fifteen years that this engine has been developed to be as reliable as any engine operating with steam. Considering the fact that the crude oil engine, under certain conditions, is three to four times as economical in operation as any steam engine, it is no wonder that this engine has claimed more attention than any other prime mover today.

When I say "certain conditions" I mean such where the load factor is sufficiently great to warrant a heavier initial investment of machinery. There are, of course, a few cases where low initial cost of installation is more important than the economical operation. One case where the load factor is great, and therefore the crude oil engine should have the greatest consideration, is for the propulsion of ships. In this case the somewhat greater initial cost is of minor importance. The economy in operation, saving of space, together with many other advantages, are here foremost.

It is only eight years since the first ocean-going motorship was placed in service and this is still operating with success today, and has amply demonstrated the reliability of her engines. There are today about 800 motorships with from 1000 to 12,000 tons capacity. Some of these ships are making from 40 to 50 days' continuous runs, covering more than 10,000 miles, without a stop, carrying cargo of 10,000 to 11,000 tons. These ships consume during such a voyage 400 tons of fuel oil, instead of 1500 tons of the ordinary steamer, with a saving of 1000 tons in fuel consumption, besides the saving of another 1000 tons available cargo space, not to mention the additional cargo space due to the absence of boilers. Ships of this character have been constructed by a number of foreign nations and a great many more are under construction today. These ships are going to partake in the foreign trade to come, and unless we have similar ships with which to meet their competition we will not be able to obtain our share of this business.

Heavy or crude oil engines are termed "internal combustion engines," as they convert the heat energy of the fuel into work in the engine cylinder itself. The heavy oil injected into the cylinder ignites and burns with the oxygen of the air in the cylinder and thus evolves heat.

The most common method for obtaining vaporization and ignition of the fuel is that of spraying it against a hot wall or projection of the cylinder head. On contact with this wall or projection, the oil is heated and vaporized, and, as the vaporization is almost instantaneous, the combustion assumes the character of an explosion. Engines working on this principle are known as "surface ignition oil engines" and often are referred to as "semi-Diesel engines."

Another way is to compress the air in the cylinder enough to create a sufficiently high temperature at the instant when the injection of fuel takes place. The fuel oil mingled with high pressure air, which thoroughly atomizes it, then ignites instantaneously and the combustion lasts during the whole time that the oil enters the cylinder, thus assuming the character of a gradual combustion instead of an explosion, and the combustion therefore takes place under constant pressure. Engines working on this principle are called "Diesel type oil engines" or "Diesel engines."

The Diesel engine was invented by Dr. Rudolph Diesel in 1892. The first commercial and successful engine was constructed and completed at the Augsburg Works in Germany in 1897. This engine attained the highest efficiency of any heat motor at that time and even today no other process is known by which a higher efficiency is obtained by changing heat into work—although other internal combustion engines of today may claim equal results and several improvements in operation.

All crude oil engines, surface ignition or Diesel, operate on either the four-cycle or two-cycle plan, which means that either four strokes of the piston is required to complete the cycle of operation or that the engine completes the same process in two strokes of the piston.

In the case of the four-cycle engines, the piston moves away from the cylinder head during the first stroke and draws in air from the atmosphere through the suction valve. During the second stroke, with the suction valve closed, the piston returns toward the cylinder head and compresses the air and thus raises its temperature. When the compression is completed at the end of the second stroke, the fuel oil is injected, and due to the temperature of the air in the cylinder it ignites and generates heat which during the third stroke is transformed into mechanical work produced by the expansion of the burning gases. During the fourth and last stroke the exhaust valve is opened and the piston drives out the burnt gases, leaving the cylinder ready to commence the new cycle.

With the two-cycle engine all of these operations occur in two strokes—that is to say, in a single revolution of the crankshaft. The cycle starts from the position where the piston is close to the cylinder head, the compression stroke having just been completed and just after the fuel has been injected and is ignited. The piston then moves away from the cylinder head and expansion and mechanical work take place. After the piston has almost completed its first stroke, it uncovers ports in the cylinder wall through which the burnt gases are exhausted. A current of pure air at a slight pressure enters the cylinder shortly afterwards and sweeps these gases out of the cylinder. In this manner the cylinder is free from exhaust gas and filled with air and is in the same condition as at the end of the suction stroke of the four-cycle engine. As the piston returns towards the cylinder head during the second stroke, it compresses the air in the cylinder and the cycle recommences. In the two-cycle engine the scavenging of the burnt gases and the filling of the cylinder with fresh air takes place in a very short time between the end of the expansion and the commencement of the compression stroke, thus eliminating the two strokes of suction and exhaust of the four-cycle engine.

As regards the relative advantages of the four-cycle engine over the two-cycle engine, theoretically the two-cycle engine appears to be superior for a given speed and cylinder size, the special duty of any engine having a two-stroke cycle is to duplicate that of an engine having a four-stroke cycle. The two-stroke cycle engine receives a power impulse for every revolution as against one for every two revolutions of the engine having a four-stroke cycle. Its mechanical efficiency also would appear to be greater, as the engine with a four-stroke cycle has to make two strokes in order to expel the burnt gases and to fill the cylinder with fresh air for burning the rest of the fuel charge. The power for the work has to be drawn from the flywheel in which it has to be stored again during the power stroke. The four-stroke engine, therefore, is also much heavier per horsepower than the two-stroke engine.

In practice these advantages are not so apparent. Engines having a two-stroke cycle require an auxiliary air pump for performing the work of scavenging and refilling the working cylinder with fresh air. This work in the four-stroke cycle engine is performed directly in the working cylinder.

On account of the more rapid heat expansion in the two-cycle engine, its material is more severely taxed, and a low mean effective pressure therefore becomes necessary, which tends to lower the efficiency of the two-cycle engine.

In low-powered engines fuel economy is generally sacrificed to lower initial cost. Lightness, combined with simplicity in operation, is here of the greatest importance. Surface ignition engines of the two-cycle type meet these requirements best. These engines, instead of having a separate air compressor, generally compress the air in the crank case as the main piston moves downward. Engines of this type have self-acting disk valves for admitting air to the crankcase and a fuel pump driving a measured amount of fuel to the fuel injection nozzle.

Diesel engines demand mechanically operated valves and the high-pressure air compressor which, together with the high compression and resulting high temperatures, demand the highest grade of workmanship and materials, involving a higher cost per horsepower.

The advantages of crude oil engines for marine purposes can be summed up as follows:

1. The space occupied is less than that required for a steam engine and boilers; also the weight is less, which consequently means greater space in the ship available for cargo.

2. The unsurpassed fuel economy and greater cruising radius obtainable with a given quantity of fuel. The average stea mengine consumes from one to one and one-half pounds of fuel oil per indicated horsepower hour, whereas the crude oil engine only consumes .3 to .4 pound per indicated horsepower hour, or one-fourth of what the steam engine consumes.

3. The amount of attention required on a motor ship is less, the stokers and coal trimmers necessary with the steam engine ships being entirely eliminated.

4. The quick starting of the engine, which can be accomplished at a moment's notice.

5. The elimination of standby costs. This is, as soon as the engine is stopped the fuel consumption ceases. With the steam engine ships it takes from six to twenty-four hours to get up the steam, and after the engines are stopped considerable heat is wasted, due to the cooling of the water in the boilers.

Motorship Sebastian

Why Is Internal Combustion Motor Not Used More?

By Bruce Lloyd

IN dealing with this subject, which is so diversified in character, it seems almost impossible to begin without paying a tribute to the machine which the shipowner is now asked to discard for the internal combustion engine.

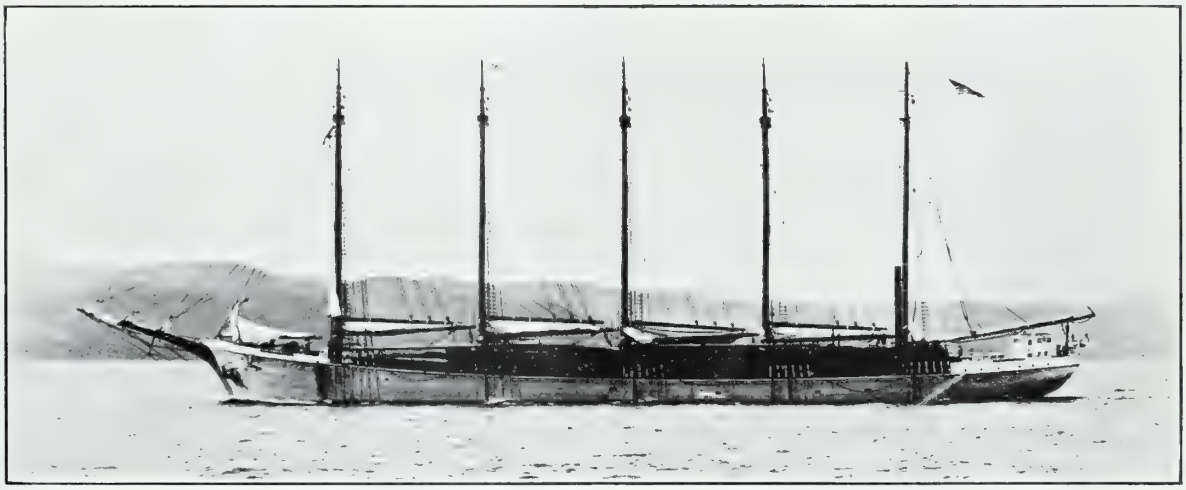
The development of the steam engine, extending over a period of about one hundred years, has reached such a stage that it is probably today the most perfect machine that has ever been produced; its reliability is unquestioned, its economy is high, and it has become so familiar as a prime mover that there is now very little difficulty in procuring operators to handle it successfully. The steam engine is wonderfully smooth running and possesses great flexibility of power, and it is perhaps not too much to say that it has probably reached the zenith of its perfection.

Unfortunately, however, the steam engine is not complete in itself, and its failure is doomed by its necessary adjunct, the steam generator, which has never been improved to such a degree of economy that it has been received with favor; nor have its attendant danger and other well-known disadvantages been removed, on which account its disappearance is devoutly hoped for by many.

The space occupied by the boiler of a steamship, together with the large amount of room necessary for fuel, is the most obvious and perplexing problem that presents itself to the shipowner who contemplates the construction of a serviceable and economical cargo carrier. Attempts have been made to overcome this objectionable feature by placing the boilers on the upper deck of the ship, which is not so valuable for cargo space, but the fact remains that the boilers are still on board, adding at least their weight, and detracting just so much from the general efficiency of the vessel.

In spite of the fact that the internal combustion engine has overcome this difficulty and given him a tremendous advantage in cargo-carrying capacity, the average shipowner has clung to the steam-driven vessel with a tenacity equal to that shown by his forefathers in their disinclination to discard the sailing ship and adopt the steamer, and it may be noted here that so strong was this distrust of the steam engine that it is only within the last fifteen years that owners of steam ships were able to overcome their fears that the steam engine might conceivably break down and dependence have to be placed on sails, all ships up to that time being provided with considerable sail area. The history of the application of the steam engine to the propulsion of ships thus shows an exact parallel to the introduction at the present time of the internal combustion engine for the same purpose, auxiliary sail power being still much in evidence in motorships.

There are, however, besides his abiding faith in the steam engine and his distrust of the internal combustion engine, other and perhaps more weighty reasons which prevent the shipowner from adopting the latter more readily. Until very recently the ports of the world were regulated and equipped to suit the conditions of steamship traffic. Almost every port in the world, no matter how remote from the great centers of shipping, was provided with some facilities for repairing the boilers and engines of the ordinary steamship; neither did they lack the mechanics who possessed the necessary skill to make these repairs, and engineers well versed in the operation of a steam engine were always available. Thus the shipowner, when arranging for a voyage to a distant port, secure in his knowledge of the above facts, felt no concern, as he knew his vessel would be well taken care of. Up to the present time, however, equal facilities have not been provided for ships whose motive power is the fuel oil engine, although this fault is gradually being overcome.



Standard Type of Auxiliary Schooner

Another thing which served to retard the development of the fuel oil engine was the fact that European shipowners, who controlled the bulk of the world's shipping, were, with the exception of those in Scandinavian countries, to some extent interested in the coal industry and they were also afraid that, should they become dependent on oil for fuel, the price would considerably advance and the supply prove inadequate.

The attitude of the shipowner toward the internal combustion engine has also been influenced to some degree by his advisers, the naval architect and superintending engineer, many of whom have not taken up the study of this particular branch of engineering and who even look askance at it. These men would naturally hesitate to advise the equipment of a ship with machinery which is unfamiliar to them; nor would they be willing to assume the responsibility of superintending the installation of this machinery—afraid of encountering the difficulties which they might possibly be unable to overcome. The war has, of course, considerably delayed the more general adoption of the fuel oil engine, owing to the imperative demand that has arisen for ships driven by machinery to which the shipping world is entirely accustomed and for which there was a plentiful supply of skilled operators.

The foregoing, I believe, are the principal reasons for the antagonistic attitude of shipowners toward the fuel oil engine, which attitude is now rapidly being overcome. The reliability of the internal combustion engine is now proved absolutely beyond question, when the engine selected is of well-known design and constructed by a builder of long experience and established reputation—the installation carefully made in a well-constructed hull, with a proper appreciation of the class of cargo that is to be carried. The owner who is swayed by a desire for cheapness either in the purchase of the engine or the installation on the ship will get just what he has paid for and the general reputation of the engine will have suffered accordingly.

The experience of the writer has been almost entirely with the Bolinder Crude Oil Engine, manufactured by the firm of Messrs. J. C. Bolinder of Sweden. This engine is of the direct reversible type and has been especially designed for full-powered sea-going vessels. There are no cam shafts or intricate gearing, all pumps, etc., being driven off eccentric on the crank shaft; a small compressor driven off the forward end of the crankshaft supplies air for pulverizing the fuel on entering the cylinder; the reversal of the engine's direction of rotation is effected by pre-ignition, maneuvering in a method similar to that of the steam engine. These engines are manufactured in two and four-cylinder sizes up to 1000 b. h. p.

During the past two and one-half years sixteen vessels owned and operated on the Pacific Coast have been equipped with these engines for motive power; ten of these are what is termed auxiliary ships, in which the sail power is intended to predominate. All of them are engaged in overseas trade to distant ports, where fuel is either not available or procurable only at almost prohibitive rates. Fuel tankage had therefore to be provided of sufficient capacity to supply the engines, when running at full speed, for a voyage outward and homeward of nearly 17,000 miles. These ships vary in size from 1500 to 3500 deadweight tons, and the size of the engines with which they are equipped, from 320 to 600 b. h. p. The machinery of these motorships has been in continuous service now for nearly two years, operating for periods from thirty-five to fifty days without once stopping the engine, with the exception of minor mishaps which have occurred only in the first two installations.

Space will not permit reference to the perform[illegible] of more than one ship of each type.

The first large auxiliary ship, equipped with "Bolinder" engines on the Pacific Coast, was the motorship "City of Portland," one of the three sister ships built and owned by the McCormick Steamship Company of San Francisco. These vessels are approximately 3500 deadweight tons and are able to carry more than 2,000,000 feet of lumber. They are equipped with twin engines of 320 b. h. p. each and have as auxiliary machinery for light purposes two 8 b. h. p. stationary engines of the same manufacture as the main engines, directly connected to five K. W. generators. The "City of Porland" has made two voyages to Australia, carrying lumber on the outward voyage and returning with large cargoes of copra collected at different islands in the Pacific. She has since made voyages to the eastern coast of the United States, via the Panama Canal, and has now just completed a voyage from Astoria to Shanghai which occupied thirty-four days. The engines have run continuously, often making runs of forty-five days without any stoppage of the machinery. The average speed maintained to Australia was 6.8 knots. During the voyage to Portland, Maine, from San Francisco and to Shanghai from Astoria, the engines were allowed to develop their full power, and the speed averaged 7.5 knots per hour. The sails were of practically no use on any of these voyages, and these vessels should be properly designated as low-powered motorships.

The fuel consumption averaged twenty-three barrels per day of oil of twenty-four degrees Baume gravity, and the total amount of fuel oil used for propelling the ship on the round voyage, 17,000 miles, was 1997 barrels. The motorships that have attracted the greatest attention are the full-powered vessels, as they afford the best opportunity of comparison with steamships, and of these the four motorships that have lately been added to the fleet of Messrs. W. R. Grace & Company are excellent examples of the possibilities of moderate-sized ships equipped with fuel oil engines. These ships are the "Santa Elena," "Santa Isabel," "Santa Cristina" and "Santa Flavia," and their dimensions are as follows: Length 235 feet, breadth 42 feet, depth 29 feet, cargo capacity about 2000 tons on 18-foot 6-inch draft. The propelling machinery of each ship consists of two 320 b. h. p. "Bolinder" engines (twin screw). The main fuel supply is carried in steel tanks, having a total capacity of 1770 barrels, sufficient for nearly fifteen days' running, and the extensive radius over which they are able to travel without having to stop for refueling gives them an immense advantage over the ordinary steamer, to which may be added the cargo space obtained by the elimination of the boiler space. The auxiliary machinery consists of one 15 b. h. p. "Bolinder" engine, direct connected to a 10-kw. generator and one rotary pump of 2500 gallons capacity and one 8 b. h. p. "Bolinder" engine connected to a 5-kw. generator and rotary compressor. The refrigerating plant consists of one-ton Brunswick motor-driven ice machine, the ship being fitted with 600 feet of refrigerating space for ship's stores. All of these vessels have completed voyages to New York, via Valparaiso, calling at other South American ports and the Panama Canal, covering a distance of over 14,000 miles, at an average speed of 180 knots per day. There were no detentions at sea and none at any port on account of repairs to engines.

Of the problems that appeared at first, the most disturbing was the lack of skilled operators, but, in a surprisingly short time it was found that the local engineers were able to thoroughly understand and operate this type of engine, and there is now very little difficulty in obtaining engineers who, although previously with the marine steam engine, are now competent to undertake long voyages in motorships, which has been fully proven by the records of voyages mentioned.

The engine troubles have been confined almost entirely to cracked cylinder heads and broken compressor shafts. The fracturing of the cylinder heads, it was noted, always occurred while maneuvering the engine in entering or leaving port, and never at sea while under way. It was discovered that this was caused by the overheating of the head, through the cutting off of the water cooling supply when the engine stopped, the circulating pump being driven off the main crankshaft and the sudden cooling and contraction which took place, when the engine started again forcing the water back through the heads. This trouble has been entirely eliminated by devising means to keep a constant circulation of water through the cylinder heasd while the engine is at rest.

The breaking of the compressor shaft, which occurred in the first three installations only, was due to a mistake in the design, which was quickly and easily rectified, and there has never been a recurrence of this trouble.

It is not intended in this paper to advocate the internal combustion engine for passenger ships, or for vessels carrying highly valuable cargoes, such as silk or refrigerated products, which on account of the large amount of capital invested and the extremely high rate of insurance must be transported within the shortest possible time; this necessity for speed relegates the question of economy to a place of secondary importance, as such cargoes must be carried in large ships of high power, which is not possible at the present time, having regard to the development of the oil engine.

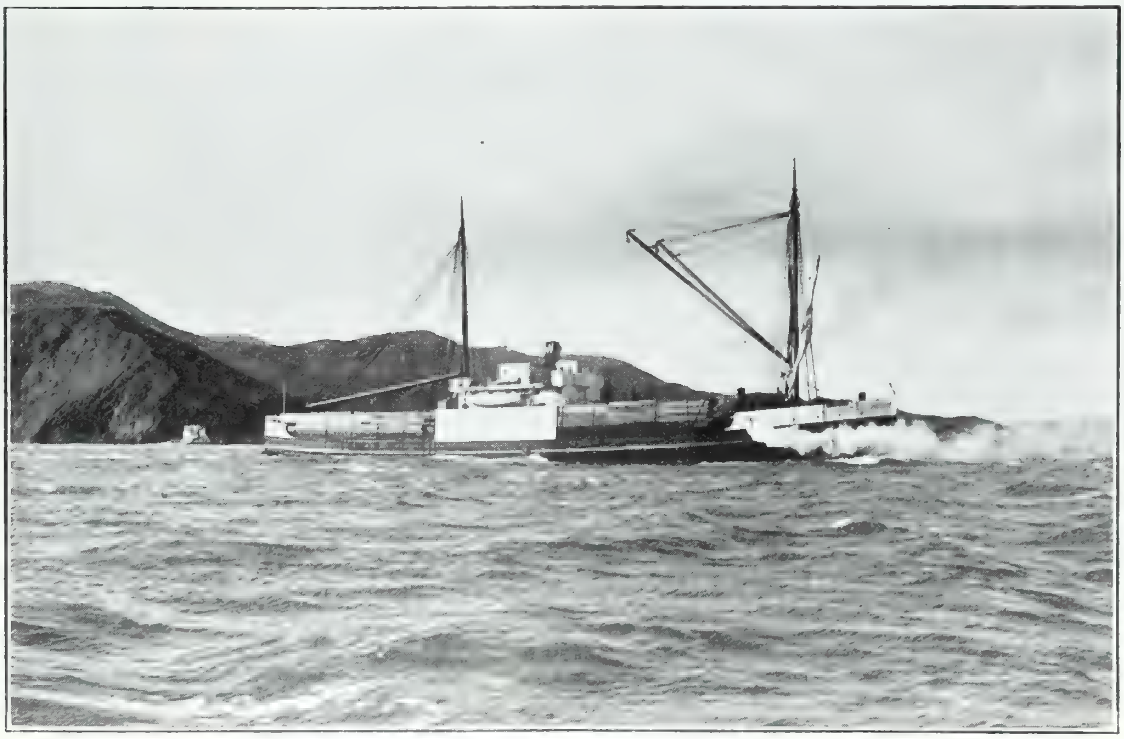
We take it for granted that merchant ships and steamers are operated for the purpose of profit, or carrying cargo at a minimum cost; therefore the hull that can carry the most cargo at the lowest cost, at the usual tramp speed, at about an equal outlay of capital, is the most economical. Trans-Pacific trade is one that this coast is most seriously interested in. Developing and extending the export and import business with Australia, the Orient and South America should be the particular endeavor of our Pacific Coast merchants and shipping companies, and to handle overseas goods and products, tonnage is absolutely necessary. On account of the distances, difficulty has been experienced in finding economical ships; an ordinary tramp steamer of 5000 d.w. tons, inclusive of bunkers, on some voyages, can carry only 3000 to 4000 actual freight paying cargo, on account of the space taken up by bunkers or weight of fuel oil. A steel motorship of 3500 tons deadweight nine-knots speed, carries on a direct voyage of 8000 to 10,0000 miles nearly as much revenue-producing cargo (at a greatly reduced cost of operation) as a steel steamer of 5000 tons deadweight of the same speed, viz. (engine space about similar):

Vessel tonnage, 3500 tons deadweight.

Motorship, oil fuel; fuel 45 days, at 5 tons oil per day, tons	225
Water for boiler	None
Total tons	225
Net paying cargo, tons	3275

Vessel tonnage, 5000 tons deadweight.

Steam coal fuel; fuel 45 days, at 25 tons per day, tons	1125
Water for boiler	100
Total tons	1225
Net paying cargo, tons	3875

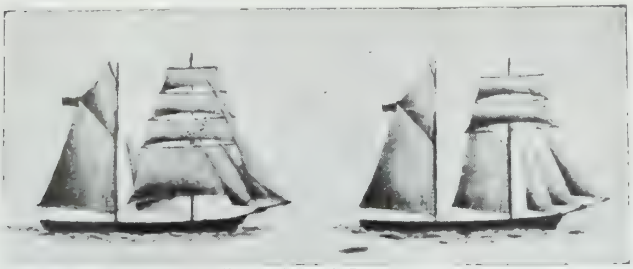


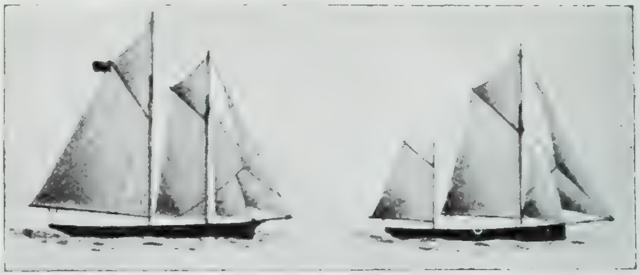
Bolinder motorship Sierra

Rigging of Sailing Vessels

COMPLYING with requests that have come through the mails desiring information on the nomenclature of various rigs of sailing vessels, the editor has compiled this series of illustrated definitions from that splendid handbook, "Modern Seamanship," by Rear Admiral Austin M. Knight, United States Navy.

While sails and spars have practically disappeared from naval vessels and are very little used on steam vessels of the merchant marine, the sailing vessel has by no means vanished from the ocean, and some familiarity with the rigs employed is expected of all who are in any way connected with marine affairs. In the ordinary use of English, practically every vessel that floats on the ocean is designated as a ship. Thus we speak of steam ships, motor ships, sailing ships, war ships, ships of the line, passenger ships, wooden ships, iron ships, cement ships, forgetting all the while that the word "ship," as originally used, applied to the rigging, but this brings us to our definitions:


Hermaphrodite Brig and Topsail Schooner


Schooner and Ketch

"A **ship,** often referred to as a 'full-rigged ship,' has three masts: the fore, main, and mizen, all of them square-rigged.

"A ship may have more than three masts. Four-masted ships are common, and five-masters are occasionally seen. In a four-master the after-mast is called the jigger-mast. In a five-master, the masts are usually called 'fore,' 'main,' 'middle,' 'mizzen,' and 'jigger.'

"A **barque** has three masts, the fore and main square-rigged, the mizzen, fore-and-aft rigged.

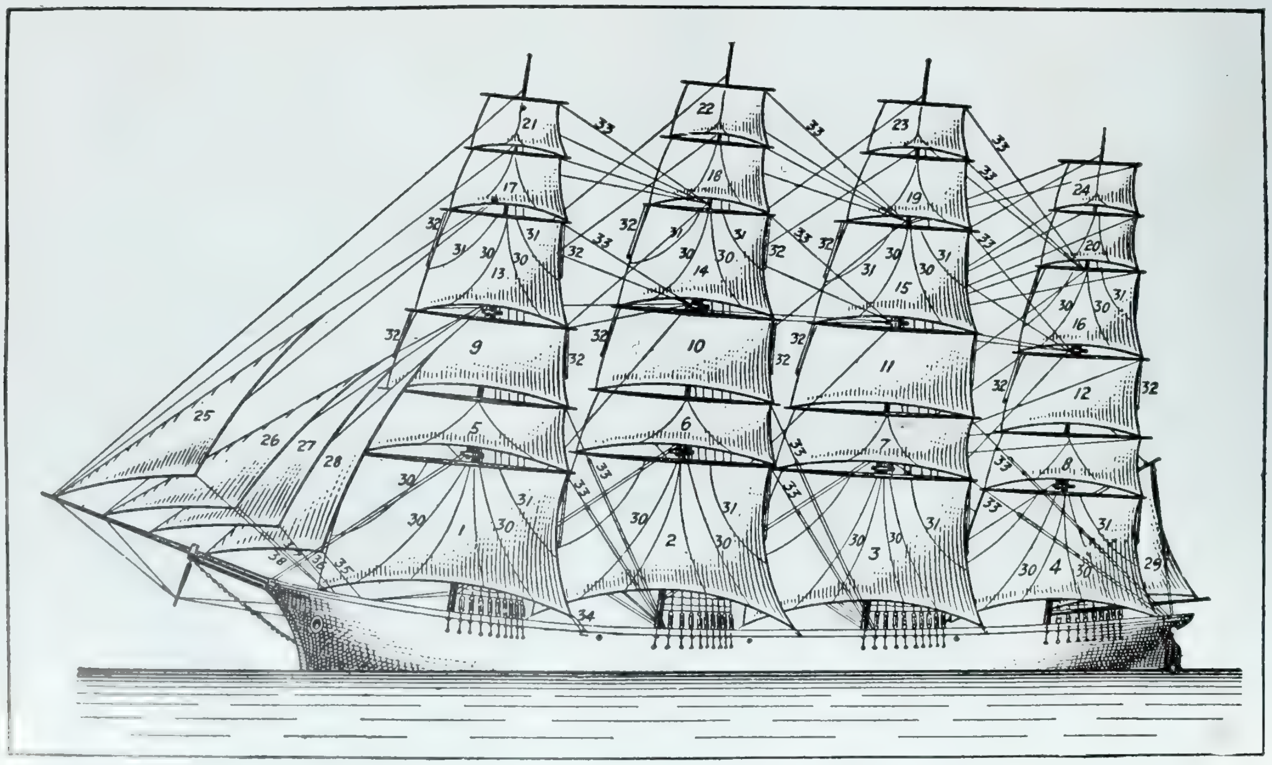
"A barque, like a ship, may have more than three masts, the names being the same as in the case of a ship. She is still a barque if all the masts except the after one are square-rigged.

"A **barkentine** has three or more masts, of which the two after ones, main and mizzen, or mizzen and jigger, are fore-and-aft rigged. A five-master, with the three after-masts fore-and-aft rigged, is still a barkentine.

"A **brig** has two masts, both full square-rigged. A brigantine is a brig without a square mainsail; that is to say, she carries all the square sails of a brig on both fore and main masts, except the mainsail.

"A **hermaphrodite brig** has two masts, the foremast full square-rigged, the mainmast full fore-and-aft rigged. A hermaphrodite brig is often incorrectly called a brigantine.

"A **topsail schooner** has a fore-and-aft foresail, with a square fore-topsail, and in some cases a fore-

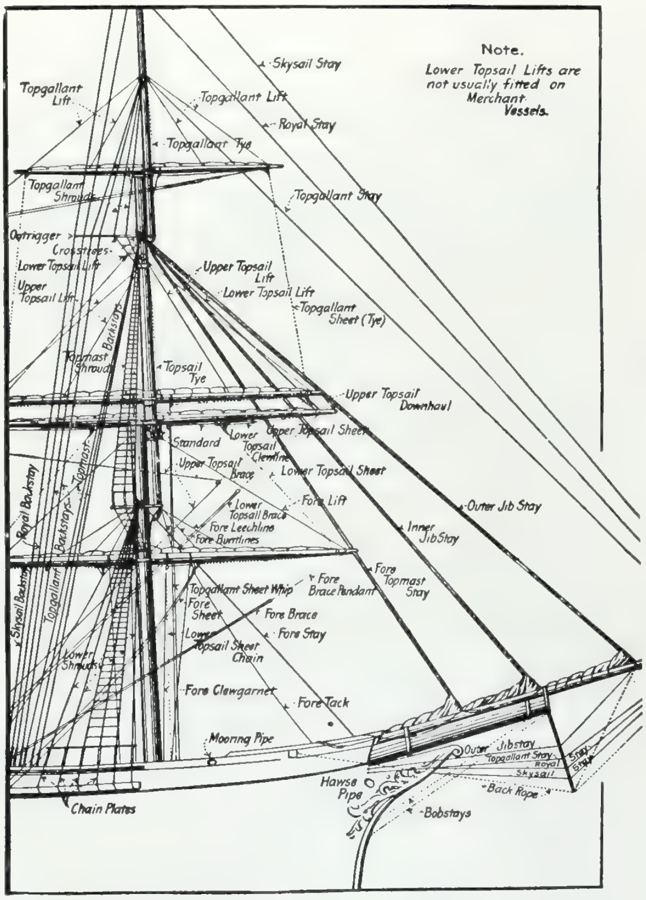


Key to Plate 150

1 Foresail
2 Mainsail
3 Crossjack
4 Jigger
5 Lower fore topsail
6 Lower main topsail
7 Lower mizzen topsail
8 Lower jigger topsail
9 Upper fore topsail
10 Upper main topsail
11 Upper mizzen topsail
12 Upper jigger topsail
13 Fore topgallant sail
14 Main topgallant sail
15 Mizzen topgallant sail
16 Jigger topgallant sail
17, 18, 19, 20, Royals
21, 22, 23, 24, Skysails
25 Flying-jib
26 Outer-jib
27 Jib
28 Fore topmast staysail
29 Spanker
30 Buntlines
31 Leechlines
32 Reeftackles
33 Braces
34 Foresheet
35 Fore topmast staysail sheet
36 Jib-sheet
37 Outer jib-sheet
38 Flying jib-sheet

Key to Plate 151

1 Foremast
2 Mainmast
3 Mizzenmast
4 Topmasts; fore, main, and mizzen
5 Topgallant masts; fore, main and mizzen
6 Royal and skysail masts; fore, main and mizzen
7 Fore yard
8 Main yard
9 Crossjack yard
10 Lower topsail yards; fore, main and mizzen
11 Upper topsail yards; fore, main and mizzen
12 Lower topgallant yards; fore, main and mizzen
13 Upper topgallant yards; fore, main and mizzen
14 Royal yards; fore, main and mizzen
15 Skysail yards; fore, main and mizzen
16 Spanker gaff
17 Trysail gaff, fore and main
18 Lower shrouds
19 Topmast shrouds
20 Back stays
21 Fore skysail stay
22 Fore royal stay
23 Flying-jib stay
24 Fore topgallant stay
25 Jib stay
26 Fore topmast stays
27 Fore stays
28 Main skysail stay
29 Main topgallant stay
30 Main topmast stay
31 Mizzen skysail stay
32 Fore and main lifts
33 Topsail lifts
34 Topgallant lifts
35 Spanker boom
36 Bowsprit
37 Jib-boom
38 Flying jib-boom
39 Martingale or dolphin striker
40 Braces (named from yard to which they belong)
41 Bobstays
42 Martingale guys



Above: Foremast and head-booms of a modern sailing ship. Plates 150 and 151 give the detail sail and standing and running rigging of a full-rigged ship.

A full-rigged ship carries a lower, topsail, topgallant, royal, and sometimes a sky-sail, yard, on each mast. The topsail and topgallant yards are often double. The masts of a ship are supported from the sides by shrouds, from forward by stays and from aft by backstays. The backstays contribute also to the widewise support, since they are necessarily led to the sides of the ship. The stays, in addition to supporting the masts, serve to carry certain fore-and-aft sails known as staysails.

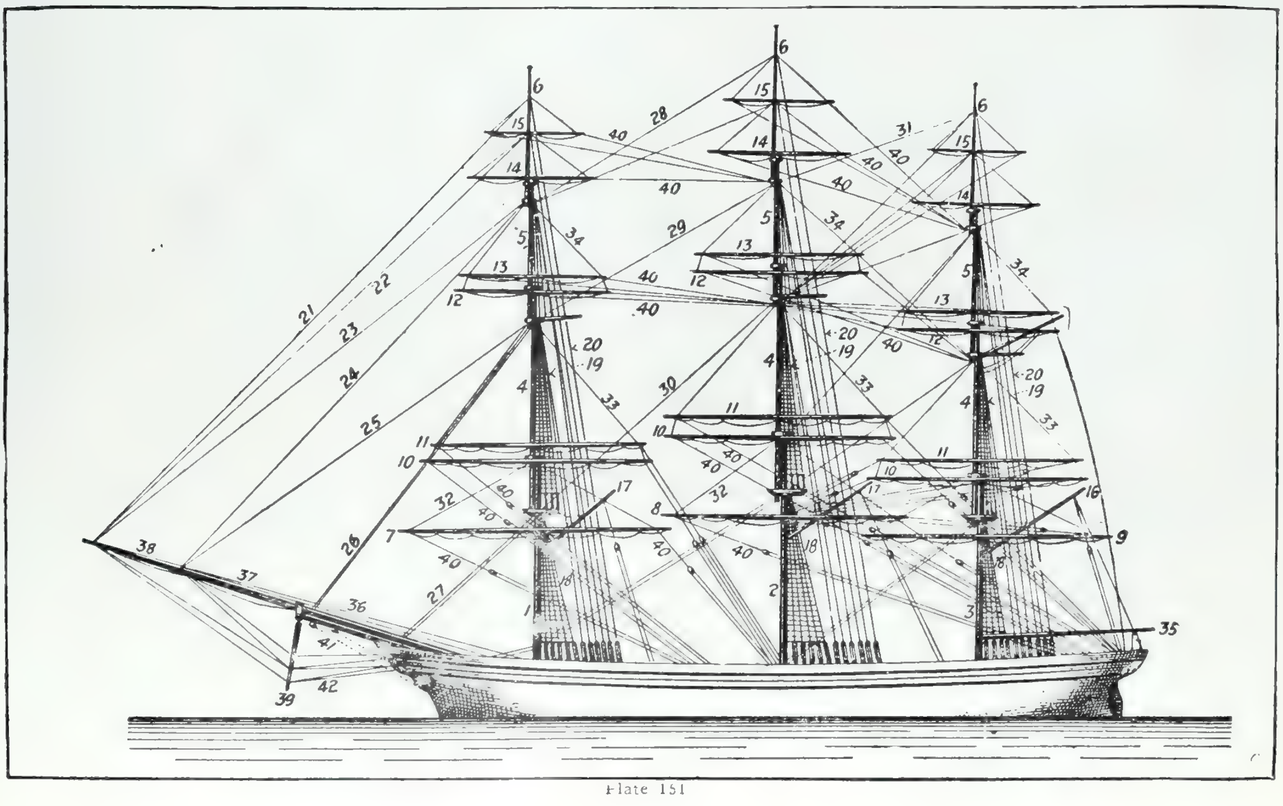
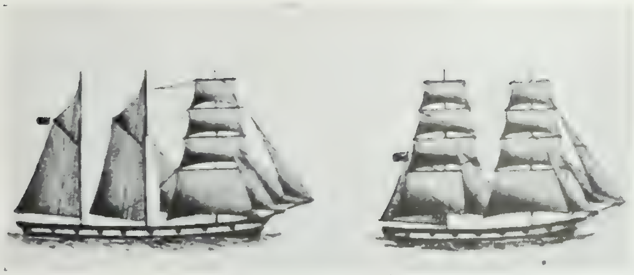
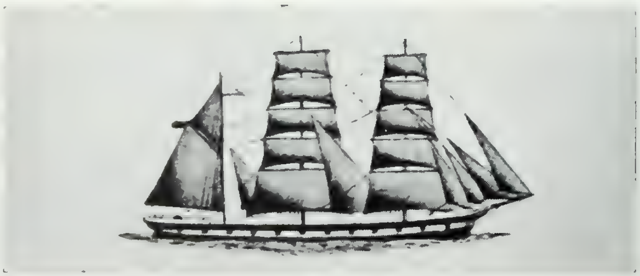


Plate 151



Barkentine and Brig



Bark

topgallant sail. The mainmast is full fore-and-aft rigged. A topsail schooner is often incorrectly called a hermaphrodite brig.

"A **schooner** has two, three or more masts, all fore-and-aft rigged. The designations of the masts where there are more than two are the same as in the case of a ship or a barque.

"There are many variations of the single-masted rig shown in the **cutter** of our illustration. The 'sloop' differs from the cutter so far as rig is concerned in having a short fixed bowsprit instead of a long movable one, and in carrying only one head sail. The most important distinction, however, between the sloop and the cutter, as at present recognized by yachtsmen, has to do with the model of the hull rather than with the rig.

"The **ketch** and the **yawl** are modifications of the single-master rather than of the schooner, since they have grown out of the desire to make the total sail area more manageable by dividing it. For racing, the 'single-sticker' holds its own, because, as is well known, a given amount of canvas has far greater **driving** power in one sail than in two. An incidental advantage of the yawl or ketch rig is that the craft can be handled under very small sail—jib and jigger—which is a great convenience in working around a harbor, and may be of vital consequence in bad weather when the mainsail must be lowered, perhaps only for reefing; a situation in which the boat under a jib alone would be altogether unmanageable, and reefing a difficult and dangerous operation.

"The same considerations of manageability with a small crew which have led to the development of the yawl and ketch from the single-master, have led to the division of the mainsail of large schooners, resulting in the production of schooners of three, four and more masts.

"As regards the merits of the fore-and-aft rig as compared with the square-rig, it may be said that the fore-and-after has marked advantages on the wind, and the square-rigger advantages quite as marked in running free, especially in bad weather. A square-rigger before the wind is as manageable and comfortable as on any other point of sailing, but the fore-and-after, if there is any sea running, is in a situation which is at the best a difficult and trying one, and at the worst is very dangerous."

FOR THE EDUCATION OF ALL

Editor Pacific Marine Review,
San Francisco, Cal.

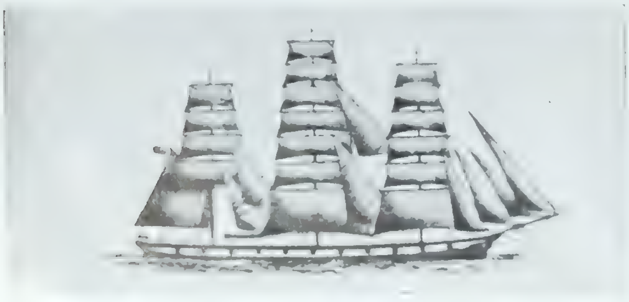
Dear Sir:

This letter is about the rig of sailing vessels. In reading the daily papers I notice the marine writers refer to ships as schooners, barkentines and barks, etc. I presume this is an error in typesetting. If consistent, would like you to publish an article in your next issue describing the rig of ships. One of the writers referred to the four-mast Olympic as an "un-named" thing. It seems to me that the Olympic is a true four-masted bark. In the U. S. shipping list the Annie M. Reid is called a bark, while the Golden Gate and Star of Poland are called ships. What difference is there in the rig of these vessels? The Reid has single topgallant yards while the other two have double. One writer stated that a barkentine was a vessel, foremast square-rigged, two masts fore-and-aft. Also stated that a five-masted vessel, two square-rigged masts and three fore-and-aft masts was still a barkentine. Is this consistent?

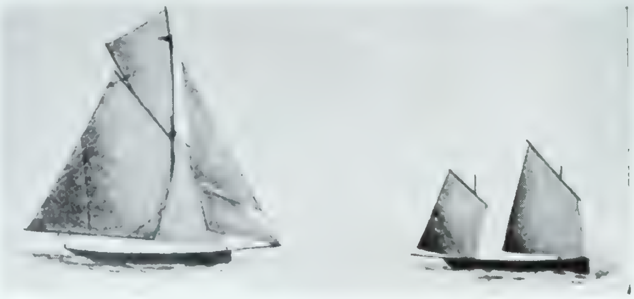
A comprehensive article regarding rigs would be an addition to the literature of the sailing vessel. If not asking too much, would like you to publish a full description of all rigs in your next issue (or an early one) as I believe it would be greatly appreciated by everyone interested in ships (especially by myself) and serve to educate a number of people (especially myself and the marine reporters of the daily papers).

I am not a subscriber of your excellent paper, but have purchased it consistently for years and intend doing so. Do not throw this in the basket, but write a nice article on ship rigs and I assure you it will be greatly appreciated by the writer.

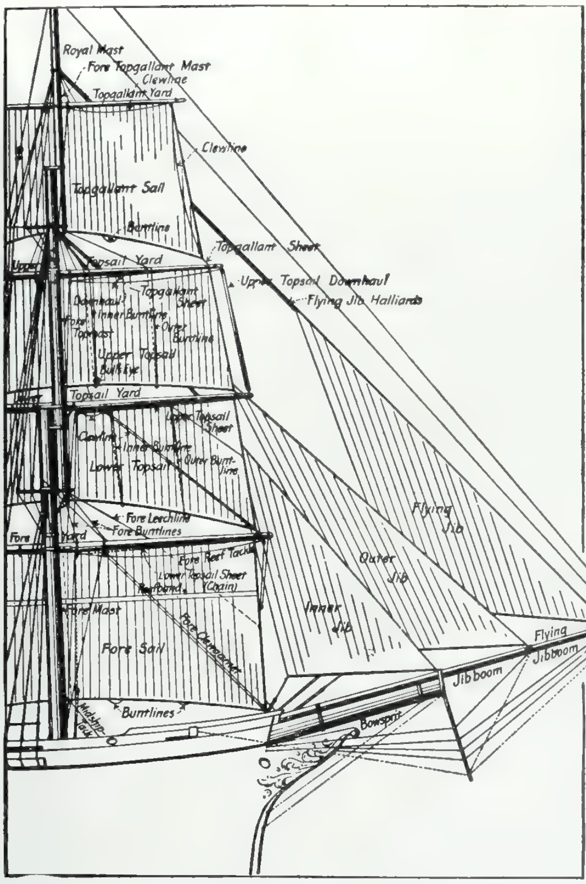
SAILOR.



Full Rigged Ship

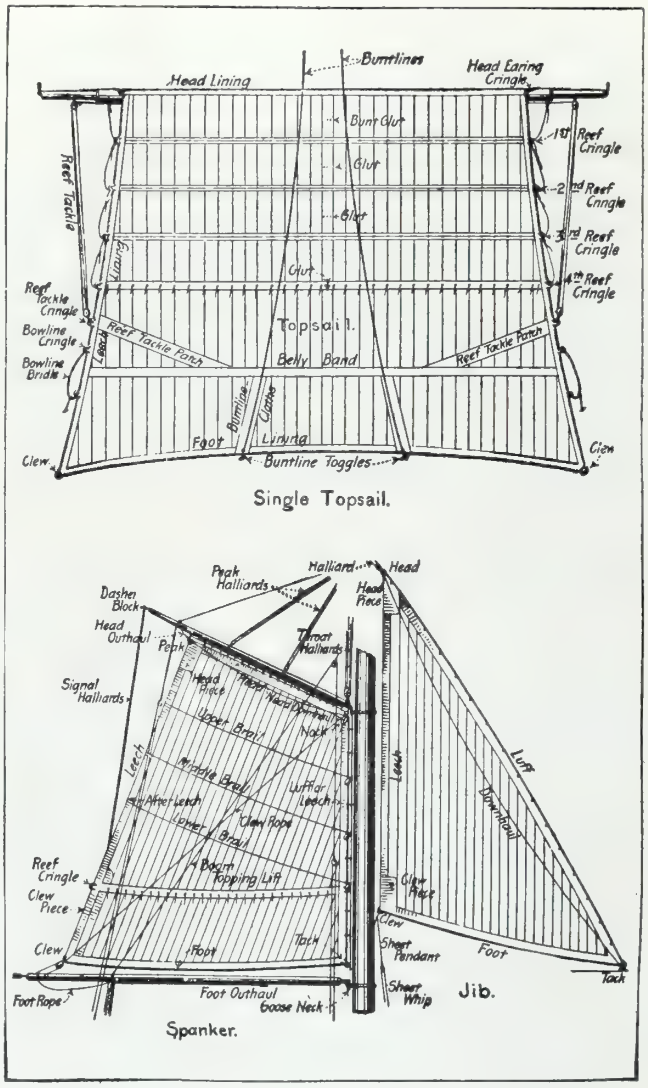


Cutter and Lugger



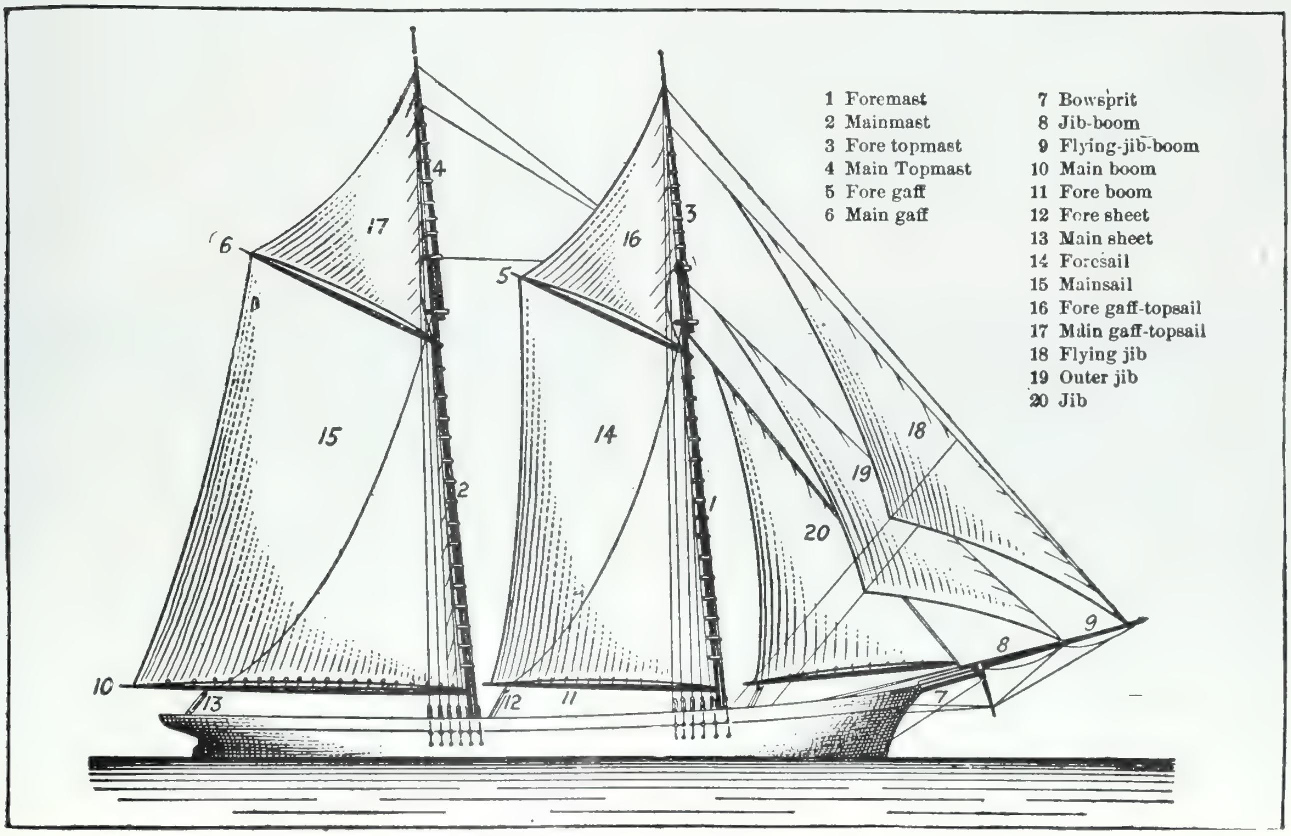
Above, left: Foremast and head-booms of modern sailing ship, sails set. Above, right: Details of sails. Below: Schooner under sail.

There are many variations from the rig of the schooner as shown, especially in yachting, where special sails are used in racing and to some extent in cruising, under favorable conditions of weather. The gaff topsail is often replaced by a "club topsail," having the head and foot stretched out on long light spars which admit of spreading a greatly increased area of canvas. In this case the halliards are bent to the "yard" on the head of the sail near the middle point, and the yard, when hoisted to the masthead, carries the peak of the sail well up, playing the part of a topmast "pole."


Single Topsail.

Spanker.

Jib.



PACIFIC MACHINERY

Skandia Crankshaft Construction

By G. W. Somerville

OF the many important details requiring high-class workmanship in the construction of Diesel and semi-Diesel engines, there is hardly any more important than the crankshaft and its journals. In the early development of this type of prime mover bearing troubles occupied a position second only to pistons and cylinder heads. These latter parts caused a good deal of trouble by reason of their habit of continually cracking. However, these troubles, together with those of the bearings, are now a matter of history, as the engineering fraternity, both in Europe and America, have come to understand and overcome the difficulties.

The purpose of this article is to describe and illustrate, principally, crankshaft and main bearing construction, as applied to the Skandia semi-Diesel engines, built at the plant of the Skandia Pacific Oil Engine Company at Oakland, Cal.

Fig. 1 shows a 500-horsepower 6-cylinder direct reversible hot surface ignition engine for marine propulsion on the testing stand of this company. The cylinder dimensions of this engine are: Bore, 16½ inches; stroke, 18 9/10 inches; speed of revolution, 225 r. p. m. The engine being of the 2-cycle type, six explosions occur for each revolution of the crankshaft. The thrust of the propeller is taken up in a standard marine type horseshoe thrust bearing by means of collars turned solid on the crankshaft. This detail is clearly shown in the cut herewith.

For manufacturing reasons, the bedplate, crank-housing and crankshaft are made in two pieces, each bolted together at the middle section of the engine. Fig. 2 shows the after half of the main crankshaft having its crank pins turned up on a large electrically driven lathe. The crankshaft had been previously roughed out on its main journal centers, after which the blocks were cut out, the shaft in this position having the three pins rough and finish turned. The manner of holding the crankshaft for turning the pins is clearly shown in the cut, an eccentric holding fixture is bolted to the face plate of the lathe, this fixture being provided with a rest, into which the coupling flange on the shaft is inserted and rigidly clamped to prevent possible movement. The after coupling flange is made of sufficient diameter to allow its being held in the tail center by means of a projection on the tail stock spindle, special provision being made to lubricate this point so as to prevent any possible distortion through binding. To counteract the unbalanced weight of the crankshaft when turning the pins, a counterweight is provided and attached through a wire cable which is run over sheaves to the crankshaft. It is possible, by these methods, to obtain great accuracy in the size of crank pins and at the same time make them within a very small fraction of an inch of true cylindrical proportions.

When the crankshafts are set up for turning the pins, they are completely finished, from rough to

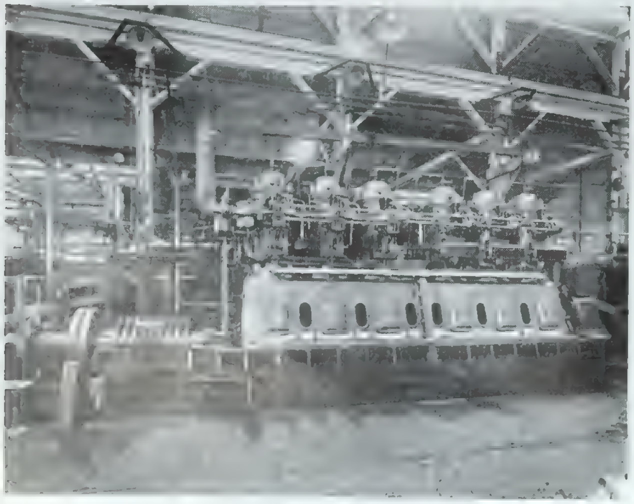


Fig. 1

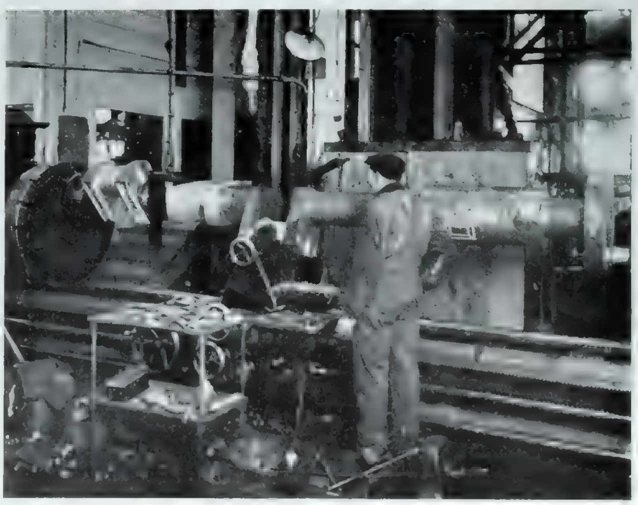


Fig. 2

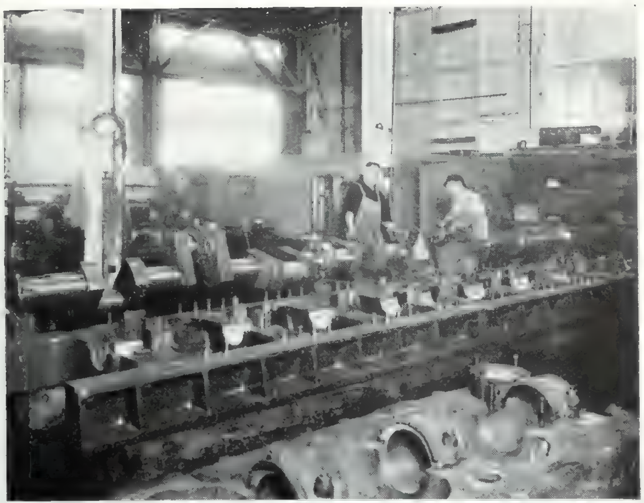


Fig. 3

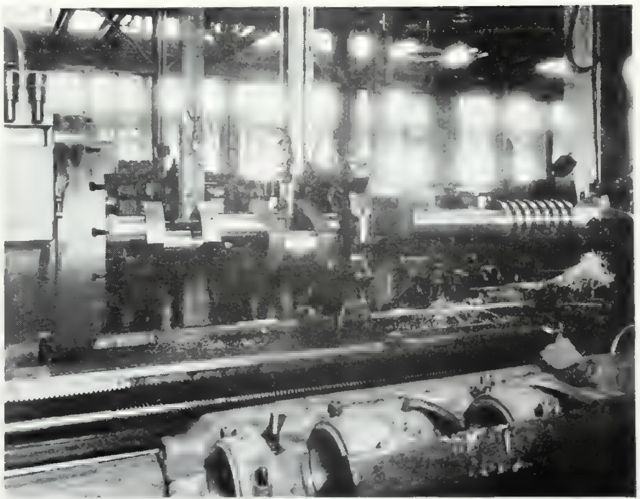


Fig. 4

polished finish, in the same setting of the lathe, after which the shaft is again turned on the centers of its main journal, finishing up the journals and thrust bearing, together with coupling flanges, to their true sizes, giving the finishes as required for their respective duties. The finishing operation on this same crankshaft is shown in Fig. 3, in which the thrust bearing collars have been brought to size and a finishing cut is being taken on the after coupling flange. It should be noted that the tendency of the shaft to buckle, due to the thrust necessary to hold it on centers, is taken up by means of studs between the web blocks, clearly shown in the cut, while a substantial steady-rest prevents any tendency of the shaft to sag.

After the two halves of the shaft have been bolted together, the lubrication oil holes are drilled into the crank pins and the brass centrifugal oil rings are attached for lubricating same. The shaft is then fitted into the previously prepared bedplate, the removable liners of which have been filed and scraped to a good bearing in the bedplate. The crankshaft is then lowered into the liners, these being scraped to a bearing over 130 degrees of their bottom surface.

When the bedplate is properly levelled up and the crankshaft fitted, the main journal caps in place, it must be possible to rotate the shaft by hand before being finally passed in inspection. It has been found in past experience that the crankshaft and its bearings require particular attention in manufacturing, assembling and testing if the engine is to succeed when in service.

Because of the high initial pressures and the frequency with which they occur, the lubricating system becomes of vital importance on this type of prime mover. Also the heat generated by this type of motor, unless properly controlled, is liable to cause serious bearing troubles. In fact, many steam engineers are alarmed at the apparent high running temperature of the main bearings in this type of motor, but with proper lubrication and workmanship in the journals and bearings, no trouble is experienced.

In the past two years, practically all of the engines of this type installed have been in wooden ships, which have shown probably a greater tendency to hog than the steel ships, and for this reason great rigidity in the bedplate is necessary. Beds have to be constructed quite deep and of great rigidity to resist this tendency, which is vital to the success of the engines, particularly because of their effect on journal operation. In the engines being described the bedplate construction is clearly shown in Figs. 4 and 5, while Fig. 6 shows the construction adopted for the smaller 4-cylinder marine engine. This engine, being of the crankcase compression type, a somewhat different design was necessary, as the scavenging air was drawn through the bedplate to muffle the noise of suction.

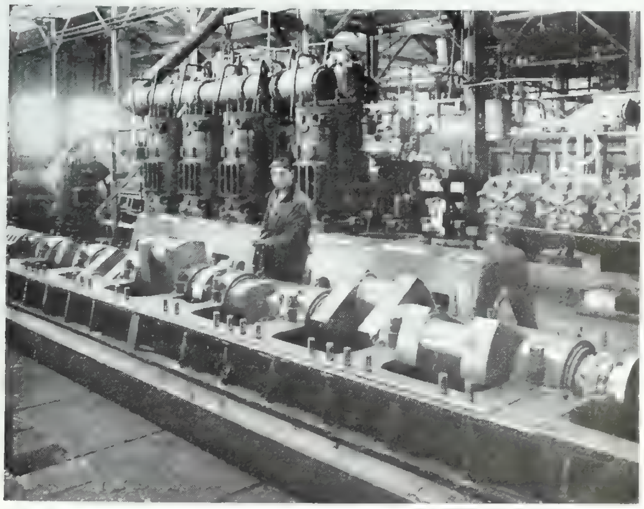


Fig. 5

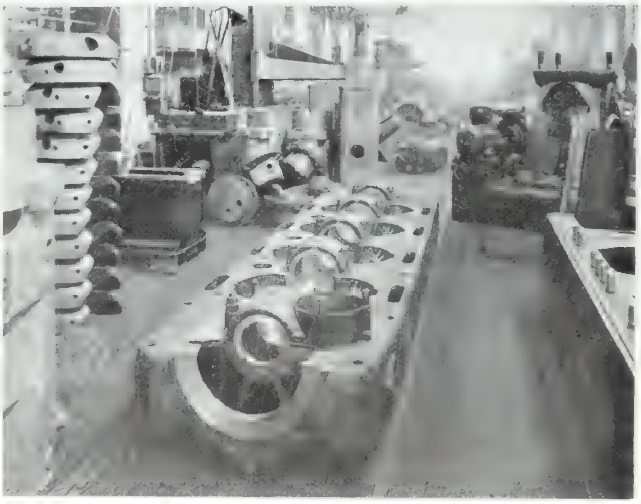


Fig. 6

Cutting and Drilling Speeds

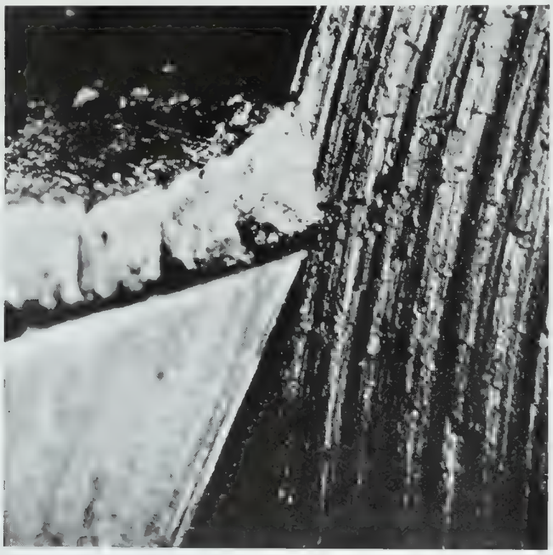
THE true action of a cutting tool in ripping off metal has been a matter of much speculation. Experience has shown that for the best results the tool must be ground in a certain way and operated in a certain position, as illustrated.

This ripping of metal consumes much energy. All of the energy used in breaking metal is converted into heat; thus, roughly speaking, if it takes 10-horsepower to drive a lathe, most of that 10-horsepower is converted into heat at the point of the tool.

The cut must be run slowly enough to allow the heat to be carried off by radiation, or artificial cooling must be resorted to. Pure water rusts iron and gradually increases the temper of the tool to a point where it breaks off. Correct cutting compounds do not increase the temper of the tool and do not rust the work.

Correct cutting compounds also lubricate the tool so that less power is required and less heat developed. This results in a great increase of production of the cutting tool.

The illustration is a microscopic view of a tool taken in action. It will be noted that the metal is ripped off by first crushing it, then tearing or shearing, or "prying" it from the main body of metal. The metal is crushed and bent outward until it can no longer stand the strain, whereupon it breaks, forming the crevices characteristic of the outside of the shaving.



Magnified view of lathe tool in operation

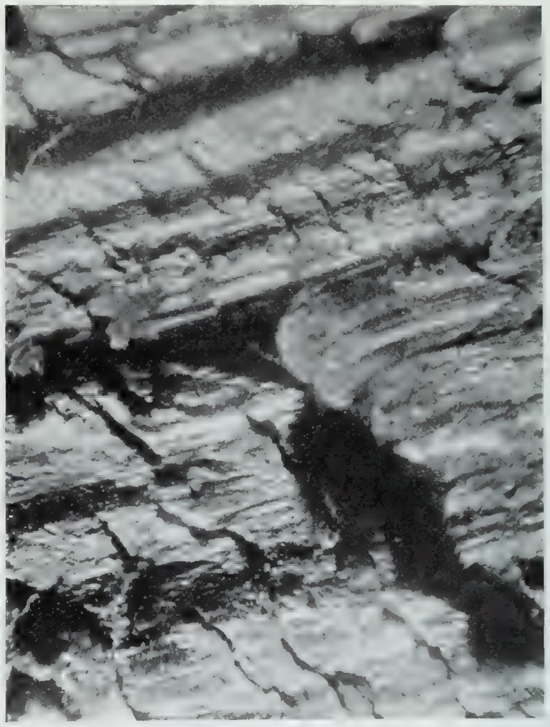
The point of the tool is never in contact with the shaving. It is, however, in contact with the slivers left on the metal and tends to lay them over and smooth up the metal.

The cutting compound flows down from the side of the shaving and into the crevice above the point of the tool. This crevice is plainly visible in the photograph, proving accurately the exact action of the cutting tool at work.

A metal which gives short brittle chips that do not slide down the top of the tool requires practically no lubrication and very little cooling because most of the heat developed in crushing the chips is carried off by them. Metal giving long, tough chips requires both lubrication and cooling.

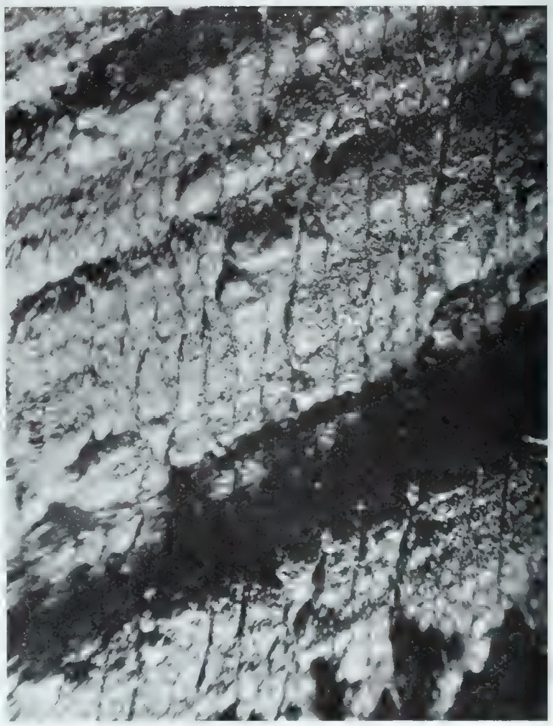
The microphotograph shown below illustrates the under side of a steel chip.

It clearly illustrates that the action of a cutting tool is vibratory. The tool is first bent down slightly by the pressure of crushing a mass of iron crystals; then they split for a certain distance and the tool bends back.



Under side of steel chip

The alternate bands of crushed crystals separated by splits clearly shows this.



Top side of steel chip

The cutting compound enters during the splitting period and lubricates the top of the tool for the crushing period which follows.

The chip curls because the splits are all on one side and the compression on the other.

The microphotograph illustrated above shows the **top** or **inside curve** of the chip. The crushing and splitting are still in evidence, but all compressed together.

The process is also accompanied by tearing and shearing, as shown by the big tear in the center of the microphotograph.

The tables shown are approximate only. Conditions vary so that it is impossible to give fixed figures. The figures given in these tables are based upon the best practice of modern machinery with the use of the best **cutting compounds** and are compiled and copyrighted by the Warner & Swasey Company of Cleveland, Ohio.

The speeds can be increased 50 per cent where conditions are favorable.

This table gives the revolutions per minute and feed. The feed is given in revolutions of the drill per inch of advance. The decimal equivalents below the table give the feed per revolution of the drill. On screw machines the turning feeds generally used for machine steel or tool steel range from 125 (.008 inches) to 31 (.032 inches), depending on grade of finish wanted and depth of cut.

When the work is to be finished by grinding, feed from 66 (.015 inches) to 31 (.032 inches) can be used. For light cuts these feeds can often be increased.

For forming and cutting-off, fine feeds are used, ranging from 1000 (.001 inches) to 100 (.010 inches) depending on width of cut. For roughing cast iron, feeds from 31 to (.032 inches) to 16 (.062 inches) can be used.

DRILLING SPEED

Drill	Soft Cast Iron		Medium Steel		Hard or Tough Steel	
Size	R.P.M.	Feed	R.P.M.	Feed	R.P.M.	Feed
¼	1500	100 to 66	1200	125 to 100	600 to 900	165 to 125
⅜	1000	100 to 66	800	125 to 100	400 to 600	165 to 125
½	750	100 to 66	600	125 to 100	300 to 460	165 to 125
⅝	600	83 to 50	500	100 to 83	200 to 360	125 to 100
¾	500	83 to 50	400	100 to 83	200 to 300	125 to 100
⅞	440	83 to 50	350	100 to 83	180 to 260	125 to 100
1	380	83 to 50	300	100 to 83	150 to 225	125 to 100
1⅛	340	55 to 40	270	83 to 55	140 to 200	100 to 66
1¼	300	55 to 40	240	83 to 55	120 to 180	100 to 66
1⅜	275	55 to 40	220	83 to 55	110 to 165	100 to 66
1½	250	55 to 40	200	83 to 55	100 to 150	100 to 66
1⅝	235	50 to 33	185	83 to 55	95 to 140	100 to 66
1¾	220	50 to 33	170	83 to 55	90 to 130	100 to 66
1⅞	205	50 to 33	160	83 to 55	80 to 120	100 to 66
2	190	50 to 33	150	83 to 55	75 to 114	100 to 66

Decimal Equivalents of Feeds Given in the Above Table:

33—.030
40—.025
50—.020
55—.118
66—.015
83—.012
100—.010
125—.008
165—.006

Cutting Speeds

The figures given should be used only as a guide. It is impossible to give fixed cutting speeds and feeds for work on screw machines, as so much depends on the material, and the accuracy and finish required. The given speeds can often be increased 50 per cent when running under the best conditions.

Table of Average Cutting Speeds

Material	Surface Feet per Minute	Material	Surface Feet Per Minute
Soft cast iron roughing	50 to 60	Soft machine steel	80 to 100
Soft cast iron finishing	80 to 100	Medium hard machine steel	60 to 80
Hard cast iron roughing	35 to 50	Hard machine steel	40 to 60
Hard cast iron finishing	60 to 80	Tool steel annealed	60 to 80
Malleable cast iron	80 to 90	Tool steel unannealed	25 to 35
Steel casting	50 to 60	Alloy steel annealed	50 to 60
Brass	150 to 250	Alloy steel treated	30 to 40
Bronze	100 to 150	Cutting threads on brass	60 to 150
Hard bronze	80 to 100	Cutting threads on steel and cast iron	25 to 40
Aluminum	300 to 400		

A New Lathe Attachment

By Edw. N. Moor, Inventor

DURING the past few years many radical changes have become necessary in the methods employed in all shops in getting out work calling for extreme precision, of a kind where old methods cannot meet this necessity of fine and accurate fitting. The average shop, particularly one away from the city, usually consists of a good lathe substantially built, as it should be; and a drill press. With these tools the workman can get away with and accomplish a certain amount of work, but he stops short when it comes to the proper handling of hardened work which has to be ground, valve fitting, keyway cutting, the replacement of gears and the ability to make tools needed in his own work, many of which cannot be bought.

The purchase price of appliances necessary to accomplish such work at the present time is extremely large, and touches the ship-owner's pocketbook to such an extent that it is a hardship to him to meet this demand. It means, in addition to his lathe and drill press, a milling machine with which to cut his gears and keyways, square his auto axles and do the necessary work calling for milling. Again, the matter of grinding calls for an up-to-date grinder to handle his wrist pins after being case hardened, his valves, hardened steel bushings, his crankshafts, and many kindred things that should be ground after being hardened to have the proper degree of accuracy, which cannot be accomplished in any other way.

Many inventors have patented lathe attachments to be used for milling and grinding operations, but with most of these the complicated adjustments necessary in setting up to do work involved so much lost time and trouble that they have not been of any great help in machine shop practice. The author in presenting the new attachment described in this article believes he has solved the problem of milling and grinding on the ordinary engine lathe with the minimum amount of adjustment and with a mechanism that could be manufactured and sold at a reasonable cost.

The device as illustrated is shown in position upon the lathe carriage. The tool is applied and bolted to the carriage by a single bolt that passes through the column of same, and clamps the tool to the T-way on the tool post compound or simple rest of carriage. This column with its elevating slide makes it possible to align the center of the active parts of the tool (the quills) to the center of any lathe, no matter of what size or swing. It is possible, as well, to change the position of these quills as placed in the holder, from the horizontal to the perpendicular or to any intermediate angle. The quills are interchangeable by the loosening of two (2) bolts which clamp the sleeve holder to the quills, so that one can mill and then grind, without any radical changes being made in the adjustment of the tool.

The grinding quill has twelve (12) changes of speed from 1200 r.p.m. to 13,000 r.p.m. The milling quill, driven by the worm gear, also has twelve (12) changes of speed from 24 per minute to 350 r.p.m.

In addition to the worm drive on the milling quill of this tool, as it is marketed now, a V pulley is incorporated which allows the throwing out of the worm drive and the direct driving of this spindle for rapid end milling work without the use of the gear. This adapts it to high speed work with a small end mill, etc., and as well for drilling face plate work in the lathe; or work between centers. This gives a range of speeds from 24 to 13,000 with all the changes that can possibly be desired to meet the correct working speeds of drills, end mills, standard milling cutters of 2½ or 3 inch diameter, or larger, metal saws, and then the necessary speeds for all abrasive wheels for both inside and outside grinding from the smallest inside work with interior burrs, up to a wheel large enough to grind main bearings of auto crank shafts or any other work which may be ordinarily worked between lathe centers.

The variations of speed and the ability to accomplish this is entirely due to the efficiency of driving power applied to this tool, and its rapidity of application in adjustment for all changes of speed, and self-adjustment of position in changes of the driven pulleys.

The driving power is a ¾ h. p. electric motor of about 1750 r.p.m. speed, and can be of any make desired. The driving mechanism consists of a pulley on motor shaft belted to a cone on a counter shaft. The bearing of this countershaft is supported by a steel bar from a casting bolted to the bed of the motor. This driving unit is supported by a universal joint from a single rail trolley parallel with the lathe bed in such fashion that the weight of the motor sufficiently overbalances the countershaft and cone to keep the belt from cone to tool tight under all conditions. This arrangement enables the motive power to follow automatically any possible change in position of the working tool. This is clearly shown in cut.

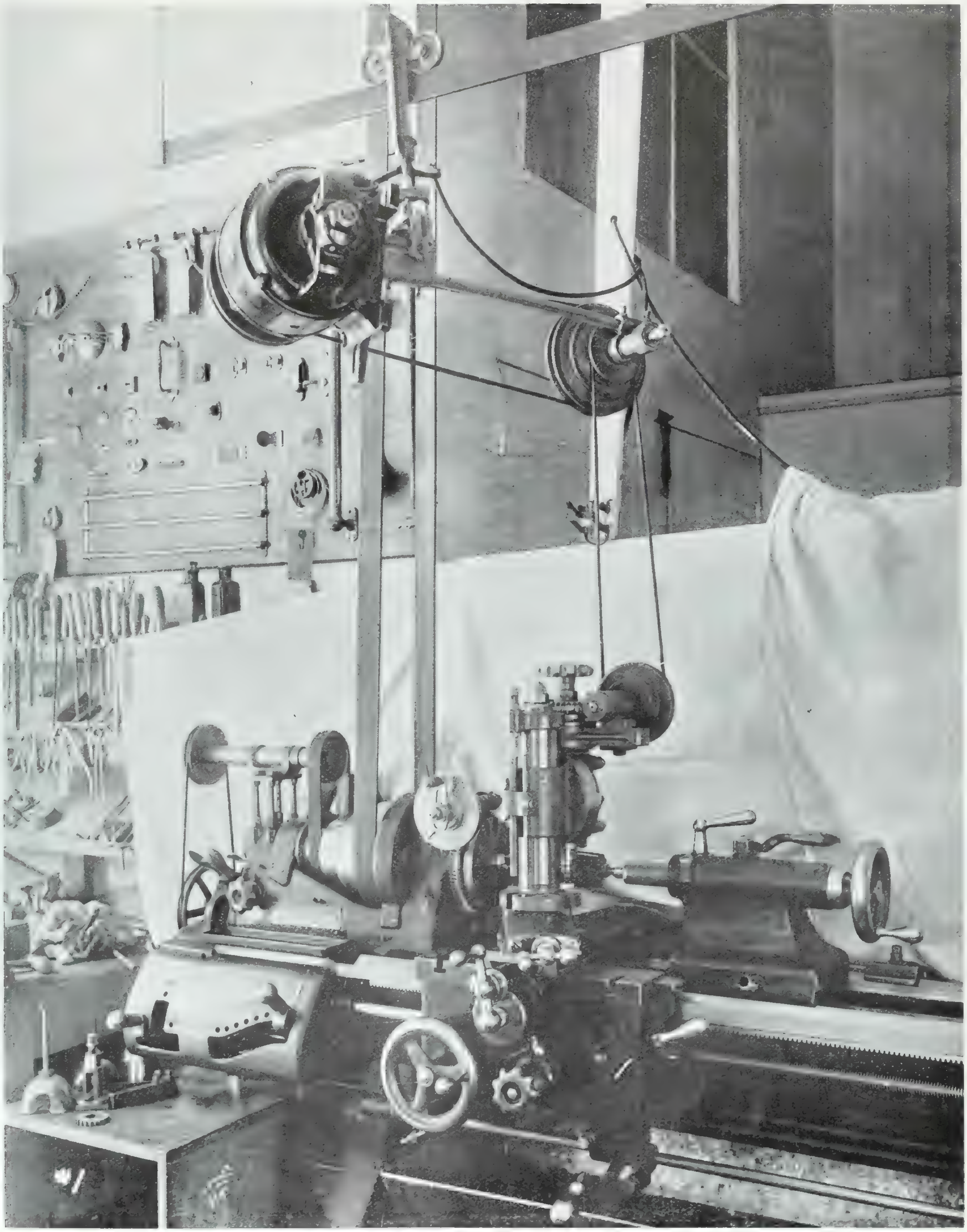
The motive power is within reach of the operator, the track being hung from the ceiling if desired, by light chains and hooks that allow for the adjustment of the height of the motor from the floor to suit the reach of the operator and all is within easy reach—without climbing to adjust.

The advantages of a cutting tool working upon the carriage of the lathe for vertical or horizontal milling are many, and a tool of this kind as applied to the lathe, should be so placed upon the lathe as to take advantage of the construction of the lathe; thereby obviating overhang and side tension stresses so that the cutting tool will accomplish its work as nearly as posible as it is done by a lathe tool held in the tool post holder backed up by the crossfeed slide. In others words, all stress should be in line with the cross feed on the carriage of the lathe. By using a milling tool in this position there is no necessity to remove any work from the chucked face plate work, or on centers of the lathe. No resetting of tapers, readjustments of any kind are necessary. In the case of milling a tapered reamer—as shown in illustration—**First,** the turning out of the rough reamer between centers with the taper attachment or compound rest to produce same. **Second,** the placing of the milling machine on the carriage and milling of flutes with a standard milling cutter taper adjustment as in roughing out. **Third,** removing of reamer, hardening and drawing the temper. **Fourth,** the replaceing between lathe centers and the substitution of the grinding quill for the milling quill, and grinding same to gauge with exactly the same adjustment of taper attachment as was used in roughing out the tool, thereby keeping everything the same, and no resetting to gauge.

The construction of this lathe attachment calls for some comment. Everything is standardized. The collets and arbors of the mill are interchangeable, being made of a standard size, held in place by a draw-in bar; and as well applicable to the lathe spindle, if so desired, by the same means. A three-quarter hole through the spindle of the milling machine, so that rod work can be held therein, and the cutting tool placed in the lathe if desired.

The bearings in the mill are taper roller bearings, and cannot be harmed even if allowed to run dry, and if anything should go wrong can be replaced in a few moments' time. In the case of the grinder ball bearings of the very best make are used.

Alignment is perfect, oiling easily done, and



The E. N. Moor milling and grinding attachment for engine lathes absolutely no wear. No readjustments are necessary even after long periods of use.

The arbors for the grinding quill are standard taper, regulation length and drawn into the taper with a draw-in bar, the spindle of the grinder being hollow. This pulls them firmly into position and they cannot possibly loosen up while working.

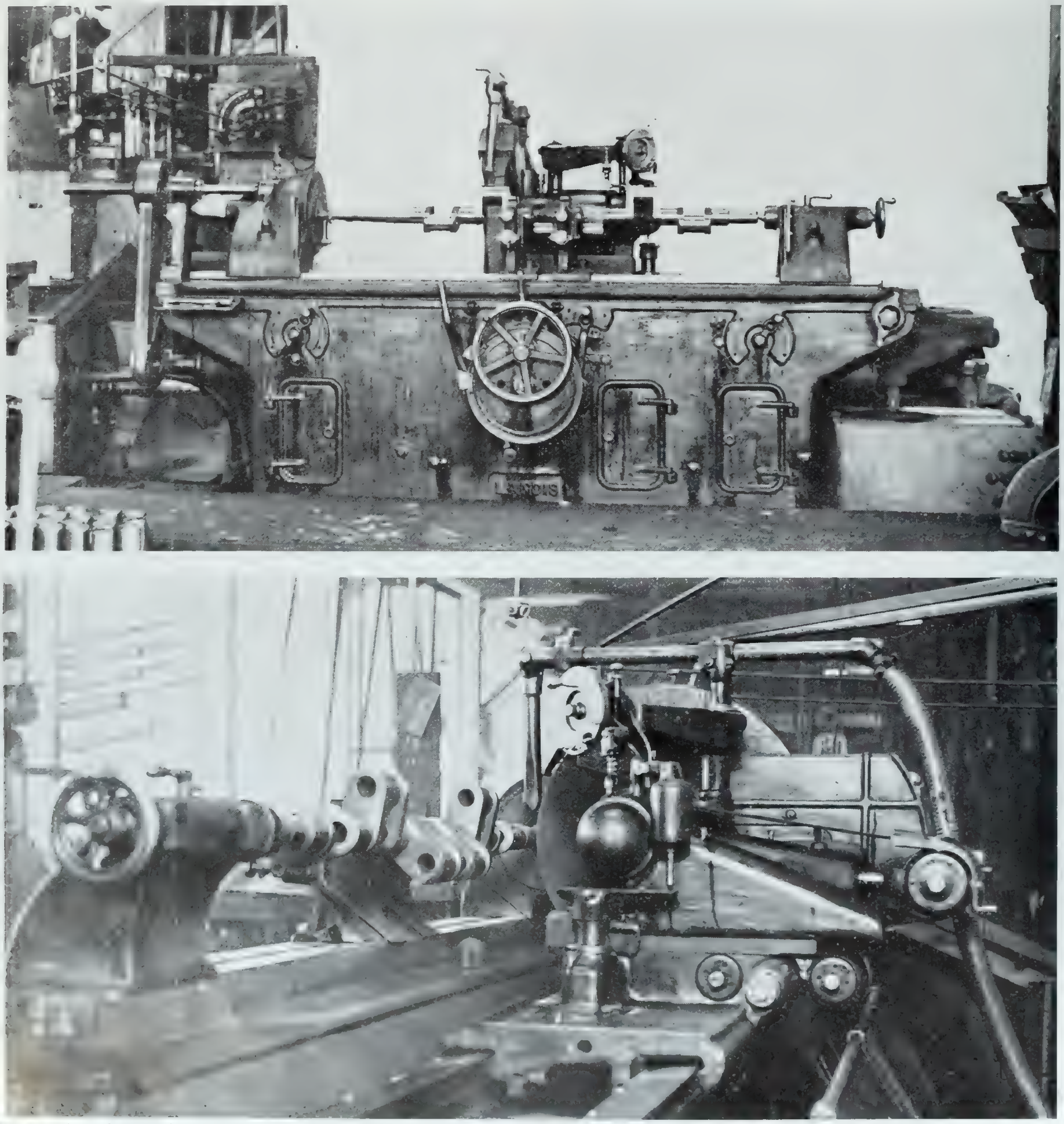
All of these points have been worked out with one object in view, that is, to give to the purchaser of this tool as good work as is possible to be had in construction, and leave nothing undone that could aid and give efficiency. Ball bearings in the countershaft, and as well in the worm gear of the milling quill are dust proof, and ability to oil is easy everywhere.

The mill will cut keyways easily to ½"x½" in chrome nickel steel at one cut. Will square the ordinary auto axle at one cut with a standard mill. Will meet all demands as to power necessary, and no hard knocks can come through the belt and deliver to the cutting tool all the power it will stand, and all that the carriage of the lathe will stand.

The grinder does not tickle the work on hand, but will remove stock—will take with a 5" wheel a cut from .010" to .015" or more at one cut, and keep it up, and, having a ¾ h. p. motor behind it it does not kill down under heavy grinding stress.

The resiliency of the belt mechanism makes this grinding quill a very accurate and sensitive tool, for no hard knocks can come through the belt and be passed to the grinding spindle on account of the elasticity of the driving countershaft and its ability to give and take under working conditions.

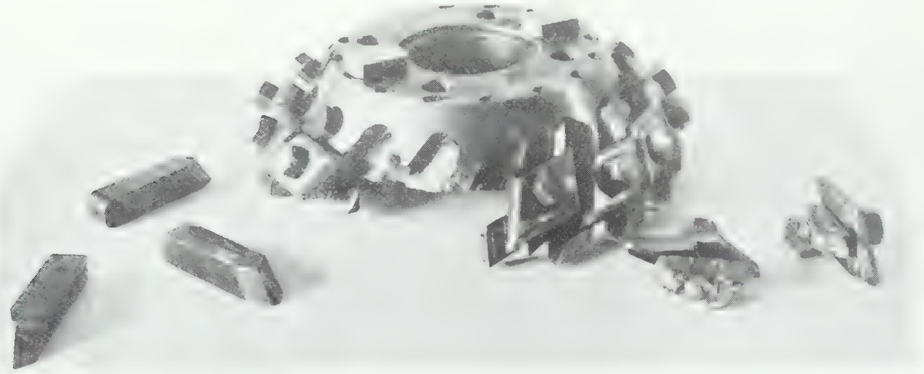
Landis Grinder at Union Gas Engine Company



The grinding of crankpins and other bearing surfaces on high-speed gas engines calls for extreme precision in finish. The micrometer feed on this machine enables the Union Gas Engine Company to finish these surfaces to the required precision

Tool Breakage a Serious Problem

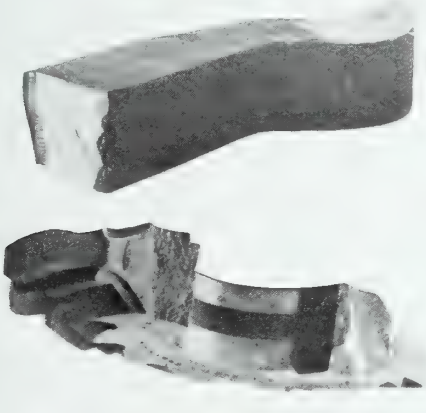
(Reprint from Willamette Plant Record)



A moment's inattention—a broken milling head; cost, $135

AT the beginning of our industrial expansion a little over two years ago, all tools required by our force of about 500 men were easily dispensed and taken care of by two tool rooms, one in the machine shop and one in the boiler shop. Tool breakage was then a matter of great importance, but how much greater it is today can be judged from the fact that where there were eight tool room attendants at that time, there are thirty-nine today and eleven men of the plant do nothing but grind tools. There are three rooms, one for the machine shop, one for the boiler shop and one for the marine department.

Tool breakage is a problem in every great plant where many men working under high pressure are often put in charge of machines which, in former years, would never have been trusted to an individual who had not had years of experience at tasks where his responsibility was not so great. In this way, the present demand for machinists and tool workers gives them opportunities which they never would have had otherwise.



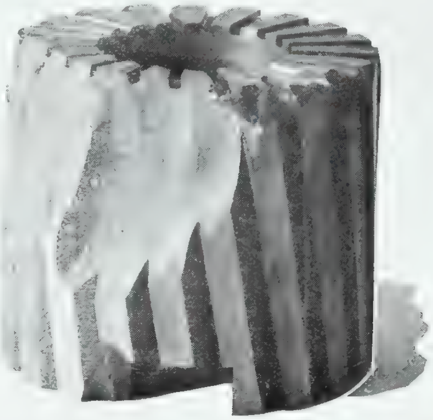
Above: Planer tool, 1½ inches, value $30. And below: gear cutter, 1¾ inches, value $90, destroyed by carelessness

Breakage Scores Against Standard

However, tool breakage scores against many otherwise proficient men and to bring up their standards of workmanship this very important factor will have to be reduced. During June, July and August, the greatest number of new men were put on the force of the Willamette Iron & Steel Works. The curve of breakage on the chart kept in the machine superintendent's office went up by leaps and bounds and all the effort made by the old men in keeping down the cost of broken tools seemed, for a while, lost in the endless string of damaged pieces, many of them costing well over a hundred dollars.

In the last few months there has been a better showing and gradually the cases of breakage due to pure carelessness are being eliminated, but there is still room for cutting down the number of cases which are directly attributable to lax methods on the part of the operator.

The cost of these tools is an important matter and a careless man can destroy, in a moment, expensive tools far in excess of the value of his labor for weeks and months. This has happened on one or two occasions in the last month. Greater than the monetary loss is the fact that it is almost impossible to replace at once many of these high-speed tools which are in such demand. Breaking several of the important implements in succession can lay off a machine and hold up the whole progress here at Willamette.



There was a dead loss of $60 in this end mill. And there is such scarcity that the company often has to make its own

Supply is Problem

The problem of thus supplying nearly 3000 men with proper tools at all times, therefore, is no small problem and is one which can only be solved when every man realizes how much his effort or lack of care may mean to the whole war programme. The tool department must anticipate these breakages and keep the supply of tools ordered for three months in advance, and then it is often impossible to get them when they are needed.

Breakage Responsibility Placed

Tool breakage and tool damage, as far as record is concerned, is reduced to a very simple matter here at Willamette. Every broken tool is accompanied by a "Tool Damage Report." This fully explains the cause of breakage before the tool can be exchanged for a new one, or before the workman can get his check back. These cards are all sent to the machine shop superintendent's office daily, where a careful record is kept both of the tool damage charged to the individual and the segregation of costs against each shift and department. The result of those records is the graphic chart shown here in part.

The final production of any manufacturing plant is limited almost entirely to the working tools with which it supplies its men to do the work. The best mechanic cannot produce good results if he is given a small variety of dilapidated tools. The best results and cheapest production are obtained by high-grade tools in the hands of first-class workmen, and these are the ideal conditions which we are constantly striving to obtain. If the quality of either must suffer, the remedy cannot be found in a poor grade of tools. A workman may be educated, but a cheap tool cannot be improved.

Costly Results Shown

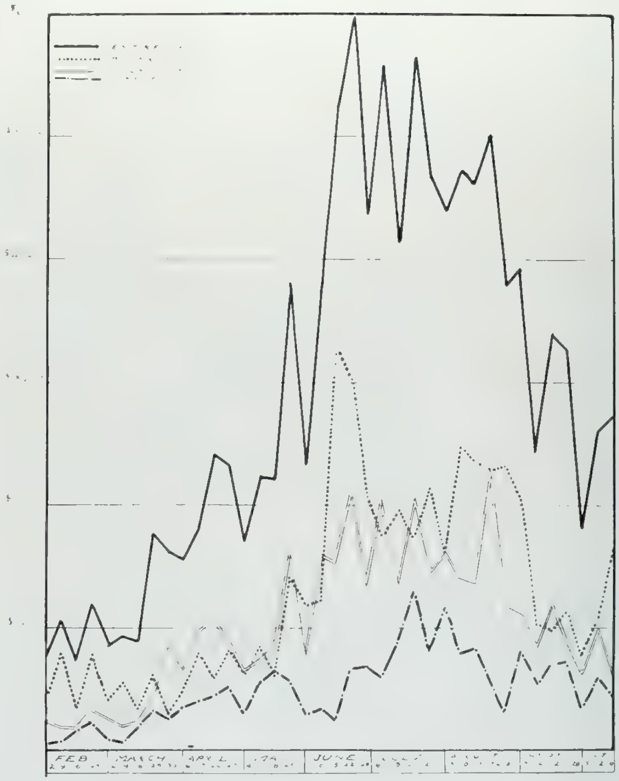
The costly results of putting good tools in the hands of poor workmen are hereby shown in the accompanying photographs, and from these glaring examples it ought to be the aim of every man using tools, both in justice to himself and consideration for his employer, to exercise a great deal more care in the tools given him to work with and thus increase his value to the company as well as reduce a heavy burden of manufacturing expense.

Left: Key seating cutter, value $18. Center: Plate reamer, value $8.25, broken in attempting to force it. And right: Long twist drill, value $22.50, broken when they shouldn't have been.

The tools supplied will stand lots of speed and plenty of feed if used intelligently, but are not designed to stand abuse.

Tools Are Best for Speed

In this connection it might be well to state that tools are selected with an idea of obtaining the highest possible cutting speed metal will stand and for this purpose we are using large quantities of expensive high-speed steel. In addition to the high-speed steel tools which we are able to purchase, we find it necessary to make a great many tools at the plant. For this purpose we have a completely equipped tool-making department fitted with all up-to-date machinery and tempering appliances, where the condition of tools and results of different steels and their treatment are carefully watched and from the results obtained we are enabled to make the proper selection of the brand and grade of steel best suited to the particular work for which it is intended.



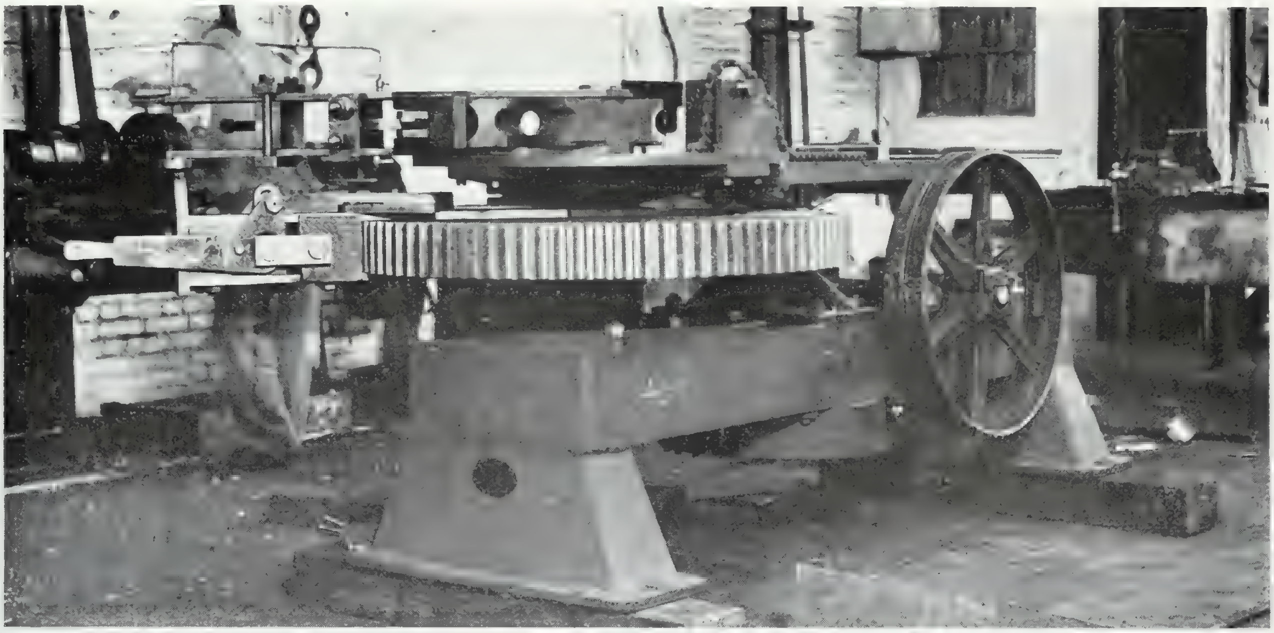
Graphic chart of tool damage, Willamette plant

The tool situation at the plant, as it stands at present, has been developed and perfected by Mr. W. O. Paulson, machine shop superintendent, and his assistant, Mr. H. A. Abbott, who is now in charge.

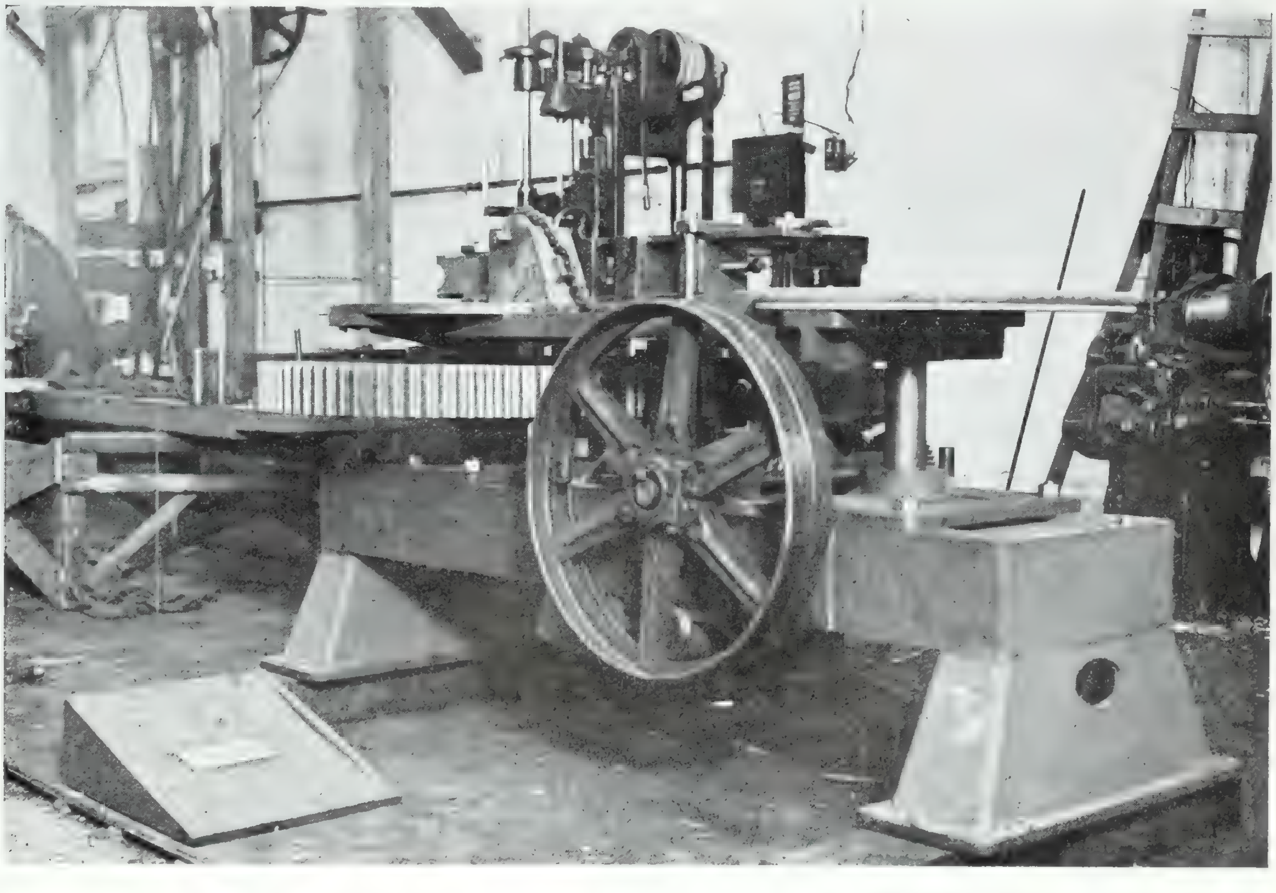
MAY IMPORT WOOLS

Unrestricted importation from Argentina, Uruguay, and South Africa of wools for private account is allowed under a decision of the War Trade Board, effective January 10. Importers will still have to secure licenses for such importations, but licenses will be issued freely for shipment from all non-enemy countries. The removal of restrictions applies to raw wool and wool tops, noils, yarns and waste. For some time all wool imported has been for government account. The accumulated stores are now being offered at restricted auction and it is asserted by the trade that minimum prices are so high that a reaction is inevitable as soon as the Buenos Ayres market is reopened. A report by the Department of Agriculture on the wool manufacturing industry as of December 2, 1918, shows a heavy decrease of activity on government orders. General idleness is not marked, however, some machinery being better engaged than on November 1.

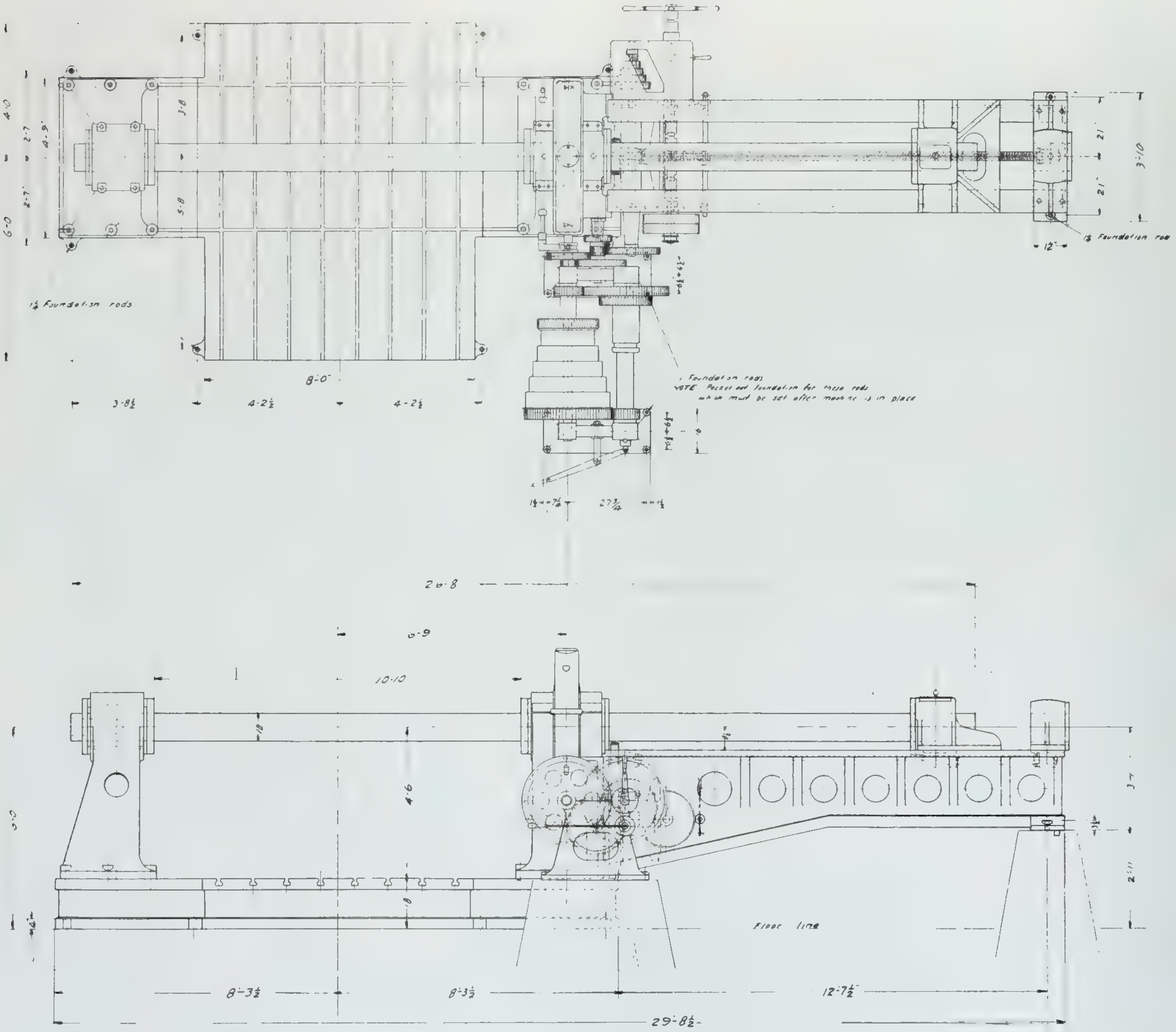
A Powerful Pipe Bending Machine



The peculiar feature of this machine, which enables it to bend pipe of large diameter to curves of small radius without breaking or spliting the pipe, is the straight block former which does the work of bending. The stationary form about which the pipe is to be bent is set concentric with the large gear shown in illustration. The groove in this form is made from 1/16 inch to 1/8 inch deeper than one-half the diameter of pipe. The pipe is clamped at one end in a chain vise and the outside form, whose groove is correspondingly shallow, is placed in position on the arm. This outside form has now a full length bearing on the pipe. After swabbing the pipe with suitable oil, the arm is thrown into mesh with the gear and the outside form block moves over the pipe, pressing it into the curve required. The comparatively long, straight bearing of the former block distributes strains so evenly that, of the thousands of bends made with these machines, not one has developed a buckle or split. One or two instances of clean break have occurred when the metal lacked homogeneity or was crystallized. In fact, the bends, subjected to the same hydrostatic tests as the new straight pipe from which they are made, have never developed a failure. This is a San Francisco machine, built here by the inventors, The U. S. Shape and Pipe Bending Company.



Large Boring Mill Built at Sunnyvale



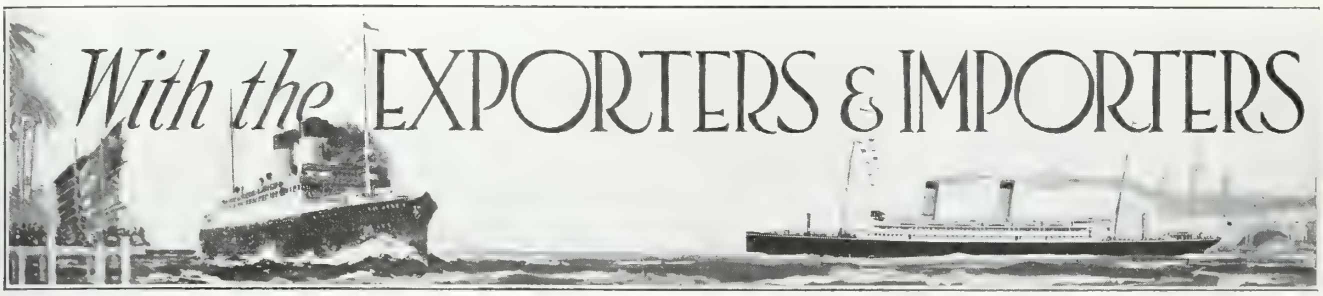
The emergency need for a large number of steam engines in connection with the building of vessels created a corresponding need for machine tools, and many shops that were unable to obtain from tool makers deliveries prompt enough to be of much service were forced to build their own tools. This was especially so where machine tools of large size were needed.

The Joshua Hendy Iron Works of Sunnyvale, confronted with the opportunity of obtaining a contract for building twenty-eight triple expansion engines for the 8800-ton ships building at the Schaw-Batcher Company Ship Works, at South San Francisco, immediately set about reconstructing their plant. Among other machine tools which they were forced to build was the large horizontal boring mill, drawings of which are shown in the illustration above. This mill is capable of boring a cylinder 90 inches in diameter and of facing the flanges on the same. It is driven by a 20 horsepower direct current motor through an open belt, cone pulleys and back gears, and has a variation in speeds ranging from ½ to 11 r. p. m. of the cutting bar, and ten variations in feed, ranging from .03 to .43. This wide variation enables this machine to be used at the safe maximum cutting speed for practically any sized cylinder bore up to the capacity of the machine.

One interesting feature of this tool is that the boring bar is driven through a cast-iron worm and a bronze worm wheel working in oil, and, according to the testimony of the superintendent, this combination increases the working life of both the worm and the wheel, it being found that after a considerable period of hard driving there was no appreciable wear on either.

The mill is very massive in its design and has been found in operation to work with extreme accuracy in both boring and facing operations. The floor space occupied is 11 by 30 feet.

The fact that so many shops in Central California have, when put to it by the emergency, been able to design and construct machines of this character, shows that we have all the possibilities both in resourcefulness and skill to make the San Francisco Bay region the manufacturing center that it should be.



INVESTIGATION OF FOREIGN MARKETS

By Herman Virde.

A GREAT deal of money is wasted every year in export campaigns that fail chiefly because many a firm making its first effort to secure foreign trade neglects to study various markets carefully.

An exporter must familiarize himself with the needs of the people and the conditions under which his goods will be used and bought in far distant markets. Only on this underlying knowledge can he build successfully.

Successful selling depends solely upon pleasing the foreign buyer, and the best way to find out if your goods and service are satisfactory to the trade is to ask and keep on asking.

The following are a few of the questions to be considered in an investigation of a foreign market:

1. Information desired: (a) Questions of fact; (b) Questions of opinion.
2. Methods to be employed: (a) Personal investigations through a number of territorial investigators; (b) gathering information directly by mail.
3. Population of the country and principal cities.
4. Coins and currency.
5. Weights and measures.
6. Import tariffs.
7. Registration of trade-marks and labels.
8. Importation and exportation of the commodity.
9. Domestic production.
10. Total consumption of the article involved.
11. What classes of consumers constitute the market.
12. The number of consumers of each class.
13. The increase in consumption each year during a series of years.
14. How and when are purchases made.
15. Number of actual dealers and jobbers handling the article.
16. Number of possible dealers for handling the article.
17. Names, sales methods, and resources of competitors.
18. Merits and demerits of competitors' goods.
19. Transportation problems.
20. Banking facilities, and length of credit allowed.
21. Factors affecting the rate of exchange and methods of protection.
22. Do surrounding crop conditions affect the demand.
23. What percentage of credit losses should be expected.
24. How credit information may be obtained.
25. Packing for export shipments.
26. Can the product be sold as it is, or are certain changes necessary.
27. If no demand exists can one be created; what is the best method.
28. What advertising pays best.
29. Methods for adjustment of claims.
30. Mail facilities and parcel post regulations.
31. Mapping out the agency territories.

A greater interest is now shown in foreign trade than ever in the history of the American nation. Export institutions have been forced to increase their staffs. Export journals are carrying the greatest total volume of advertising. Universities and associations are starting special courses in foreign trade. Executives of firms whose sales have been confined to the United States are looking abroad, even while their factories are running to capacity on domestic orders.

TRADE WITH DUTCH EAST INDIES

DURING the last four years American merchants suddenly found open to them trade avenues of whose existence they scarcely had been aware, or, if aware, certainly had not interested themselves greatly in. American foreign trade has spread into many countries that formerly dealt almost entirely with Europe; but the war has ended, the nations of Europe will bestir themselves again, and what portion of that new business Amerca will or can keep is one of the most interesting economic questions of the day.

A study by H. A. van Coenen Torchiana, consul-general for Holland in San Francisco, entitled "The Future Trade Between the United States of America and the Netherlands and Its Colonies," becomes therefore quite apropos at this time. The pamphlet is being distributed by the Holland-American Chamber of Commerce.

German Submarines Did It

The writer divides his booklet into four chapters: psychological factors, trade with the mother country, with the Netherlands East Indies, and with the Netherlands West Indies. With the third of course the Pacific Coast is most concerned. Although it may not be pleasing to American exporters to be told that they neglected the Malay trade before the war, they will have to acquiesce in the statement that "war conditions suddenly changed the whole situation. This was not due by any means to the foresight or energy of the American merchant, but to the activities of the German submarines and the inability of the Netherlands merchant marine to follow its customary trade routes, first through the Suez Canal and afterwards around the Cape of Good Hope and Durban."

What this trade, thus suddenly and literally thrown into the lap of America, amounted to is summarized in two tables, one of which shows the exports from the United States to the Dutch East Indies and the other the imports. Briefly, the United States imported goods to the value of $6,-

221,954 in 1913 and $62,011,236 in 1917; and exported $3,151,603 in 1913 and $21,139,305 in 1917. San Francisco's share of the 1917 imports was $18,294,183, and of the 1917 exports, $5,501,859.

These increases are huge. It is true that the trade balance was much against the United States, and that the Dutch possessions have found us a valuable customer, but it is to be remembered that the war altered radically many established trade conditions—rubber and sugar, for examples—and, in any event, there are the figures of 1913 and 1917 to demonstrate to the Pacific ports just what the new trade has meant to them.

That Word "Unless—"

Banking, ships and American capital invested in the East Indies will aid the country to hold its commerce, the writer believes. After citing examples of ante-bellum trade conditions, the question is asked:

"Are these conditions going to return?"

And the answer:

"Yes, they will, to a large extent, unless American merchants and American capital will take more interest, not only in the trade of these articles, but also in their production. They must take a kindly interest in these colonies and their industries, and not merely figure what they can make on a 2½ or 5 per cent commission business. If they don't, others will."

And, by no means of least importance, there is no reason why American shipowners could not find the East Indies trade highly profitable.

STEEL MANUFACTURERS COMBINE

THE organization formed by the independent steel manufacturers to handle their export trade has been incorporated in the State of Delamare with a capital of $10,000,000. Active business was started January 2 with the opening of general offices in the City Investing Building, New York.

The Consolidated Steel Corporation, which is the name finally adopted, will be the exclusive agency for exporting the merchant iron and steel products of the following companies:

Bethlehem Steel Company, the Brier Hill Steel Company, Cambria Steel Company, Lackawanna Steel Company, Republic Iron and Steel Company, Sharon Steel Hoop Company, the Trumbull Steel Company, Whitaker-Glessner Company and the Youngstown Sheet and Tube Company.

Annual Output 12,000,000 Tons

Together these companies control more than one-quarter of the steel making capacity of the country and their annual ingot capacity is about 12,000,000 tons. It is expected that other companies will join, until substantially all important steel producers of the country, outside of the United States Steel Corporation, will be represented.

The president of the organization is E. A. S. Clarke, who resigned from the presidency and directorship of the Lackawanna Steel Company in order to devote his full time to the new enterprise. H. H. Barbour, the vice-president, was formerly with the Lackawanna Steel Company, and the same is true of L. W. Hesselman, secretary and comptroller, and A. Van Winkle, treasurer. Mr. Hesselman was comptroller of the Lackawanna Company, and Mr. Van Winkle was secretary to Mr. Clarke when he was at the head of that concern. The traffic manager is William Heyman, formerly foreign freight agent for the Delaware, Lackawanna and Western Railroad.

The board of directors consists of the heads of the constituent companies.

To Open Foreign Offices

Foreign offices are to be opened and representatives appointed to cover every part of the world where American iron and steel products are usable.

The launching of this company, the first among the steel producers under the Webb Bill, which gives the right to combine and cooperate in export trade, marks the beginning of a broad constructive work. This will benefit not only those directly interested, but the whole country; and should receive the hearty support of all who believe in the value to the United States of an increasing foreign trade in manufactured articles.

TRADE COUNCIL TO MEET

The National Foreign Trade Council will hold its sixth national foreign trade convention at the Congress Hotel, Chicago, Thursday, Friday and Saturday, April 24, 25 and 26. The formal call will be issued shortly by the chairman of the council, James A. Farrell, president of the United States Steel Corporation.

In the past these conventions have drawn an increasingly large number of prominent business men of the country, representing all forms of industry, commerce, finance and transportation. To these now will be added the representatives of labor. In this way the delegates are supplied with a broad view of the business situation, with specific information to meet their individual needs, and with advice and inspiration for the coming year.

The convention in April will deal with foreign trade as a factor in stabilizing American industry —problems involving the conversion of war industries to the needs of peace; development of our foreign trade to provide employment for our soldiers, sailors, and war workers; and the formation of a definite policy dealing with the future of our new shipping.

The procedure of the convention will be along the lines that have proved so successful in the past: general sessions with prepared papers by the leading authorities, followed by discussion; group sessions, consisting mainly of discussion, in which the special interests of different types of business are treated; individual conferences with government representatives and trade advisers.

It is expected that the attendance this year will be unusually large. There is a growing realization throughout the country that foreign trade is essential to continued prosperity, and many concerns are turning to the foreign field for the first time. For these the convention offers an unusual opportunity to profit by the experience of older export firms and to learn the general policies of the country in respect to foreign trade.

University Opens Trade Course.

The University of California, Berkeley, has just started a lecture course in foreign trade. The course will be conducted by Herman Virde, who has had many years of practical experience in oversea markets.

Lessons from Pre-War International Trade

By Arthur W. Robinson,
Managing Director, Gaston, Williams & Wigmore, London, England

SHOULD it develop that the Allies are as little prepared for peace as they were for war, it will mean that a terrific commercial struggle confronts them, and that the lessons of the war have not been thoroughly learned.

What have the merchants and manufacturers of the Allied countries done toward adequate preparation for the post-war international trade, the control of which was undoubtedly one of the compelling purposes that led Germany to take up arms with scant excuse and no reason? And what are these Allied countries doing right now in this respect?

Volumes have been written about the glittering opportunities that will exist for the Allied and Neutral countries, to increase their foreign trade after the war in those markets formerly largely supplied by Germany. Most of us know in a general way that Germany, keenly alive to the wealth-producing possibilities of foreign trade, has for years been diligently fostering her own by every means she was able to conceive. As a result, when the war broke out, German ships were in every port, German goods in every market, and her foreign commerce was increasing by leaps and bounds. The full extent, however, to which she prospered through her efforts is not so well known, so comparative figures should prove extremely valuable as guides for the Allies in planning for the future.

Surprising Trade Facts

No single instance is more striking than the remarkable increase during the five years immediately preceding the war in the trade between Great Britain and Germany, as contrasted with that between the United States and Great Britain.

Between England and America the commercial ties are naturally very close because of the same language, identical standards of weights and measures, similar commercial practices, and to a large extent the same general customs and ideals. Commercial announcements and advertisements in the printed mediums of each country circulate readily and are easily understood throughout both countries. Each knows in general the good points and advantages of the products of the other. This renders "campaigns of education" unnecessary.

Then, too, there was the tie of shipping. The finest long-distance transportation service in the world before the war was that between New York and the British Isles when two pounds of freight could be carried from New York to Liverpool for one cent. These sundry mutual advantages should have precluded even the poossibility of any other country making inroads on the volume of business transacted by them. However, the cold figures prove beyond dispute that these advantages availed them very little indeed in conserving their trade interests.

On the other hand, no special predilection existed for German goods in either England or America. German manufacturers had to contend with the difficulties of a different language, different weights and standards, and to some extent, distrust. Trade conditions in other lands and markets did not always leave a high regard for German goods or German methods. Quite to the contrary, both her goods and methods frequently proved unsatisfactory and created widespread antagonism. Her iron-willed persistence, however, went far toward nullifying these self-imposed handicaps.

Surprising as it may sound, the total trade between Great Britain and Germany showed a percentage increase for 1913 over that of 1909 that was two and a half times as great as the percentage increase of the total trade between Great Britain and the United States during the same period.

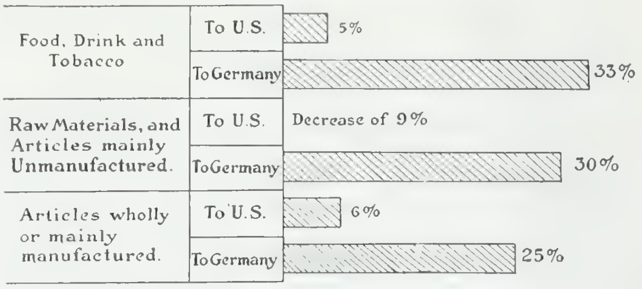


Diagram 1

The diagram, No. 1, shows the comparative percentage increase in value for the year 1913 over 1909 of the principal classified exports from Great Britain to the United States and from Great Britain to Germany.

In the principal classified exports, "food, drink and tobacco," $19,000,000 went to the United States from Great Britain in 1909, $20,000,000 in 1913, or a gain of only five per cent over 1909. Germany received from Great Britain $24,000,000 in 1909 and $32,000,000 in 1913, an increase of 33 per cent. "Raw materials and articles mainly unmanufactured" to the amount of $120,000,000 went to the United States in 1909, which was reduced in 1913 to $109,000,000, an actual loss in American trade of nine per cent. Germany took $87,000,000 in 1909 or $33,000,000 less than the United States, but in 1913 she took $113,000,000 or $4,000,000 more than the United States.

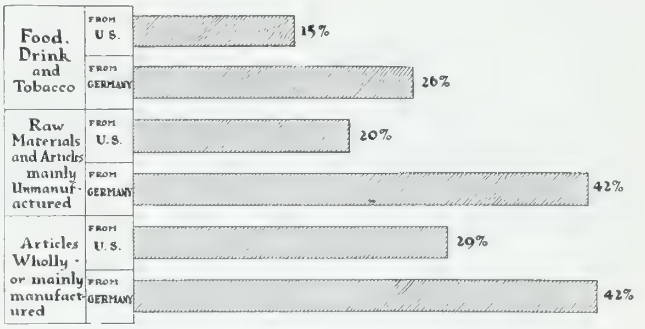


Diagram 2

The diagram, No. 2, shows the comparative percentage increase in value for the year 1913 over 1909 of the principal classified imports into Great Britain from the United States and from Germany.

In classified imports it is interesting to note that while the United States produces so much of the world's "food, drink and tobacco," the importation into Great Britain of these articles from America increased from $220,000,000 in 1909 to $252,000,000 in 1913. Germany, sending $65,000,000 of the same products in 1909, increased it to $82,000,000 in 1913, a gain of 26 per cent as against a 15 per cent increase for the United States. Germany increased her imports of "raw materials" from $197,000,000 in 1909 to $281,000,000, or 42 per cent in 1913. The United States, sending $269,000,000 in 1909, increased her import into Great Britain in 1913 to $322,000,000, or 20 per cent, a percentage increase less than half as great as Germany's.

The Past and Future

In looking back over these increases in Germany's trade with her chief commercial rival in the pre-war days, the British merchant may console himself with the knowledge that in 1913 Great Britain at least exported, both to Germany and the United States, more manufactured articles than she imported.

But the past is past! Now, what about the future?

Before the countries of the world, particularly those which have fought together as comrades in arms, looms a great opportunity. Men from a score of nations, from every continent, have fought together in a common cause, become intimately acqainted and have come to respect each other. Readjustments of international trade naturally enough will prove one of the inevitable results of the war. Ultimately the race will be won by the swiftest runner—the nation most alert, most aggressive and fully prepared to give to every customer the best goods at lowest prices and on the most favorable terms.

FREIGHT REPORT

Conditions of the freight market are still undetermined, as the government situation has not yet been cleared up. There is every indication that the shipping board will gradually cease control of American tonnage. A few weeks ago it announced officially that it had ceased to have jurisdiction over any vessels put on the berth or on trip charters to different parts of the world, but that it would still insist that its approval be asked for any time charters made. This was followed, a week or so later, by a proclamation that all steamers under 4000 tons were to be given wholly into the hands of the owners to charter as they please, and more recently the board announced that all American steamers not actually engaged in war service would be given, on their return to a United States port, into the control of the owners.

Buyers Holding Back.

The general feeling is that we shall see lower rates of freight because the buyers of cargoes of merchandise, lumber, etc., expecting lower rates, are holding back. Even the Japanese freight market, which has ruled higher than in any other part of the world, is already feeling the effects, and letters we have under date of December 31, from Japan, state that the cessation of hostilities caused a near panic amongst charterers and speculators who had been paying high rates for their steamers on time charters.

Nitrate and ore charters from Chile are weaker. The last rates paid on the steam schooners Bee and Solano from Chile to Tacoma, with ore, were [illegible] a ton; the steam schooner Fred Baxter, nitrate to Honolulu, $22.50; and sailer Belfast, also to Honolulu, $17.50 a ton.

Lumber freights from the North to Chile are down to $42.50.

No charters have been made to Australia, but we quote $40 to $42.50 a thousand to Sydney, and $5 and $6 higher to Melbourne.

Captain Whitney Buys Benicia.

To Africa there has been one transaction—barkentine Benicia, chartered to Beira by G. W. Gates & Company at a reported rate of 320 shillings a thousand. The Benicia has been sold by former owners to Captain Whitney for $71,000, and he also is reported to have bought the bark Albert for $50,000.

The Robert Dollar Company has bought the barkentine Jane L. Stanford on private terms.

Norwegian steamers are now beginning to ask for offers on time charter for from one to ten years, but no business has resulted so far.

We have no doubt that business will commence again soon on normal lines in the way of time chartering for future business, but just at the moment owners' and charterers' ideas are too far apart.

PAGE BROTHERS.

OIL IMPORTERS MOVE TO NEW YORK

The headquarters of the oil department of Rogers Brown & Company is being moved bodily from Seattle to New York.

The changes brought about by the war and the cessation of hostilities have made it necessary for the firm to place its oil department headquarters in New York City.

The New York office, located at 46 Cedar street, in the past has handled the oil selling in the Atlantic coast territory, and now will also have direct supervision over all oil purchases and sales, domestic and foreign.

Cabling to and from the Orient, Europe and other parts of the world will be handled direct by New York. This will considerably decrease the time required for the transmission of messages to producers and customers, and places the men who are directing the oil marketing facilities of Rogers Brown & Company within easy access of their customers.

The general headquarters and home office of the company still remain in Seattle, where the shipping, bulking and handling generally of all oils and imports and exports are taken care of.

Before transferring the oil department headquarters to New York, the matter was thoroughly canvassed with the Oriental shippers, who supply most of the oil handled by Rogers Brown & Company, and with the large and growing clientele of this company in the East and Middle West, and it was the concensus of opinion that this clientele and its requirements and the European customers of the company would be best served by having the headquarters located in the heart of the Eastern markets.

H. H. Hardwood, manager of the oil department, will depart for New York within a few days to install the various required accounting, cabling and other systems, which he has developed and which have worked so successfully here on the Coast. Mr. Harwood expects to remain in the East for about ninety days.

SAN FRANCISCO

The announcement from Washington that the government had decided to release all requisitioned vessels except those in the service of the War Department or engaged in other war work was better news to the freight lines than to the passenger.

The announcement offers small consolation to companies whose passenger liners were taken over for use as transports. Presumably, such vessels are within the class of those excepted as being in war department service. Until these vessels are returned and refitted, passenger travel from San Francisco, especially for Honolulu, probably will remain congested. The three big passenger carriers of the Matson line, the Maui, the new flagshp; Matsonia and Wilhelmina, and one of the Oceanic Company's Hawaiian-Australian liners, the Sierra, are being used as transports. After release, quite a time will be required to refit them.

American-Hawaiian First

It is estimated that 360 vessels, of about 2,500,000 deadweight tons, will be released. The American-Hawaiian Steamship Company is first with sixteen vessels of 171,000 deadweight tons. The Luckenbach Company, with twelve of 116,400 tons, and W. R. Grace & Co., with ten of 75,600, are other lines whose steamers are affected.

Most of the vessels were taken over in October, 1917. The announcement by the Shipping Board was:

"Through its division of operations the United States Shipping Board today (January 16) announced the release of all American-owned steamships from requisition charter, excepting those in the service of the War Department or employed in other Government service. In the case of these the owners are given privilege to obtain from the Shipping Board steamships of equal tonnage which they will be permitted to operate on their own account.

"In a telegram sent today (January 16) to representatives of the Shipping Board in various cities John H. Rosseter, director of the division of operations, gave instructions that the releases are to begin immediately after the vessels affected by this order complete present voyages at ports of the United States.

May Get Equal Tonnage

"The cablegram follows:

"'Pleased to announce board has authorized release all American-owned steamers from requisition charter except those in war or other government service, and in the latter case owners are privileged to obtain board steamers of equal tonnage for operation of their own account. Releasing begins immediately after arrival and completion of present voyages at American port. Advise four agencies and press, also Chamber of Commerce'."

There are many bids for allocation of government vessels, particularly by companies whose vessels are being held in government service.

Persia Maru Returning

One of the first of the old trans-Pacific steamers, taken for war service on the Atlantic, to reappear in these waters is the Toyo Kisen Kaisha steamship "Persia Maru," formerly under the Pacific Mail flag, which, turned over by the Toyo Kisen Kaisha to the United States Government, has been released. She will load at San Francisco early in February for the Far East, resuming her regular place in the trans-Pacific schedule of the T. K. K.

Barge Mohican is Old Sailer

The barge "Mohican," purchased by the state for a vegetable oil carrier, is the same "Mohican" that formerly, as a bark, was under command of Captain C. W. Saunders, port superintendent of the Matson Navigation Company. The "Mohican" was built at Chelsea, Massachusetts, in 1875. Ap-

A busy scene at the W. F. Stone Shipbuilding Company's plant, Oakland parently, she ended her service some years ago, when she was laid up in Pearl Harbor, near Honolulu, but was repaired and used as a molasses barge by the Matson line at Honolulu and Pearl Harbor. In the forty-four years of her existence the "Mohican" has had a noteworthy history. She is 160 feet in length, 35.2 beam and 19.9 deep.

Captain Emery Rice Dead

Captain Emery Rice, well known in many Pacific ports as master of the steamship Mongolia when she was under the Pacific Mail flag, died in New York City early this month of pneumonia and was buried at Arlington, Washington, D. C. When the liners of the old Mail Company were withdrawn from the Pacific after the passage of the Seamen's Act, Captain Rice took the Mongolia, the last of the vessels to leave these waters, to the Atlantic. She was used as a general cargo-carrier until the outbreak of war between the United States and Germany, when she became a Government transport. The first encounter between an armed American merchantman and a German submarine was reported by the Mongolia as having occurred April 19, 1917, the submarine being sunk. At different times later Captain Rice figured in news dispatches.

Captain Rice was born in Seattle. Most of his Pacific service was on the liners China and Mongolia.

Committee to Advise Board

An advisory committee on foreign commerce, to confer and advise with the State Board of Harbor Commissioners, has been appointed by J. H. McCallum, president, and held its first meeting with the board last month. The organization of the committee will be permanent. The members are:

Captain Robert Dollar, Robert Dollar Steamship Company; Major C. L. Tilden, Over and Transfer Company; H. S. Scott, Associated Terminals Company; S. M. Haslett, Haslett Warehouse Company; Capt. J. H. Bennett, Goodall & Bennett; William H. Hammer, Hammer & Company and president Foreign Club; J. R. Hanify, chairman Maritime Committee, Chamber of Commerce; A. M. Newhall, H. M. Newhall & Company; Charles J. Bentley, California Packing Corporation; J. A. Rholfs, Standard Oil Company; Fred Samuels, J. D. Spreckles & Bros. Company; M. J. Brandenstein & Company; R. C. Reid, Balfour, Guthrie & Company; Y. Nagashima, Mitsui & Company; C. A. Thayer, representing Shipowners' Association of Pacific Coast, and president of the E. K. Wood Lumber Company; William P. Roth, vice-president and general manager of Matson Navigation Company; Captain John Barneson, China Mail Steamship Company; K. Doi, Toyo Kisen Kaisha; George C. Boardman, Chamber of Commerce.

Steam schooner San Pedro

Alterations under way, S. S. San Pedro

Nathaniel B. Phillips, freight agent for the South America-Pacific Line, died of pneumonia, following influenza, in January. Mr. Phillips was thirty-two years old and is survived by a widow and mother.

Steam Schooner Altered

The well known Pacific Coast steam schooner San Pedro is undergoing extensive alterations, having been sold through Welch & Company of San Francisco to the Campania Nivera of Manila, to be used in the general freighting business.

The San Pedro was built by J. Lindstrom at Aberdeen, Washington, in 1899, and outfitted by the Fulton Iron Works with a compound 14-inch by 32-inch by 24-inch steam engine. The vessel is 163 feet long by 34 feet beam by 11.7 feet deep, and carries about 400,000 feet of lumber. She has lately been in the service of the Gulf Mail Steamship Company, carrying general freight between Mexican ports. The alterations include extra fuel tanks and the installation of a raised deck. This work is being done by the Barnes & Tibbitts Shipbuilding & Dry Dock Company to plans prepared by D. W. and R. Z. Dickie.

Prize Court Condemns Goods

Condemnation of large quantities of dried fruits, shipped by Rosenberg Brothers & Co., San Francisco, seized by or sold at the order of the British prize court, has been ordered. Costs of court were assessed against the claimants. The goods were valued at about £25,000 and were shipped from America to various Scandinavian ports. In giving judgment, the president of the court said in part:

"Rosenberg Brothers & Co. are a firm composed of three brothers, Max, L. Abraham and Adolph Rosenberg, all according to the affidavit of Max Rosenberg, native-born American citizens, who carry on business as dried fruit merchants, having their principal office at San Francisco, California.

The Crown's case was that all these goods were in fact destined for a firm called Boecker & Berkefeld, dried fruit merchants, of Hamburg, and that they were on a continuous voyage, via the various Scandinavian ports to that firm at Hamburg, which, as was decided by the late President, is a base of supplies for the German armed forces, and, being foodstuffs, and therefore conditional contraband, they were liable to condemnation.

"It was stated by Mr. Greenwood in his evidence on behalf of the Crown that Rosenberg Brothers & Co. were in close business relations with Boecker & Berkefeld, and that the latter acted as the confidential agents of the former for the sale of dried fruit in Germany. It was admitted by the claimants that they had had agents in Germany."

Cappy Ricks on Stage

San Francisco's best-known shipping man, Cappy Ricks, has appeared on the New York theatrical stage. New York theatrical notices are not flattering. The New York Journal of Commerce says,

"Last night's audience seemed pleased by the play, but, frankly, there have been few worse examples of playwriting seen in New York this season. Edward E. Rose was the dramatist.

"Two actors more widely different than Thomas Wise and William Courtenay from the Cappy Ricks and Matt Peasley of the stories would be hard to find, and all the more credit is due Mr. Wise for making the role as engaging as it is. Mr. Courtenay is just Mr. Courtenay, a graceful, finished actor. The love story of Peasley and Florence Ricks is pitchforked into the first act and played hard all the way through. That may be excusable, because the public demands what is called love interest. But the disconnected, unconvincing way in which the business part of the play is handled is not excusable. It is not convincing for a minute and it is doubtful if anyone in the audience could have told last night what the deal was about which there was so much talk about. Neither the story of the play nor the characters in it were the creation of Mr. Kyne."

Teak Cargo Coming

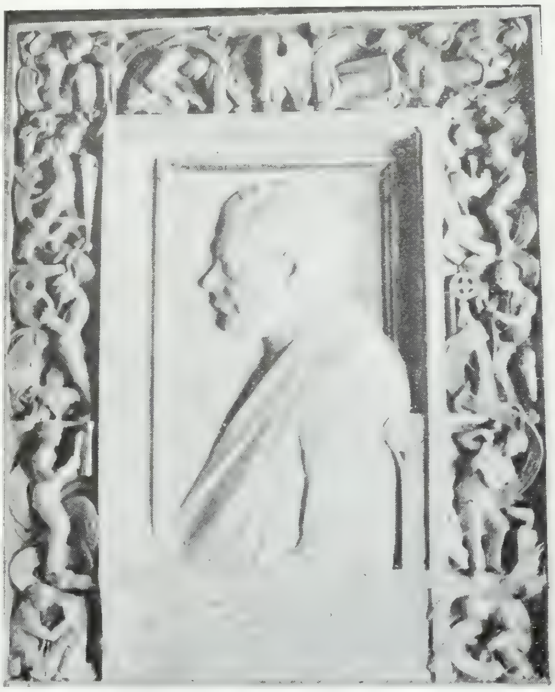
A cargo of teak, aggregating some 700,000 feet, is being imported by J. H. Dieckmann, Jr., 519 California street, who specializes in the importation of hardwoods. Of the cargo, 500,000 feet is in planks, two inches thick and up, in a large assortment of thicknesses, widths and lengths. Two hundred thousand feet will be in logs, 14x14 inches and up and from fifteen to thirty feet long. All the lumber is A-1 Siamese teak. The value of the cargo is nearly $250,000. The insurance premium exceeds $10,000. Mr. Dieckmann expects to interest American shipbuilders in the use of teak for vessels, for parts of which, especially decks, the Orientals use it very largely.

May Import Chrome Ore

The restriction on the importation of chrome ore or chromite has been lifted by the war trade board. Licenses will be issued, when applications otherwise are in order, for importations from any country. For San Francisco this is most important as regards importations from New Caledonia. Manganese ore also may be imported from Asia and Australasia. Monazite sand, copper ore and copper concentrates also may be imported. Announcements of the lifting of these restrictions were made January 15.

A Master Shipbuilder

O. B. Kibele, superintendent of the Schaw-Batcher Shipbuilding Yards, South San Francisco, is one of the "live wires" among Pacific Coast builders. He went from the Union Iron Works to the Schaw-Batcher plant October 1, 1918, and has averaged a launching a month since. The yard was started in November, 1917, and has four ways. Four more vessels will be ready for launching during the next four months, which is remarkably good work for a four-way yard.


O. B. Kibele

Mr. Kibele had been superintendent of transportation of the Union Oil Company prior to becoming superintendent of the Union Iron Works. During the disturbances in the Philippines he was chief engineer of an American man-of-war. Just as many of the present generation of shipbuilders and operators have done, Mr. Kibele went to deep water from far inland, having been born in Northeastern Ohio. He is a member of the American Society of Engineers, the Press Club, the Society of Naval Archtects and Marine Engineers and Transportation Club of San Francisco.

The bas-relief of Mr. Kibele is the work of an employe of the Schaw-Batcher yard. The frieze represents some of the many classes of workmen employed on a steel vessel. That a workman of the yard could be found able to execute the relief shows what a remarkable diversity of men have been drawn into building ships to defeat the Hun.

Haviside, Withers & Davis of San Francisco recently obtained an order for the fitting out and complete rigging of twenty ships being built by the Foundation Company at Victoria, B. C., on account of the French government. This is the biggest order of its kind ever taken on the Pacific Coast.

C. K. Howe, of Weeks, Howe & Emerson, ship chandlers, San Francisco, has just returned from a six weeks' trip East, where he visited seventeen different cities between San Francisco and Boston, arranging for contract supplies for the ensuing year.

By Special Correspondent

THROUGH an order made effective January 15, whereby ten of the wood steamers constructed in the Oregon District were to be assigned to operators on the Atlantic Coast, it is believed a start has been made in a new apportionment of tonnage that will obviate the necessity of using the harbor as a mooring ground for more than forty carriers that would otherwise have been laid up. The first four ships were turned over to the Pacific Steamship Company and Sudden & Christenson to be loaded for the other coast. The remaining six are expected to be assigned in the same manner.

Steps have been taken by the Chamber of Commerce to place before the Oregon Legislature, now in session, a bill for the amalgamation of the Port of Portland Commission and the Commission of Public Docks. The Port of Portland Commission is organized under a state charter and its district embraces slightly more territory than the city of Portland, and its functions are to maintain a channel, a drydock, the towage and piloting service at the entrance to the Columbia River, and to provide bunkering facilities and the like, whereas the Commission of Public Docks controls municipal docks and the St. Johns terminal, and has plans for extensive betterments, including a 12,000-ton drydock. One motive for the move to consolidate is the wish to have more economical administration and centralize the port work.

Would Improve West Channel

One plan taking shape at Portland is the improvement of the west channel leading from the harbor, which may involve the purchase of Swan Island, a tract containing about 270 acres. There are those who advocate the removal of the island by dredging and the use of the material in filling low land on both sides of the river. Others favor using the property for terminal purposes. What will be done will depend largely on the price asked for the island.

Colonel Charles J. Taylor, until recently in command of the 320th Engineers, has reported to Colonel Geo. A. Zinn, of the Corps of Engineers, in charge of the First and Second Portland Districts, as military assistant. During the war Colonel Zinn was directing all river and harbor work here and the coming of Colonel Taylor is accepted as meaning that the War Department is to fill up its organizations again for peace-time operations.

Ensign [illegible] R. Jones, son of W. J. Jones, well known shipping man and stevedore, visited his parents in Portland during the early part of the month, en route to Mare Island to join one of the new destroyers ordered to Newport News. Ensign Jones was detailed as torpedo officer, and by the time the trip is ended he expects to be made a lieutenant, for which he has been recommended.

Cokesit Last Big Launching

Although the all-star launching at steel shipyards the last of the year was that of the Cokesit, at the new Standifer plant, Vancouver, other yards made features of the floating of the last vessels. The Standifer launching took place at 3 p. m. on December 31, and was important because of the fact that it was the first of the 9500-ton hulls to go overboard. Miss Ruth Standifer, sister of Guy M. Standifer, president of the corporation, was sponsor. The Cokesit was not only the largest steel ship ever set afloat on the Columbia or Willamette Rivers, but was launched with as much ease and as successfully as though scores had been sent from the ways.

The final launching at the Columbia River Shipbuilding Corporation's plant was at 4:45 o'clock the last afternoon of the year, the hull of the West Corum being sent down the ways. Miss Marion Bowles, daughter of J. R. Bowles, president of the Northwest Steel Company, christened the big ship. C. D. Bowles, vice-president of the Columbia River plant, is her uncle, so the young miss had added interest in the ship. The West Corum was the thirteenth hull to leave the ways there, the first, the "Westward Ho," having been floated November 19, 1917. The force floated twelve hulls and delivered twelve during 1918, an average of one a month.

At the Albina Engine & Machine Works the concluding event for the old year was the floating of the hull of the 3800-ton steamer Jacox. Mrs. Fred B. Pape, wife of the assistant manager of steel ship construction for the Emergency Fleet Corporation, was sponsor.

Launch With Masts in Place

"Jim" Clarkson, manager of the North Portland wood ship yard of the G. M. Standifer Construction Corporation, is to launch the hull of the steamer Wabanaquot with her masts and rudder in place, while all other work will be advanced as far as possible, except the main machinery. It will be the first time in the history of vessel construction for the Emergency Fleet Corporation on the Pacific that a carrier has gone overboard with her masts stepped and with such a high percentage of all work completed.

Mrs. Kenneth Beebe, sister-in-law of Walter B. Beebe, vice-president of the Northwest Steel Company, christened the steamer "Tacook" January 14. It was the twenty-second hull to be completed at that yard.

Announcement has been made that the International Shipbuilding Company, which last year laid out a plant at Columbia City, would undertake the construction of a 1600-ton top-mast schooner for

Miss Ruth Standifer, who christened steamer Cokesit

Portland investors, headed by Alfred S. Rex and R. T. Lyng. She will be the first of the private contract vessels undertaken in Portland since the armistice was signed. The vessel is expected to carry 1,200,000 feet of lumber and will be 190 feet long, beam 36 feet and 19 feet deep. The intention is to have her built under specifications of the Bureau Veritas. The schooner is to cost about $175,000, and it is said she has already been chartered for lumber to Sydney at $42.50, with the option of Melbourne at $48.00.

As the Port of Portland tug Wallula was undergoing annual inspection January 16, the wood tug Samson, built here twenty years ago, was leased for a few days. The Samson was constructed with diagonal planking over the frames, the same system as has been followed in building the Ballin type of composite ships, and it is held by her owners that the diagonal planking has been a material advantage. The Samson has been used principally in outside towing.

Seek State-Owned Boat

After having been in service several months off the Oregon coast as a fishing vessel, by means of which catches of halibut have been delivered to one Portland municipal market, the pilot schooner Joseph Pulitzer has been ordered returned to the Port of Portland Commission so she can be overhauled and made available for the pilots at the entrance to the Columbia River. There is a movement afoot to obtain a state-owned pilot boat, which will come up before the present session of the Legislature.

Mrs. Fred B. Pape, who christened steamer Jacox

About $50,000 is to be expended by the American Marine Iron Works in the establishment of a fitting-out plant on property adjacent to the St. Johns municipal terminal, where the Commission of Public Docks plans to place a new drydock.

Under the terms of a new order issued there will be no additional steel ships turned over to the Navy after January 31. The last of those building at Portland to be sent was the West Compo, delivered January 20, built by the Northwest Steel Company. The expectations are that the Government will begin to assign steel carriers more freely to some of the Pacific lines, which are now short of tonnage.

Portland and the Columbia River district bade adieu, January 18, to the United States dredge Chinook, which left for Charleston, S. C., to undertake a large harbor project. The Chinook was sent West in 1902, after being converted from the transport Grant.

Holding the record for having been the longest on the ways of any wood ship in the Oregon district, the hull of the Bedloe was floated at Tillamook, January 7. She was ordered towed to the Grant Smith-Porter yard here for the installation of her machinery. It is understood that Feeney & Bremer, owners of the Tillamook plant, have decided not to build any more vessels of such size.

Withdraw from Macy Agreement

Delegates from Pacific Coast cities assembled in Portland the second week in January in attendance at the Pacific Coast District Metal Trades Council, one result of which was a decision to withdraw from the Macy wage agreement by April 1, when it is proposed to enter into agreements directly with the employers. After February 1 the forty-four-hour week will apply at all Coast cities on shipwork. The forty-four-hour week, which means Saturday half holidays, has been in effect among Portland steel workers for the last few months and was made effective by men in the wood ship yards the latter part of December. Employers refuse to recognize the curtailed time and the yards are kept open in conformity with provisions of the Macy agreement for forty-eight hours' work.

Labor conditions in Portland shipyards were such at the close of January that only machinists and boilermakers in limited number could be placed in steel plants; while at wood ship yards men continued to be discharged.

For a few hours January 10 the torpedo boat Goldsborough was in the harbor from Puget Sound. The ship was built at Portland in 1898-99 by Wolfe and Swicker, who also turned out the steamer Kvichak of the Alaskan salmon fleet, when steel-ship construction was active.

H. F. Alexander, president of the Pacific Steamship Company, and A. F. Haines, vice-president and general manager, were here early in the month and inspected Portland's new terminal at St. Johns, where the first slip and pier are completed so that vessels can berth there if necessary. The officials were frank in saying they were inspecting with a view to familiarizing themselves with facilities in connection with the proposed Oriental line service.

To Buy in Portland

An important change in the organization of the Emergency Fleet Corporation during the month was that of providing for the purchase in Portland of all supplies for the Oregon district, whereas in the past they had been looked after at Seattle. H. I. Morrison is in charge of the department as disbursing agent.

On a mission having to do with probable changes in the design of the 8800-ton steel ships, Portland was visited early in January by R. L. Hague, head of construction and repairs for the division of operation of the Shipping Board; H. C. Sadler, naval constructor for the board; R. Prior, assistant to the manager of steel ship construction, and Captain J. F. Blain, manager of steel ship building in the Northwest. The party conferred with officials of the Northwest Steel Company and the Columbia River Shipbuilding Corporation, and it is expected that, although the lines of hulls will be made finer, shelter decks will be recommended so that the vessels will not lose their deadweight capacity.

$2,500,000 Worth of Boilers

Boilers constructed during the past year by the Willamette Iron & Steel Works represent a contract valuation of approximately $2,500,000, and the same character of work closed and in prospect for 1919 is estimated at $4,000,000. When it is realized that in addition to handling such an amount of marine business the plant also did a normal year's work in providing the spruce production board with 150 donkey engines with which to get out logs from the woods of the Northwest to be cut into aeroplane stock, it shows how production has been increased.

The plant has a force of 2500 men. Payrolls and salaries for the year reached $3,500,000. In operating in conjunction with the Northwest Steel Company to the extent of handling all machinery installation and completely fitting out 8800-ton steel hulls launched by the former, the Willamette Iron & Steel Works finished sixteen of the fleet during the year, so that, while the Northwest interests hold the contracts from the Emergency Fleet Corporation, the Willamette plant has fulfilled about 45 per cent on each ship.

Supplies Coast Yards.

The maximum monthly boiler capacity at the plant is twenty boilers. In 1918 there were actually 127 boilers tested and, had it been possible to obtain adequate supplies of boiler manufacturing material at all times, the plant would have kept up its maximum production. The showing has given the organization the reputation of being the largest producer of boilers in the United States.

Besides having built all boilers that were installed in the ships launched by the Northwest Steel Company, it manufactured those for the 3300 and 3800-ton steamers turned out by the Albina Engine & Machine Works, also shipped fifteen to the Union Iron Works, nine to the Moore Shipbuilding Company; three to Los Angeles for the Southwestern Ship Company; eighteen to Seattle for Skinner & Eddy; nine for the J. F. Duthie Company and three for the Ames Shipbuilding Company.

Some of the orders on hand now include forty-five boilers for the G. M. Standifer Construction Corporation, twenty-two for the Albina Engine & Machine Works, twenty-one for the J. F. Duthie Company, twenty for the Foundation Company's Victoria yard, thirty-six for the Long Beach Shipbuilding Company, thirty for Shaw-Batcher Company, San Francisco, nine for the Todd Shipbuilding Company's Tacoma yard and eight for Balboa, to be installed in German steamers seized there.

Grant-Smith-Porter Yard Wins

For building the hull of the Hough steamer Caponka in forty-nine working days, the Grant Smith-Porter Ship Company was awarded a handsome silver basket, manufactured much in the shape of a loving cup, by the firm of Jacobs & Gile, Portland distributors of iron and steel products. Jacobs & Gile announced in April that they would offer a silver a silver trophy for the Oregon yard building a wood hull in record time. The award was left to a committee—John L. Hubbard, executive assistant to the supervisor of the Oregon district; Captain W. C. McNaught, surveyor for the San Francisco Board of Marine Underwriters, and E. G. Tuck, Pacific Coast agent for the American Bureau of Shipping. The award was made so that the trophy was placed on exhibition at the winning yard early in January.

GOES TO COLUMBIA CORPORATION

Ward R. Bowles, formerly assistant to the president of the J. F. Duthie Company of Seattle, is now with the Columbia River Shipbuilding Corporation. Mr. Bowles is now assistant to C. D. Bowles and Alfred Smith. His many friends are very glad to hear of his promotion and wish him all the success that he deserves.

GLEDHILL GIVEN PROMOTION

Herbert W. Gledhill, formerly sales engineer of the Philadelphia office of the Shepard Electric Crane and Hoist Company, has been made district manager of the Philadelphia district, with Glenn Rumsey and Leland Woodworth as his assistants.

LOS ANGELES

By Special Correspondent

Plans to present to the Shipping Board representatives in Washington and to John H. Rosseter, director of operations of the Emergency Fleet Corporation, the needs of Los Angeles for the diversion of steamers of the Emergency Fleet Corporation here, are being completed.

The Los Angeles Chamber of Commerce, in conjunction with the San Pedro Chamber of Commerce and the Long Beach Chamber of Commerce, has prepared a summary of the needs.

Mr. Rosseter, when in Los Angeles several months ago, announced that ships would be diverted as cargoes were provided, and more recently announced that the claims of Los Angeles for more ships would be taken under consideration. He said that congestion in larger ports must be relieved first.

Now Los Angeles importers and exporters are clamoring for more vessels and have prepared a list of commodities handled at their port as the basis for their request for steamers.

In the general summary of the advantages of Los Angeles, not only to Southern California shippers, but to Eastern and Middle West shippers as well, attention is called to the distance of San Pedro from the interior as compared with distances overland to other ports. The number of wharves and docks, the class of merchandise handled, the depth of water and other features of advantage, are given in the report. Lists of firms, manufacturers and jobbers and the industries of the city are included.

Loads Flour for Atlantic

The first steamer built in Los Angeles yards to receive its full cargo loaded at Pier A in the inner harbor recently. The steamer was the "West Grama," one of the vessels launched from the yards of the Los Angeles Shipbuilding & Drydock Company. The vessel was ordered to load flour for the Atlantic Coast. The flour is part of the flour and grain cargoes brought here during the war and stored in sheds in the harbor. Until the signing of the armistice no mention was made of the storage of food supplies, though several steamers arrived direct from Australia with grain. Since the signing of the armistice, San Pedro has been designated as one of the two ports on the Pacific for the collection of grain supplies for distribution in the regular channels.

The sixth steamer constructed by the Fulton Shipbuilding Company was launched from the yards of that company last month. The vessel was the "Wenakee," one of the standardized type of wooden cargo carriers constructed for the Emergency Fleet Corporation. The two wooden yards in the inner harbor have been reducing their forces since the signing of the armistice. The Fulton company has had contracts for two steamers cancelled.

The steamer "Wallingford," a 3300-ton steel vessel, built in the Craig yard in Long Beach, was launched successfully last month. The vessel will be placed in service as soon as possible. The vessel is a sister ship of the "Eldorado" and "Silverado."

Two 8800-Ton Ships Launched

The end of the year in Los Angeles yards saw the launching of two steamers of the 8800-ton class. One launching was from the yards of the Southwestern Shipbuilding Company, December

One of the great shipments of cement from Los Angeles Harbor

31, and was the most successful held there. The vessel, however, ran across the main channel and crashed stern foremost in the E. K. Wood Lumber Company wharf, doing minor injury to the wharf but none to itself. The steamer was christened the "West Caruth." The day of the launching the steamer "West Carnifax" was given its trial trip with a party of officers of the company and invited guests on board. The "West Carnifax" proved all that her builders anticipated.

Several days prior to the launching of the "West Caruth," there was a launching from the yards of the Los Angeles Shipbuilding & Drydock Company. This was of the "West Kalumb," which was the fifteenth steamer launched from the yards of this company. Immediately following the launching the keel for the twenty-second steamer was laid.

That there is no prospect of lessening of contracts with Los Angeles shipyards was announced recently by an officer of one of the steel shipbuilding companies. He said that the companies had been besieged with requests from private steamship companies in all parts of the world to construct steamers under private contract. All requests were refused, as the yards have sufficient work from the Emergency Fleet Corporation to keep them busy until the end of 1920. With the elimination of overtime and Sunday time, the yards are not working as rapidly, and, with less men employed and with less necessity for haste, work now under contract will keep the yards busy.

Dredging for the 10,000-ton drydock in the west basin in the inner harbor is being rushed rapidly, and with the completion of the dock much work which heretofore went elsewhere is expected to be diverted.

Seek Rail Rate Readjustment

The question of railroad rates is being discussed by Los Angeles exporters and importers. The sailing of the steamer "Oshkosh" several weeks ago for San Francisco to receive cargo gave impetus to an adjustment of rates. The "Oshkosh" was constructed in the Craig yards in Long Beach, was given her inspection and trial trip there, and then was sent north to load. This cargo consisted partly of beans and other commodities raised in Southern California and which the shippers had found could be sent north by rail more cheaply than they could be sent to San Pedro. The aggregate of rates from Ventura to Los Angeles and Los Angeles to San Pedro exceeded the rate from Ventura to San Francisco, though San Pedro was the nearer port. The same state of affairs is said to exist on Imperial Valley cotton, but little of which has passed through Los Angeles. The railroads are expected to meet water competition, but the former practice of giving some interior towns waterfront terminal rates is said to have militated against the export trade from the nearest port, though it aided the jobbers who depend on rail transportation.

The bank roll of the Los Angeles Shipbuilding & Drydock Company was attached by the Ocean Accident & Guaranty Company recently. More than $168,000 was tied up for several days, while the officers of the company were arranging for a bond to release the cash. The attachment was on three banks, one in Wilmington, one in San Pedro and one in Los Angeles, shortly before noon on a Saturday and could not be released until Monday, when bonds were filed. The attachment grew out of a suit of the accident company against the shipbuilding company, in which the former contended money was due for premiums and that an accurate account of the amounts had not been kept by the clerical force of the shipbuilding company.

THE LARGEST OIL TANKER IN THE WORLD

ON December 4th, 1918, there was launched at Wallsend-on-Tyne, England, by Swan, Hunter & Wigham Richardson, the oil tank steamer "San Florentino" for the account of the Eagle Oil Transport Company of London.

Details of the "San Florentino" show that in size she exceeds the ships which, quite a short time ago, were the biggest oil tank ships in the world. Leading dimensions are 546 feet in length over all, 68 feet 7 inches in width, with a moulded depth of 42½ feet, and she will carry a deadweight of 18,000 tons. She is built on the well-known Isherwood system of longitudinal framing, which has been found to be the most economical and serviceable for oil tank ships. The hull is divided into thirteen oil-tight compartments, which are subdivided by a central longitudinal oil-tight bulkhead. The range of these oil holds is further divided transversely by three cofferdams and two pump rooms, all of which extend from side to side of the ship.

There are four powerful duplex pumps capable of discharging 300 tons of oil an hour, connected to a very complete system of pipes to discharge the ship by grouping together a given number of oil holds in every conceivable way. Furthermore, four different grades of oil can be either loaded or discharged at the same time without getting mixed. Some idea of the completeness of the oil-piping may be gathered by the fact that about four and a half miles of pipes will be fitted to the "San Florentino."

Amidships are cabins for the captain, officers and a few passengers. The engineer officers, the crew and firemen are accommodated in a deckhouse in the after part of the ship.

The propelling engines and boilers are to be placed in the after end of the ship, and are being built by the Wallsend Shipway & Engineering Co. The engines consist of a set of compound geered turbines of the Brown-Curtiss type, working a single propeller and designed to drive the ship on trial trip, when fully laden, at something over eleven knots.

At a luncheon following the launching, William Denton, director of the building firm, said he thought the "San Florentino" had about reached the useful and practical limit for ships carrying oil in bulk.

Mr. Purdy, director of the Eagle Company, and of the Anglo-Mexican Oil Company, said the vessels had proved of inestimable value during the war, throughout which their captains and crews had stuck to their work wonderfully. They were now going on to 18,000-ton vessels. They knew what they could do with them, for if they had twice the shipping they could produce twice the oil.

News of European Marine Circles

By Special Correspondent

London.

NOW that more than a month has passed since the signing of the armistice, we are beginning to see something of how things will settle down for the peace period of reconstruction. Demobilizing the army has begun, but only men in certain important categories are being released as yet. The first men to come out of the ranks will be a class composed, say, of miners, locomotive engine-drivers, tool setters and important workers of that basic kind. A second class that is following close upon their heels is composed of the men called by the government documents "demobilizers"—that is, men who are being freed from the army because of certain particular functions they will fill in connection with arranging the re-absorption of army labor into civil industry. The third class is somewhat similar and is composed of "pivotal" and "slip" men, the first named being men again who are, in a manner of speaking, the pivots upon which the other men work (these would indicate engineers, etc.), whilst the slip men are those for whom jobs are at present open and waiting hungrily for one reason or another. The main body of the soldiers will thus apparently only be released gradually, and, in fact, in such batches as to disturb the labor market as little as possible.

Already, of course, that labor market looks like being quite sufficiently disturbed by the tremendous discharges from the factories in which war material has been manufactured for greater or longer periods during the past four years. Despite the attempts to lay down plans for re-absorption well in advance of the time, many rearrangements are hanging fire. It looks, however, as though we shall have for certain large classes of these men and women a more or less temporary unemployment period, and to ease this the government is paying these discharged war material workers out-of-work pay for thirteen weeks, which amounts, I think, with the newest additions, to $6.00 per week for the women and $7.00 for the men.

It is hoped by the end of three months, however, that industry will have moved well on its way towards a sound and substantial peace basis and any extreme unemployment may be obviated. The claims of mercantile shipbuilding for some of the quickly-freed help are obvious and it is hoped these claims will not be overlooked by the military authorities. Unless merchant shipbuilding is pushed forward now there will not be nearly enough ships when the activities of our reconstructed industries become appreciable. Principally because of the shortage of labor the shipyards are working at much less than their full capacity. The serious shortage is, of course, of skilled men, for their number limits the number of unskilled workers who may be profitably employed. When the employers and the trade unions pressed for the return of more skilled workers, they were told that the army needed the services of the men, the great majority of whom were in technical units. In the face of that, employers and trade unionists naturally did not push their claim, but they quite frankly think that something ought to be done for them now, as the need for retaining the men in technical units is not nearly so great as it was. Skilled shipyard workers are, it may be added, more urgently required than engineers, as propelling machinery is at the moment much further advanced than hulls.

Liner Contracts

All the British passenger companies are in the market for new shipping tonnage. The Cunard, Peninsular and Oriental and Canadian-Pacific are specially mentioned. Vickers, Ltd., and Cammell Laird's two establishments that have hitherto not taken mercantile construction, have accepted contracts, the Cunard's orders, I understand, being for vessels of an improved Carmania type. The Canadian-Pacific orders include big liners for the Atlantic and Pacific routes, chiefly for the latter. There is also reason to believe that these have been distributed between Harland and Wolff, Belfast, the Fairfield Company, Govan, and John Brown's, Clydebank. In facilities for output, British shipyards were never so well equipped as they are today. A special difficulty is material, and the hope is that for cargo vessels at least great assistance will be given by inland works in supplying fabricated parts.

Other ships have been provisionally ordered elsewhere, and their construction will be proceeded with as soon as possible. The P. and O. are not going to be left behind by any means in the movement toward repairing the war's wastage of their fleets. It is difficult in these days of transition to tell exactly when a contract becomes a contract and ceases to be, say, an inquiry, for no ship can be definitely begun without a certificate from the minister of shipping. But there does not seem to be much doubt that Cunarders are on order in several places, including Barrow and Birkenhead, and that vessels have been approved, or are about to be approved, for, besides the above-mentioned, the Pacific, the Royal Mail, the White Star, the Elder-Dempster, the Ellerman, the Lamport and Holt, and a number of other well-known British lines. That the ships will be dear ships goes almost without saying. According to Lord Inchape, the total amount recovered by the P. and O. for vessels destroyed will be far short of the cost of replacement, unless prices fall very materially. With the steel subsidy away and labor costs inclining to increase rather than decrease, a fall in prices is highly improbable. But whether they rise or fall, liners will have to be built if British shipping and British trade are to recover their old positions of supremacy.

Guns in Merchant Ships

It has been suggested by a writer here who has gone into the matter that a number of shipowners do not see eye to eye with the authorities on what may be called the gun question. There never was, of course, any idea of continuing to arm merchant ships when the need for defensive armament disappeared. But if the submarine question is left in such a position by the peace settlement as will render it advisable to provide for the arming of merchant ships, it will obviously be wise to begin the preparations now. These preparations necessarily include the strengthening of hull structures so that they may be able safely to carry guns. An objection of many owners whose ships have been altered to accommodate defensive armament is that the provision eats into carrying capacity. What the exact loss is is not easy to say, but I have heard the weight of gun and strengthening put at five tons. On the face, that is not a great deal. Still, considering how the shipowner is economically cribbed, cabined and confined by the authorities, it is not at all unreasonable that he should press this point. Another objection is that the advance of artillery experts would soon make all the guns in store obsolete. It is not so good an argument as the other, for when we began to arm merchant ships in this war a considerable number of the guns installed were old-fashioned, yet served our purpose not inefficiently. The truth is that in emergency provision everything cannot be, and nobody ought to expect it to be, absolutely up to date. The question of continuing the provision for defensively arming merchant ships depends, however, on the terms of the general peace. What the answer is time must be left to tell.

Lord Inchape on Shipping

Each year Lord Inchape seizes the opportunity of the P. and O. meeting to review broadly shipping conditions, and his address to the shareholders at the last meeting was as impressive as any that have preceded it. He twitted the government upon the ill-effects of state control, referring incidentally to the unintelligible forms of official notices issued by government departments. He declared that the shipping controller had driven many a hard bargain with the company, and he added that the company came at last to a settlement respecting payment for two steamers taken over by the government which were under construction at the outbreak of the war, "out of sheer weariness." He feared that the company had made an uncommonly bad bargain, but "running backwards and forwards to the other end of a town taxes human endurance, and our friends up there know how to wear out the public."

And Standard Ships

Lord Inchape continued: "There has been a great deal of talk about the standard ships which the government has built. I do not know who was originally responsible for the idea—one seldom knows who is responsible where the government is concerned. Had shipowners been allowed to build their own ships, the British mercantile marine after the war would have been much better equipped for the general trade of the world than it is today, and so far as meeting the requirements of the war goes, there would, I believe, have been just as many ships afloat, or nearly so, as there is now. I have nothing to say against the so-called standard ships; they are excellent vessels in their way, but, ladies and gentlemen, we all build, and have always built, standard ships. We settle the [illegible] of ship we require, and we place an order, not [illegible] but for several, and the builders pro[illegible] right away. Standardization, however, has its limits. We decline to be fossilized, and the next batch which we build is an improvement on the previous one. There is no finality in ship design or construction. I venture to say it would have been infinitely better if owners had been left free to invest their depreciation, surplus earnings and the amounts they have obtained for the ships that have been sunk in replenishing their fleets."

British and Other Shipowners and Future Working

"One thing," continued Lord Inchape, "the war has done for British shipowners, and that has been to bring them more together. When it became necessary to divert ships from their previously recognized trades to other trades, it was laid down and confirmed by the shipping controller that there was to be no after-war poaching, and that each line, when things became normal, was to respect the others' pre-war trades. In this way ships were handed over from one owner to another for work in full confidence. When the liner requisition comes to an end, as we hope it shortly will, we shall, I trust, all honorably revert to our various spheres, and I hope there will be no disposition by one to take advantage of the other by means of information gained or relations established while we have been fighting the common enemy. Any attempt at encroachment by one line on the sphere of another will be regarded as the insidious peaceful penetration of the Hun. I am afraid, however, attacks will be made by those who are not British. Severe dips have already been made into many hitherto British trades by Allies, associates and neutrals, and British shipowners will have to fight to regain their positions. This they will be prepared to do, though they will be working at a great disadvantage, from the fact that their profits have been severely limited, while the profits of others have been fabulous."

Lord Inchape finished his remarks by telling us that the government, for instance, are paying the British shipowner something like $3.00 to $3.75 per ton per month, and at the same time they are paying for neutral tonnage as much as $10.00 to $12.50.

Foreigners and the Standard Ships

Reverting to Lord Inchape's remarks about the standard ships, your correspondent notes, by the way, that the objection which the average British shipowner takes to the sale to foreigners by the government of its standard steamers is the perhaps not unreasonable one that British, and not foreign, shipping ought to be in a matter of this kind the state's first care. Some owners with whom I have discussed the subject think that none of these vessels ought to be sold to foreigners at all, no matter who the foreigners are or what the prices are which they offer. But the feeling of the majority seems to be that the particular pressing hardship is that, while British owners are prohibited from selling their second-hand tonnage to foreign owners, foreign owners are at liberty to buy modern ships from the British ministry of shipping. There is a good deal to be said for the argument, and it is hoped that the government may eventually be brought to see its point.

Astoria Facts and Figures

By Special Correspondent

THIRTEEN government wood ships were under construction and 2,166 men were employed at the three shipyards at Astoria on December 15, 1918, according to figures compiled by Captain H. E. Mitchell, statistician for the Emergency Fleet Corporation. The McEachern Ship Company had delivered two completed government ships, launched eight, had five hulls on the ways, and was employing 1072 men. The Wilson Shipbuilding Company had launched four hulls, delivered two completed ships to the government, had four hulls under construction and was employing 603 men. The Rodgers Shipbuilding Company had launched two hulls, had four additional hulls under construction and was employing 491 men.

During 1918, nearly a quarter of a billion feet of fir timber was shipped from the mills of the Lower Columbia River, although several of these larger mills in the vicinity of Astoria had been pressed into the service of cutting great quantities of spruce timber for government aeroplane stock. California ports received the greater part of this lumber—227,775,243 feet; and 19,055,647 feet was shipped to foreign ports. These lumber shipments, figured at a minimum average value of $12 a thousand feet, represent a total value of nearly three million dollars. The largest monthly shipment was 23,281,284 feet in August. During the same twelve-month period the district shipped 443,725 bundles of box shooks, approximately one-half of which was consigned to the Hawaiian Islands. A total of 61,730,169 feet of lumber was also shipped from the Upper Columbia River mills during this period, making a grand total of 308,551,049 feet of lumber leaving the Columbia River.

Foreign and Coastwise Trade.

According to Deputy Collector Haddix, the coastwise shipments from the Port of Astoria during the year 1918 included six rafts and 270 cargoes, comprising 428,542 feet of lumber; 583,358 bundles of shingles; and 158,210 bundles of shook. Foreign shipments include twenty-two cargoes, with 10,055,647 feet of lumber, 400 piles, 2500 ties and 30,540 sacks of flour. Miscellaneous shipments to France include 4438 tons of flour valued at $488,240. To Shanghai was sent a small shipment of apples; to Alaska cannery supplies valued at $300,448; and to Hawaii more than one million feet of lumber, valued at $24,363, and 35,507 bundles of box shooks valued at $21,128. The total value of imports is reported at $129,272.84; exports $660,720.84; and customs receipts, $2,221.39.

One of the most important export factories of the Lower Columbia River district is the large flouring mill at Astoria, with a capacity of 1000 barrels a day. This mill was established about four years ago. It probably is the largest user of electricity in the Lower Columbia River section. The total output of the mill during 1918 was 1,500,000 barrels, in addition to manufactured mill stock valued at $700,000. The entire output of the mill, during the period of the war, was turned over to the government, and today all the tonnage is shipped to France and England. The mill was established four years ago, with an initial capacity of 250 barrels, which capacity was quadrupled following the award to Astoria of parity railroad rates with Portland and Puget Sound, and with the granting of terminal shipping rates through to the mouth of the Columbia River.

Defends the Wood Vessel.

Captain William I. Eyres, inspector of hulls at Astoria for the Emergency Fleet Corporation, is one of the vigorous defenders of the wood ship. Captain Eyres speaks from actual experience as a shipmaster and shipowner, having followed the sea for more than fifty years. He maintains that the wood schooner is by far the best type of carrier for lumber that is constructed, and he believes there is golden opportunity ahead for lumber shipping from the Pacific Northwest, since the Pacific Northwest is the only region in the world today with large quantities of standing timber available for export shipment to the markets of the world. The urgent need of this timber, especially in foreign countries, demands that additional tonnage must be provided as quickly as possible.

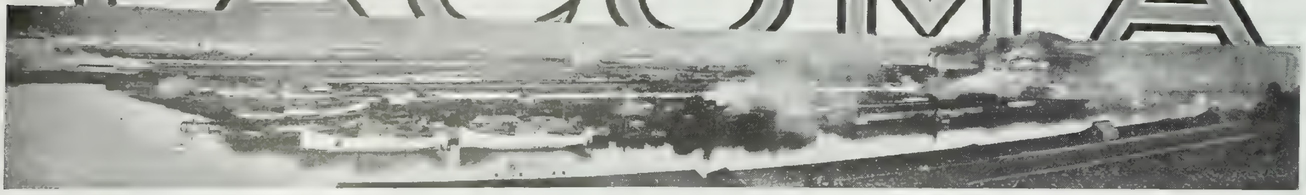
"For this traffic," he contends, "the wooden (fir) fore-and-aft sailing schooner, with single deck, five masts and a carrying capacity of from 1,500,000 to 2,000,000 feet of lumber has not and never can have a rival or competitor, until such time as some motive power is devised that will be cheaper than wind for propelling ships."

Among the reasons for this superiority, he states that such a wooden schooner "can be sailed with perfect safety without carrying a pound of ballast; and, under normal conditions, the wooden vessel can be built for at least twenty per cent less than can the one made of steel. The wooden craft of this type is also much the faster and far more durable, and there are on this coast wooden vessels that are over fifty years of age and still in service. This type requires at least one-third less men than are needed on square-rigged vessels of any nation."

Marine Railway Is Approved.

The plan for construction of a large modern marine railway at Astoria, by the Astoria Marine Iron Works, has been approved by the officials of the United States Shipping Board. This announcement was made by Thomas Bilyeu, manager of the Astoria Marine Iron Works, as a result of his recent trip to Philadelphia and Washington. The proposed marine railway will be of the modified Crandall type, with 6,000-ton dead weight capacity, great enough to afford dry-docking facilities for large sea-going vessels of the Pacific. It is further planned that a salvage tug, fully equipped to meet off-shore vessels in need only of minor repairs, shall be operated in conjunction with the marine railway. During his trip east, Mr. Bilyeu visited Boston, where the first marine railway in the United States was established in 1854. This plant has been in continuous operation since that date and has given excellent service in competition with floating dry-docks. He reports that since the creation of the United States Shipping Board and the Emergency Fleet Corporation, the government has developed 125 marine railways adjacent to various marine plants.

TACOMA



By Special Correspondent

In the presence of Mayor C. M. Riddell and other city officials and representatives of the navy, the keel of the second scout cruiser to be constructed at the plant of the Todd Drydock & Construction corporation yards was laid the latter part of December. No formal addresses were made.

These vessels, of which three will be built in Tacoma, will be 566 feet in length. It is expected that it will take from twenty-four to thirty months to complete them. Several thousand men will be engaged in this work alone. The plant is employing about 6500 men, with a payroll of $200,000 a week.

Fifty Vessels Launched in 1918.

Tacoma launched fifty vessels during 1918, when shipbuilding actively was started by the Tacoma yards. The first vessel launched was a Ferris type ship, the Quinault, from the Seaborn yards, and the last vessel, the Fort Harrison, another Ferris type, went into the water December 26. While the vessels were turned out in a very satisfactory manner, the supplying of machinery was not so quick, with the result that a number of the wood vessels are being held at Tacoma or at some other Puget Sound outfitting station awaiting their machinery.

Todd Yard Launches Quittacas

Sponsored by Mrs. H. F. Alexander, the 7500-ton steel steamship Quittacas was launched at the plant of the Todd Drydock & Construction corporation January 4. At the launching it was announced that the Todd yard would maintain a schedule of two launchings every month this year. The Quittacas was the eighth vessel put out at this plant since construction work was started.

The Cascade, a sister vessel of the Quittacas, was launched December 21 at the Todd yards. This vessel was sponsored by Miss Emily Fleetwood, one of the clerks in the office of Captain John Blain of the Shipping Board. The Cascade has been awarded to the Garland Steamship Company for operation and may ply out of Tacoma.

Power Boat Is Wrecked

With the loss of five lives, the power freight boat Amazon, owned by the Merchants Transportation Company, turned over the evening of January 5 while on her way from Seattle to Tacoma with a load of freight. The boat had her usual amount of freight on and there was no sea. The cause of the accident has not been determined. Mrs. Roy McMaster, wife of the captain, was drowned. The boat was in charge of Captain Ernest Phillips, while Captain McMaster stayed in Seattle to take another boat.

Alexander Goes to East

President C. F. Alexander of the Pacific Steamship Company, has been called to New York, following a decision of the Steamship Owners' association to take up the release of vessels with the government. He was the only shipowner delegated by the association from the Pacific Coast. He will be away from Tacoma for six weeks.

To Use Skandia Engines

It is expected that the Martinolich shipyards at Dockton will launch its first vessel soon, although on account of difficulty in securing caulkers, the management cannot fix a date. This company has contracts for three vessels for Norwegian interests. The ships are auxiliary vessels, rigged as baldheaded schooners. They will be powered with twin 240 h. p. Skandia engines. They are 250 feet in length, 44 feet beam, and 21.5 depth. They are designed for an estimated lumber carrying capacity of 1,500,000 feet.

Laying keel of a scout-cruiser

On account of the call for caulkers on government vessels, which work is looked after by the Seaborn Shipbuilding Company, this firm has found it difficult to get its own ships caulked. As the result the company has not had any launchings for several weeks, though vessels practically ready to go in the water are on the ways.

Good reports are being received from the wooden vessels turned out at the Tacoma yards. Several of the ships are now on the Atlantic Coast, while others are plying out of Pacific Coast ports. It is believed that they will stand up with anything put out on the Pacific Coast.

The old stern wheel steamer Greyhound, one of the most notable boats of her class on the Sound, is being dismantled here by junk men. The hull has been purchased by a Norwegian and may be placed in a barge service. The Greyhound was built by Troupe Brothers at Portland some twenty-five years ago and was one of the fastest stern wheel boats ever put out in the Northwest. Her last work was carrying freight between Tacoma and Olympia.

By Special Correspondent

At a recent luncheon given by the Transportation Club of Seattle in honor of the officials of the Pacific Steamship Company, A. F. Haines, vice-president and general manager of the Admiral Line, addressd the gathering at some length. General Manager Haines explained the policy of the Pacific Steamship Company, the first objective of the company being service, to which Mr. Haines attributed the success and growth of the company in the extension of its lines on the Pacific Coast and to the Orient.

While dwelling on service, Mr. Haines also took occasion to call attention to the trans-Pacific trade and its development. This trade, he said, is a greater problem than most people have thus far imagined. Much depends upon the eventual policy adopted by the United States Shipping Board with regard to the distribution and operation of the Government's fleet.

Shippers Up in the Air

Shippers generally are more or less up in the air as far as Shipping Board vessels are concerned, as Haines views the situation at present, for thus far the Government has set no method of procedure for the operation of these vessels by the private shipping concerns, and until some definite policy is arrived at the situation can only be chaotic. In the meantime the Japanese lines are plodding away in their well-known methodical manner and are getting by long odds the greater portion of the business. Something must be done, and that soon, if the American flag is to be kept on the Pacific. Mr. Haines said the Pacific Steamship Company was strongly in favor of putting the American flag foremost in trans-Pacific trade.

He called attention to the fact that his company had virtually pioneered the present Pacific trade movement, and asserted that it was the intention of the company to maintain an Oriental service to the best of its ability, whether or not assisted by the acquisition of United States Shipping Board vessels. The Admiral Line will gladly operate Shipping Board vessels, said Mr. Haines, but the company desires to be assured of the support of the Government in this operation of vessels, by which he explained that he meant that the company desired the assurance of a certain policy on the part of the Shipping Board which would insure all operators of Government vessels of just and equitable competition. He pointed out that several instances had occurred where different rates were quoted different companies in the operating of these vessels, which he declared could not continue and still prove fair to the operators.

Keen Competition Coming

Competition in the Pacific trade is bound to be one of the keenest contests for maritime supremasy that the world has ever known, so it behooves the Shipping Board to arrive at some definite policy very quickly in order to afford the various Pacific Coast shipping concerns desirous of operating American ships an opportunity to enter into this trade as speedily as possible.

All of the officials of the Seattle general offices of the Admiral Line were present and made short addresses. Among them were: E. G. McMicken, general passenger agent; Hugh MacKenzie, assistant general passenger agent; C. E. Flye, general freight agent; F. C. Ashton, city ticket agent; Sam Stocking, assistant to the general manager; H. C. Cantelow, assistant general manager; E. J. Griffith, publicity manager; Captain E. L. McNoble, port superintendent, and others.

Hamilton Higday, for eight years manager and assistant secretary of the Port of Seattle Commission, resigned the first week in January to accept a position with the Parr-McCormick interests of San Francisco, and severed his connection with the local public terminals on January 13, leaving at once for the scene of his new duties. Mr. Higday is an energetic and capable shipping man. Upon announcing his resignation the port commissioners expressed keen regret at his decision, and gave him a vote of thanks for his efforts during his long service with them.

Burchard Succeeds Lowman

J. D. Lowman, for the last year in charge of the bureau of operations for the United States Shipping Board for this district, resigned early in January, and Dudley W. Burchard, his chief assistant during the same period, was named to the place. Mr. Burchard is one of the widest known shipping men in the Northwest, and has been active in oriental and Alaskan trade operations for the past twenty years. He is eminently fitted for the place, and received the appointment upon the recommendation of Mr. Lowman, who was one of the local patriotic citizens serving the government in the emergency as $1 a year men. The emergency no longer existing, Mr. Lowman took advantage of the situation to resign in order to again take up his own business.

Seattle shipping men were sincerely grieved during the month at the sudden death of J. C. Ford, former president of the Pacific Coast Steamship Company and the Pacific Coast Company and allied interests. Mr. Ford was apparently well only a few days before his death. He is survived by his widow, two sons and four daughters.

Head of N. Y. K. in Seattle

During the month Seattle was visited by Baron Rempei Kondo, president and director general of the Nippon Yusen Kaisha (Japan Mail Steamship Company), one of the most prominent steamship men of the Pacific, who is also chairman of the imperial Japanese advisory peace commission. In the latter capacity he is going to France.

Baron Kondo announced that the N. Y. K. intended to maintain its policy of improving and extending the trans-Pacific service of its lines, especially those between Seattle and the Orient. He expressed his wonderment at the growth of Seattle since he last saw the city, and declared the N. Y. K. would not overlook any efforts to improve the service between Seattle and the Orient.

He advocated increasing Seattle's waterfront facilities and expressed the heartiest approval of the new Smith Cove unit now under construction by the Port of Seattle.

Baron Kondo briefly expressed his appreciation of the growth of the Nippon Yusen Kaisha's business at Seattle, and expressed the full confidence that this growth would continue for many years. While in the city he was entertained by Mayor Hanson, Alfred J. Rhodes, president of the Seattle Chamber of Commerce and Commercial Club, and Samuel Hill, the latter being a friend of many years.

During the month there were four Nippon Yusen Kaisha liners in port at one time. They were the Fushimi Maru, Kashima Maru, Kamo Maru and Kaifuku Maru, marking the first time in several months that so many ships flying the N. Y. K. house flag were assembled in the harbor at the same time.

Will Relieve Aleutians

Captain Louis Knaflich, president of the Kuskokwin Transportation and Trading Company, and owner of the little power schooner Bender Brothers, announces that that vessel will be despatched February 10 on a relief expedition to the Aleutian Islands, where hardships and sufferings are reported from the lack of supplies. The cancellation of the government mail contract with the little steamship Dora of the Alaska Steamship Company and the consequent withdrawal of that vessel from service to the islands, curtailed the shipment of supplies to those outlying settlements last fall, and considerable suffering has been reported as a consequence. Captain Knaflich announced that he will load the Bender Brothers with a full cargo of supplies and has the craft listed for sailing February 10. He will take the vessel personally and endeavor to reach the isolated stations where suffering is reported as most intense.

The Osaka Shosen Kaisha liner Canada Maru, which went ashore off Cape Flattery last June, completed loading and sailed for the Orient during the month. Her repairs, which had been slow and tedious owing to war conditions, were completed at Esquimalt the first week of the new year, and she went to Seattle and Tacoma to load cargo outward.

Seattle North Pacific Changes

William Cook, who has been appointed hull superintendent of the Seattle North Pacific Shipbuilding Company, formerly was inspector of hulls for the United States Emergency Fleet Corporation, District No. 8.

Mr. Cook has a wide acquaintance among the boilermakers and shipbuilders on the Coast, having begun as shipfitter's helper many years ago. His first job was as shipfitter on the battleship Nebraska, built at the old Moran plant in Seattle. Later he became superintendent of boilers for the Pacific Coast Steamship Company. After that, he held a responsible position at the Union Iron Works at San Francisco.

When the Emergency Fleet Corporation was organized, he was engaged as an inspector and later was advanced to the position he held at the time he resigned.

COST FINDING

IN an address delivered before the American Academy of Social and Political Science, Philadelphia, December 21, 1918, Wm. B. Culver, chairman of the Federal Trade Commission, reviews the work done by that body acting as an expert accountant to the War Industries Board and as a price-fixing committee for various administrative branches of the Federal Government.

After showing the great handicaps against any real cost finding due to the exaggerated values of raw materials and high cost of labor prior to the entrance of the United States into the war, which handicaps are still with us to block progress in equitable readjustment to a normal basis, he sums up the experience of the commission in the following words, which are well worth study:

"From the experience of cost finding, we believe we may argue for:

"(1) Standardized accounting systems, suited to the various industries.

"(2) Cost and profit accounting for individual products.

"(3) Reasonable standardization of products and elimination of excessive costs due to unnecessary multiplication of styles and types.

"(4) Compilation and issue of current, basic trade information.

"(5) Conferences between industries and Government for the exchange of proper and useful views and information.

"As for the outlook there need be foresight, but no fear. A period of readjustment must be met with the new and broader view. The same cooperation of industry, of labor, of capital and of Government that armed the nation for war will make it still greater in peace.

"As a nation we organized lines of supply and communication from Chile and Australia and Alaska and from every state and every farm and factory, and through these lines across oceans and continents to the battle front in France. As a nation we arrived at a power to dispatch a ship loaded with men and food and supplies, on the average, of every ten minutes night and day, Sundays and holidays.

ENGINEERS SERVING ON U. S. PORT AND HARBOR BOARD

The following gentlemen constitute the Board of Advisory Engineers of the Port and Harbor Facilities Commission of the United States Shipping Board:

Major-General W. M. Black, chief engineer of the U. S. A., Seventh and B streets N. W., Washington, D. C.

Colonel Bion J. Arnold, U. S. A., Sixth and B streets N. W., Washington, D. C.

Dr. J. E. Greiner, Fidelity Bldg., Baltimore Md.

Mr. H. McL. Harding, 52 Vanderbilt avenue, New York City.

Mr. John Meigs, 1614 Pennsylvania Bldg., Philadelphia, Pa.

Mr. Calvin Tomkins, 30 Church street, New York

On the Shores of Grays Harbor

By Special Correspondent

Revival of the wooden shipbuilding industry has resulted in much added prosperity for the industrial life of the Grays Harbor district, and during the year 1918 has been one of the chief factors in a sectional payroll never before equalled in Southwestern Washington, bringing to the Harbor hundreds of new workmen, many accompanied by their families and destined to become permanent residents.

An average of 3000 men has been employed during the year in the two Aberdeen shipyards engaged in Government construction. This number has varied from time to time, but is considered a fair average. The combined payroll for the year of the two plants is estimated at about $5,400,000. The Matthews shipyard of Hoquiam and the Chilman plant, also in this city, have operated with large crews, and the high scale of wages prevailing has made their payroll total a big figure. All this money going into the channels of trade has resulted in increased activity in all lines of business.

Harbor Launches Fifty-one Vessels

Since the building of wooden vessels has resumed its place among the Nation's chief industries, Grays Harbor shipyards have launched a total of 51 vessels, 25 of which have been for the Government. The Matthews yard in Hoquiam has turned out 10 ships, including the steamship "Daisy Matthews," motorship "Sierra," steamship "Hartwood," motorship "Santa Isabel," motorship "Santa Elena," steamship "Claremont," motorship "Lassen," steamship "San Diego," steamship "Mount Shasta" and steamship "Mount Hood," all for private owners. The Chilman yard has launched two auxiliary schooners, the "Ady" and the "Gaby," both for a French shipping concern.

The Grant Smith-Porter shipyard in Aberdeen has launched 11 Ferris type vessels for the Federal Shipping Board, the steamships "Manada," "Bancroft," "Boxley," "Moraine," "Wihaha," "Itanca," "Aiken," "Anthera," "Fort Stanwix," "Fort Snelling" and "Fort Seward." Each is of 3500 tonnage, making an aggregate of 38,500 tons of shipping.

Prior to the building of Government vessels, eight ships for private interests were turned out at the yard, begun under the operation of the Andrew Peterson Company and completed when the Grant Smith-Porter Company took over the plant. These include the "Oregon," "Columbia River," "Idaho," "Phyllis," "Santa Christina," "Suzanna," "Santa Flavia" and "Fanestrand."

Fifteen for the Government

At the yard of the Grays Harbor Motorship Corporation, fourteen Government vessels have been launched, and one auxiliary schooner completed. Five auxiliary motorships were built at the plant when it operated as the Grays Harbor Shipbuilding Company. These latters vessels included the "Santino," "Grays Harbor," "Hjeltenaes," "Balestrand" and "Mount Rainier," each 290 feet long, 48 foot beam and 24½ foot depth of hold. The auxiliary schooner "Marie de Ronde" measured the same dimensions.

Government vessels launched at the motorship yard are 4000-ton Ward type steamships, and include the "Abrigada," "Wishkah," "Kaskaskia," "Blackford," "Bromelia," "Brompton," "Broncho," "Brookdale," "Brookfield," "Brookhaven," "Grayling," "Brookland," "Aberdeen" and "Brookside."

Construction progress and efficiency records established in vessels built on Grays Harbor for the emergency Fleet Corporation have won the district an enviable reputation throughout the Nation. The Aberdeen yard of the Grant Smith-Porter Company carried off a pennant each of the three months during the national contest among wooden shipyards, in May the yard winning the red pennant, or second honors, and in June and July the blue pennant, or highest honors. This placed the plant at the head of the list among all wooden yards of the United States.

Built in Twenty-three and One-half Days

With the launching of the steamship "Abrigada," the motorship yard in Aberdeen won the distinction of sending the first wooden vessel into the water for the Federal Shipping Board, and the record of the steamship "Aberdeen," built from keel to delivery in 23½ days, set a new speed pace for the entire shipping world.

The auxiliary schooner "Mt. Hood," launched December 21, at the Matthews shipyard in this city, has the distinction of being the first ship launched from an American yard under the Norwegian flag since the United States declared war on Germany. This does not mean no Norwegian ships were launched during that period, for 74 per cent of the construction in both steel and wood in that time was contracted for by Norwegians, but the vessels were commandeered by the United States and the Stars and Stripes flew over them instead of the national emblem of Norway.

Another fact of special interest in connection with the vessel's launching is that Mrs. F. K. Haslund, the sponsor, is a descendant of President Adams. She is a member of the Kavanaugh family of Puget Sound pioneers, her grandparents having crossed the plains with ox teams and were with the Denneys, Henry Yesler, Lowes and others who founded the settlement where the city of Seattle now stands.

The tonnage of the "Mt. Hood" is 2400 deadweight capacity. She is 250 feet over all, 44 feet beam and 21 moulded depth.

CAPTAIN BAGOTT ON SHORE

Richard H. Bagott, a deep-sea master mariner of San Francisco at the beginning of ship construction on the Pacific Coast, was among the first to be appointed by the Emergency Fleet Corporation as inspector of hulls for Astoria shipyards.

As ships were delivered and masters became scarce, Captain Bagott resigned as inspector and took charge of the first steel ship built in Seattle for the Shipping Board.

The war being over, Captain Bagott has resigned his position and has become associated with M. H. Tracy & Co., Inc., 17 State Street, New York. He will act as port captain for such government ships as are managed and operated by this firm.

Pacific Steamship Company Changes

A. F. Zipf, traffic manager of the Admiral Line

M. J. Wright, Manila agent of the Admiral Line

ANNOUNCEMENT of the appointment of A. F. Zipf to be traffic manager of the Admiral Line was made recently by A. F. Haines, vice-president and general manager. Mr. Zipf took over his new duties on January 15, with headquarters in Seattle. He has full charge of the company's freight and passenger department.

The Admiral Line operates carriers in the coastwise, Alaska and Oriental trades and has been acting as managing agent for a large number of vessels of the United States Shipping Board. The company has plans for still further expansion, and to this expansion is due the creation of the position of traffic manager.

General Freight Agent C. E. Flye and General Passenger Agent E. G. McMicken of the company are under the jurisdiction of Mr. Zipf, who reports direct to Vice-President and General Manager Haines.

By establishing the new office, the Pacific Steamship Company strengthens its organization and relieves Mr. Haines of some of his duties connected with the traffic department of the company, which has grown to tremendous proportions with the increase of the Admiral Line fleet.

The newly appointed traffic head of the Pacific Steamship Company began his steamship career in 1898 as purser of river craft plying on the Yukon. From 1901 to 1902 he was agent of the Northern Commercial Company and the Northern Navigation Company in St. Michael; from 1902 to 1903, agent of the two companies in Nome; from 1903 to 1904, agent of the two companies in St. Michael; from 1904 to 1914, traffic manager of the Northern Navigation Company, and from the spring of 1914 until December 31, 1914, assistant superintendent of the American-Yukon Navigation Company with headquarters in St. Michael. On January 1, 1915, Mr. Zipf became traffic manager of the White Pass and Yukon Route with headquarters in Seattle.

Mr. Zipf was born in Idaho, going to San Francisco in 1889, where he entered the employ of the Wells Fargo Express Company. He went to Alaska aboard the famous gold ship Portland in 1898, sailing from San Francisco with crews for vessels of the Alaska Commercial Company's Yukon river fleet.

During the Alaska gold excitement days of 1898, when packets of the Mississippi River type helped make transportation history on the Yukon, Mr. Zipf was a prominent figure in the North. He says that St. Michael was a real shipbuilding center in those days, turning out a total of thirty-one vessels during the winter of 1898, all being ready when summer came for the grand rush to the gold camps. The vessels did a thriving business the summer of 1898 and during succeeding summers, the masters, mates, pilots and engineers being sent to St. Michael from points along the Mississippi.

Mr. M. J. Wright, who was recently appointed general agent of the Admiral Line in Manila, sailed on February 1st from Seattle to assume his new duties. Previous to his appointment, Mr. Wright was assistant general freight agent of the company, with headquarters in Seattle. Mr. Wright's appointment was announced by Vice-President and General Manager A. F. Haines, and is in line with the policy of the Admiral Line to station staff representatives in all of the large shipping centers of the Far East in connection with its Puget Sound-Oriental service.

"Planting the American flag of the Admiral Line in the Philippines will be some job," said Mr. Wright when informed of his appointment. "I have heard that the Philippines consist of about 3000 islands, large and small, and I judge from the statement I will need 3000 Admiral Line flags. However, I feel equal to the task."

As soon as Mr. Wright arrives in Manila, R. D. Pinneo, manager of the foreign freight department of the company, who has been sent to the Philippines to establish the Pacific Steamship Company's new agency, will return to Seattle.

Mr. Wright began his business career in November, 1901, at Vancouver as ticket agent with the Stimson Wharf Company. In May, 1905, he entered the employ of the old Pacific Coast Steamship Company, winning several promotions until he became contracting freight agent of the company in Seattle. In 1913 Mr. Wright was appointed general agent of the line in Vancouver, B. C. In October, 1913, he went to San Francisco, where he became chief clerk to H. C. Cantelow, general freight agent of the old Pacific Coast Steamship Company. With the consolidation of the Pacific Coast Steamship Company and the Pacific Alaska Navigation Company, Mr. Cantelow became freight traffic manager of the consolidated companies and Mr. Wright was assigned to the duties of chief clerk in the general traffic offices of the line in San Francisco. On January 1st, 1918, he was appointed assistant general freight agent with headquarters at Seattle.

CHINA A RICH FIELD FOR AMERICAN MANUFACTURERS

THE wonderful wealth of China in natural resources and raw materials has only within recent years attracted the serious attention of Occidental peoples, says Mr. Julian Arnold, American commercial attache at Peking, in the first of a series of articles to appear in "Commerce Reports." The Chinese themselves have not appreciated the potentialities in the markets of the West for the many products that their country has to offer. Foreigners have had to come to China to uncover the wealth of the country in mineral, vegetable and animal products. They have had to put their organization in the field, with facilities for financing the trade, for assembling and preparing the products to fit the needs of the foreign markets, and for the shipping of them to their destinations. The Germans, prior to the war, were more active in searching out and developing new possibilities in Chinese products than were other foreign peoples. It is estimated that before the beginning of hostilities 75 per cent of China's export business to the United States, exclusive of that in silks and teas, was in the hands of German houses. Very little of this business was handled by American concerns. Much of it was not even credited to China in American import returns, as the goods went to the United States via Europe. The Germans are not at present a factor in the China market. The war has extended greatly the markets for Chinese products in the Allied countries, and Japanese, British and American merchants control this business now.

It has been unfortunate, indeed, for China that the nation has not been in a position to take full advantage of the marvelous opportunities created by the war as regards foreign markets for its products. Lack of ships, internal disorders, absence of trained native organizations and the failure to give the country a uniform currency have all militated against China's reaping a harvest in returns and obtaining results that might have been ten times as great as they have actually been. In spite of these unfavorable conditions, however, trade has expanded enormously during these years, indicating what might have been attained if conditions had been more favorable. One has only to contrast Japan's position today with that of China to appreciate what China might have gained. Japan at the beginning of the war was a poor country with a formidable national debt. But it was prepared to reap all the advantages that the war could offer, for it had ships, it had business organizations capable of handling and developing foreign trade, and a government ready to help; it had internal peace and order, and it had a uniform and stable currency. Although poor in natural resources, as compared with China, it has risen from a debtor to a creditor nation, and today finds itself with an enormous surplus of gold. It has not only developed its own resources, but has come to China and is deriving from the resources of China profits that the Chinese themselves might have made. Japanese merchants in China, with preferential freight rates on their government-subsidized ships, are enabled to ship more cheaply and to command more shipping space than can other foreign merchants in China with their present dearth of tonnage.

If the American manufacturer desires to become a factor in the export trade of China with advantage to himself, he will put his own organization into the field; in fact, he will be obliged to do so if he would protect his own interests. The American silk manufacturers, who import $125,000,000 worth of raw silk each year, are threatened with a monopoly of the supplies of raw materials by the silk producers of Japan unless they keep the road open to China's silk resources. America is finding that it needs the vegetable-oil products of China by the millions of tons. Bean oil, wood oil, rapeseed oil, peanut oil, etc., which a few years ago were not associated with China in the minds of the American merchant, are today necessities, and the total trade in them amounts to nearly $100,000,000. American manufacturers and importers will pay dearly for these products unless they can handle them through their own organizations and on their own ships.

Hull Insurance (Part Three) Risks and Perils Covered by Contract

By Benjamin Rush

THE clause which follows is one of the most important in the policy, as it enumerates the risks and perils against which the underwriter agrees to protect the assured. They are as follows: "They are of the seas, men-of-war, fire, enemies, pirates, rovers, thieves, jettisons, letters of mart and counter-mart, surprisals, takings at sea, arrests, restraints, and detainments of all kings, princes and people, of what nation, condition or quality soever, barratry of the master and mariners, and of all other perils, losses and misfortunes that have or shall come to the hurt, detriment or damage of the said goods and merchandise, and ship, &c., or any part thereof."

We shall have to take up this word by word, but before doing so it will be necessary to state the rule which is to be followed in determining when a loss which happens in consequence of any specified peril is attributed thereto within the meaning of the policy. It is a settled principle of insurance law that the proximate and not the remote cause of loss is to be looked to in order to determine the underwriter's liability.

The words "proximate" and "remote" with reference to causation, are expressive of the different degrees of relationship which obtain between cause and effect. The term "proximate cause" is applied to that agency by which an effect is directly produced, as, for instance, if a vessel founder in a tempest, the immediate cause of her loss is a peril of the sea.

A "remote cause" is one which operates indirectly, i. e., through the intervention of some other agency to produce an effect, as, for instance, if a vessel was driven by a gale of wind alongside another vessel which was on fire, and was burnt, the remote cause of her loss would be a peril of the seas, and the proximate cause fire.

The liability of underwriters for a loss depends, as I have already stated, upon whether the proximate cause was a peril insured against. To give an illustration: A vessel which was insured against capture only was driven ashore by tempestuous weather upon a hostile coast where, having sustained only slight injury by the stranding, she was captured by the enemy. This was held to be a loss, not by perils of the sea, but by capture, and as such recoverable under the policy. From the operation of the rule it follows that it is no answer to a claim for loss which has been approximately caused by perils insured against to show that it was remotely caused by negligence or some other contingency not covered by the policy. If a loss is sustained directly by a peril insured against, the underwriter is liable.

Coming now to the words, "Perils of the seas," what do these comprise? In brief, the term "perils of the seas" is expressive of the extraordinary dangers that are peculiar to that element. It includes all marine hazards and casualties resulting from the violent or fortuitous action of the sea as distinguished from their silent, gradual influence upon the vessel.

There must be some casualty, something which could not be foreseen as one of the necessary incidents of the adventure.

The purpose of the policy is to secure an indemnity against accidents which may happen — not against accidents which must happen.

The term embraces many kinds of marine casualties, such, for instance, as shipwreck, foundering, stranding, sinking by coming into collision with another vessel, and every similar species of damage to a ship by the violent or fortuitous action of the winds or waves, not comprehended in the ordinary wear and tear of the voyage, or directly referable to the acts and negligence of the assured, as its proximate cause, such, for instance, as overloading, defect or inherent weakness, which condition would violate the implied warranty of seaworthiness. Grounding and stranding fall under the same designation if extraordinary, nor is it necessary for the grounding or stranding to be occasioned by a temest. For if a vessel accidentally strikes upon a sunken rock, and in fair weather sinks, this is a loss by "perils of the seas."

Per contra, grounding and stranding, if it takes place during the ordinary course of navigation, as when vessels are sent to a tidal harbor, where it is expected that they will lie ashore during the time the tide is out, would not be considered a grounding or stranding, but if, while the vessel lay ashore as expected, she was turned over by a tempest, and damaged, such a loss would be covered.

The next peril which we will consider is that of fire, which practically explains itself. It also covers loss by lightning or by the enemy (provided the risks of war are not excluded by endorsement). It would also cover ships' stores, temporarily placed on shore in accordance with the custom of the trade, and burned while so stored.

A loss by the explosion of steam, however, is not covered under the term "fire."

Now follow the words: "Men-of-war, enemies, pirates, rovers, thieves, jettisons, letters of mart and countermart, surprisals, takings at sea, arrests, restraints, and detainments of all kings, princes and people of what nation, condition or quality soever." These constitute the risks of war which are assumed by the underwriter, and its peculiar feature may be said to be "violence at the hand of man," in contradistinction to violence of the elements, and the underwriter takes upon himself the burden of all losses or damage thus occasioned, whether it consists of injury to the vessel's hull, spars and riggings by an enemy's shot or shell, or by other hostile acts, or the total destruction of the property insured by the operation of the same causes.

"Capture," properly so called, is the taking by the enemy as prize in time of open war or by way of reprisals, with intent to deprive the owner of all dominion or right over the property so taken.

Capture is deemed lawful when made by a declared enemy, lawfully commissioned, and according to the laws of war; unlawful when it is made otherwise. Whether it be legal or illegal, however, does not affect the underwriter's liability. He is liable for illegal as well as legal capture.

Capture has been defined as the forcible appropriation of property by an enemy or belligerent with the intent to keep it. Consequently it would cover capture by mutinous passengers or slaves.

The words "men of war" and "enemies" refer to those who are authorized by a prince or sovereign state, and who make war in accordance with the law of nations, as distinguished from "pirates," "rovers" and "thieves," who are unauthorized depredators.

The words "pirates," "rovers" and "thieves" refer to unauthorized persons who take by violence in contradistinction to petty pilferage, which latter is not covered by the clause.

Capture is, prima facie, a case of total loss, which gives the assured an immediate right to give notice of abandonment. If the underwriter accept the abandonment, the rights of the parties are thereby fixed, but if not the right of the assured to collect for a total loss depends upon the point whether the ship be restored before action is brought. If it be, then the assured will recover in proportion to the actual damage done; if not, then the whole sum insured.

It is, however, the law that property is not changed by capture in favor of a vendee or recaptor so as to bar the original owner until there has been a regular sentence of condemnation pronounced by a prize court of the government of the captor, sitting either in the country of the captor or of his ally, and apart from all questions as to abandonment the underwriter is liable for any damage the ship may have actually sustained, and also for all necessary expenses, such as salvage, etc., which the owner has sustained in the release of his property.

"Jettison": This word signifies the throwing overboard of part of the cargo or any article on the ship, or the cutting away or casting away of masts, spars, rigging, or other ship's furniture, for the purpose of lightening or relieving the ship, in case of necessity or emergency.

When a jettison is effected to save the ship and/or cargo from a common danger, the value of the property sacrificed is made good to the owner in general average, but the assured may, however, elect to claim direct upon his underwriters for the insured value of the jettisoned property, and the underwriters, having settled his claim, will be entitled to receive whatever is ultimately recovered by the assured from the third parties, in diminution of the loss.

Loss, which is the necessary and immediate consequence of a jettison, is reimbursed in the same way as a jettison itself, such, for instance, as cutting the halliards, which results in the prompt blowing away of a sail, or the cutting away of the ship's mast, which results in the loss of others of her spars.

"Letters of mart and countermart" are commissions granted to privateers, either to prey upon an enemy's commerce or to enable merchants who have suffered from the depredations of an enemy to recoup their losses by preying upon that enemy's commerce.

"Surprisals, takings at sea, arrests, restraints, and detainments of all kings, princes and people of what condition or quality soever." The terms "arrests" and "restraints" should be carefully distinguished from "capture." "Capture" is an intention to change the ownership of the property. "Arrests" is taking with intent ultimately to restore to the owner.

"Restraint" is the prevention of a ship's sailing. The detention of ships in port after declaration of war against the country to which they belong is a capture, and not an arrest. So is the taking into port of a ship by a belligerent cruiser under suspicion of having enemy goods on board in direct violation of the laws of war.

An embargo is the most common cause of "arrest, restraint or detainment of princes." It is a decree issued by the government of a state to prohibit the departure of vessels lying within its jurisdiction. An embargo laid on any vessel entitles the assured to give notice of abandonment, and if the embargo continues to the time action is brought to recover as for a total loss, subject, however, to the following exceptions, in which the right to abandon does not exist, viz., when the arrest is only temporary, causing momentary interruption of the voyage, but without occasioning any permanent loss or control over the ship.

Finally, the word "people" is to be understood, not in the sense of a mob or multitude, but as the ruling power of the nation, however it may be composed.

Now follow the words, "Barratry of the master and mariners." This may be defined as any act with criminal intent, committed by the master or crew of a vessel, in violation of their duty to the shipowner, and without the connivance of the letter. Its essential feature is conscious misdoing, without which, no error or omission, however great, will amount to that offense. It is an unlawful act, wilfully done.

It comprehends not only every specific or fraudulent knavery covinously committed by the master with the intention of benefiting himself at the expense of his owners, but every wilful act, on his part of known illegality, gross malversation or criminal negligence by whatever motive induced, whereby the owners or charterers of the ship (in cases where the latter are considered owners pro tempore) are in fact damnified.

The term includes every wrongful act wilfully committed by the master or crew to the prejudice of the owner, or as the case may be, the charterer.

The most atrocious forms of this offense occur when a ship is scuttled, burnt, run ashore, or fraudulently diverted from her course, and sold by the master or crew.

Minor, but not less decided instances of the kind occur, as for instance when a ship-master engages in smuggling or any other illegal trade, or attempts to enter a port in intentional violation of any blockade. Sailing out of port without paying port dues, whereby a ship is subjected to forfeiture, is barratrous, as is resistance of the right to search, or an attempt to rescue a ship which is rightfully detained by a belligerent cruiser.

It must, however, be carefully borne in mind that in the absence of fraud nothing but acts of known criminality, gross malversation or the like can amount to barratry. Loss arising from the ignorance or incompetence of the captain, from a mistake as to the meaning of his instructions, or misapprehension of the best mode of carrying them into effect, can never amount to barratry.

Another principle, clearly flowing from the true notion of barratry as a criminal act committed by the master against the interest of the owners, whether fraudulently or not, is that no act can be barratrous to which the owners can in any way be shown to have been consenting parties, for no man can take advantage of his own wrong.

Criminal delay of such a degree as to discharge the underwriter if occasioned by the captain for the purpose of committing an act of barratry is a barratrous act. Needless to say, if the master himself is owner of the ship, he cannot commit barratry. The losses resulting from barratry, which are claimable from the underwriters, are not limited to the direct physical results of the barratrous act, but comprehend all losses or damage sustained during the currency of the policy, which follows therefrom in the ordinary and natural course of events.

Now follows a clause reading as follows: "And of all other perils, losses and misfortunes that have or shall come to the hurt, detriment or damage of the said ship or of any part thereof."

The terms of this clause are so comprehensive as at first sight to convey the impression that they embrace every kind of mishap, not already particularized, to which property at sea can be subjected. Such, however, is not the case, for here the rule of construction applies that general terms following particular ones apply only to matters which are of the same kind as those specified. Consequently, this clause includes only perils similar in kind to the perils specifically mentioned in the policy, or which are of ejusdem generis, such for instance as damage to a ship which was heeled over by the wind, in a graving dock, and thereby damaged, for while the loss was not caused directly by a peril of the sea, the vessel being on land at the time, it was held to be close enough to come within the "all other perils" clause. The loss of dollars thrown overboard from a vessel on the point of capture, in order that they might not be taken possession of by the enemy, was held to be akin to capture; the wrecking of a steamer through the bursting of a boiler was held to be akin to fire. It may clarify this "all other risks and perils" clause if I recite as an illustration certain losses which are not comprehended by it, such for instance as loss by deterioration, and ordinary delay in navigation, wear and tear of tackle, corrosion, damage by rats or worms, and such like deterioration or damage to materials, loss remotely, but not directly, caused by the perils insured against, such as loss arising from compulsory abandonment of the voyage consequent upon blockade, unless the risks of war are assumed, loss of interest on capital, owing to the protraction of the voyage by bad weather; the liability of shipowners for loss or injury caused by persons or property through the default of their servants, loss directly attributable to the misconduct of the assured or his agents; theft which, when unaccompanied by overpowering force, might have been prevented by the exercise of ordinary vigilance on the part of those in charge of the vessel; loss through defects in the ships tackle, etc.

CONGRESS AND THE MERCHANT MARINE

Bills have been introduced into the Senate by Mr. Calder (S. 5285) and Mr. Gould (H. R. 13671) to amend the Seamen's Act as follows:

It is proposed to strike out all of Section 4, which amends Section 4530 of the Revised Statutes. This is the section which gives the seaman the right to demand and receive one-half part of wages at every port, etc.

It is proposed to amend Section 5, so that at least two officers of the vessel shall sign any complaint regarding the vessel not being in a suitable condition, the food not satisfactory, etc.

Section 7 is amended by changing the penalties somewhat and makes it a little less attractive to desert. For desertion the proposed penalty is one month's pay or imprisonment for not more than one month.

The second paragraph of Section 7 is changed so that when a man refuses, without reasonable cause, to join his vessel, etc., the penalty is made fifteen days' pay instead of two, as now.

The third paragraph regarding quitting the vessel without leave is amended so that the penalty is the loss of one month's pay or imprisonment for not more than one month."

Amendments to Section 13

Section 13 of the act is amended to read as follows:

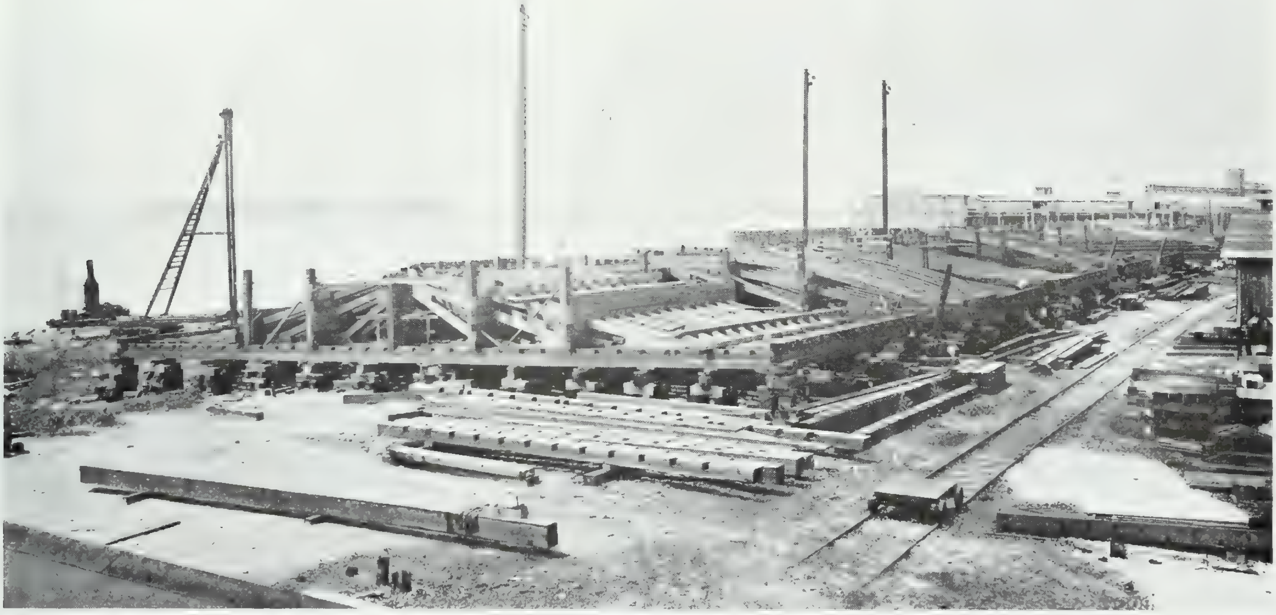
"Sec. 13. That no vessel of 100 tons gross and upwards, except those navigating rivers exclusively and the smaller inland lakes, and except as provided in one of this act, shall be permitted to depart from any port of the United States unless she has on board a crew not less than thirty-five per centum of which, in each department thereof, are able to understand any order given by the officers of such vessel. Graduates of school ships approved by and conducted under rules prescribed by the Secretary of Commerce may be rated able seamen after twelve months' service at sea: Provided, that upon examination, under rules prescribed by the Department of Commerce as to eyesight, hearing and physical condition, such persons or graduates are found to be competent: Provided further, that upon examination, under rules prescribed by the Department of Commerce as to eyesight, hearing, physical condition and knowledge of the duties of seamanship, a person found competent may be rated as able seaman after having served on deck twelve months at sea or on the Great Lakes.

"Any person may make application to any board of local inspectors for a certificate of service as able seaman, and upon proof being made to said board by affidavit and examination, under rules approved by the Secretary of Commerce, showing the nationality and age of the applicant and the vessel or vessels on which he has had service and that he is entitled to such certificate under the provisions of this section, the board of local inspectors shall issue to said applicant a certificate of service, which shall be retained by him, and be accepted as prima facie evidence of his rating as an able seaman.

"Each board of local inspectors shall keep a complete record of all certificates of service issued by them and to whom issued, and shall keep on file the affidavits upon which such certificates are issued.

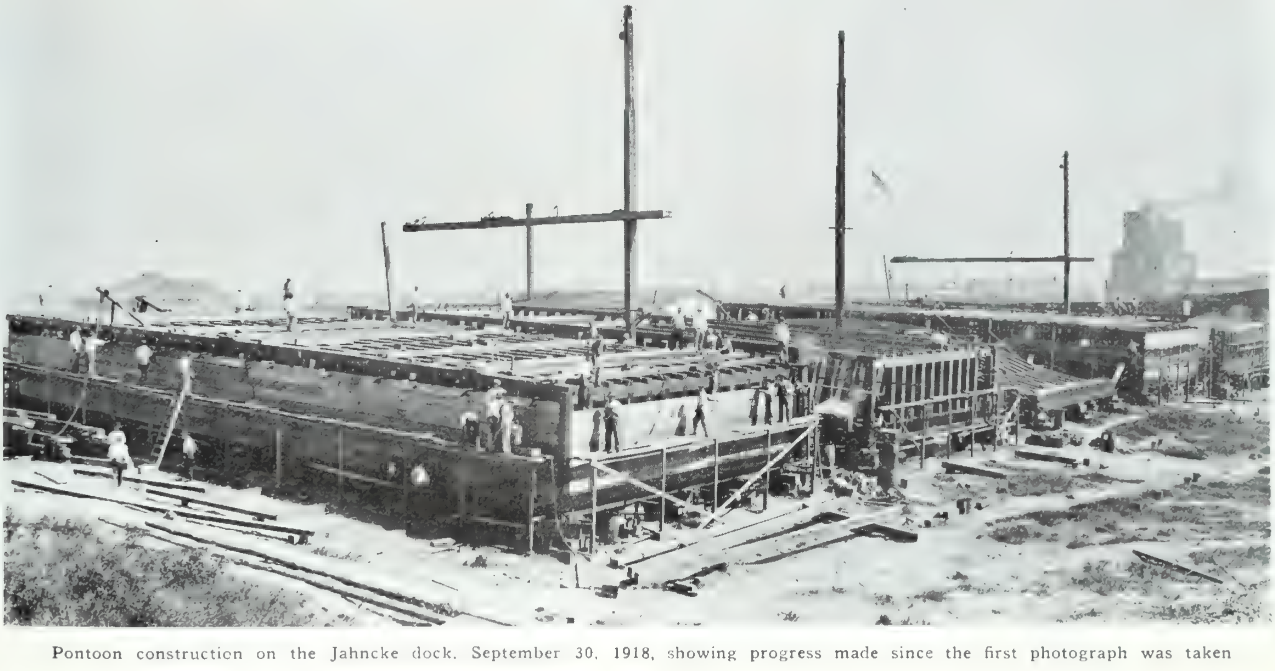
"That the Secretary of Commerce shall make such rules and regulations as may be necessary to carry out the provisions of this section, and nothing being herein shall be held or construed to prevent the Board of Supervising Inspectors, with the approval of the Secretary of Commerce, from making rules and regulations authorized by law as to vessels excluded from the operation of this section."

Dry Docks Built to Care for New Ships



Pontoon construction, Jahncke dry dock, New Orleans, August 28, 1918. The dock was designed by William T. Donnelly, consulting engineer, New York.

The great shipbuilding activites of the United States have developed many subsidiary industries, both on the Pacific and Atlantic Coasts. The Atlantic and Gulf ports, however, have had a larger share of the port shipping business of the Shipping Board and consequently there has arisen a large demand for repair facilities and especially for floating docks. William T. Donnelly, Consulting Engineer of New York, has designed and constructed many of these docks and has now under order ten floating docks for the United States Shipping Board. Two of these are of 20,000 tons and eight of 10,000 tons capacity. A dock of 20,000 tons is almost completed for the Sparrows Point yard of the Bethlehem Steel Corporation and a 10,000 ton dock at each of the ports of Mobile, New Orleans, and Galveston. In New York and vicinity Mr. Donnelly has six more docks and a 5000-ton dock for Pensacola, Florida, making an aggregate of twenty-two docks now on order.



Pontoon construction on the Jahncke dock, September 30, 1918, showing progress made since the first photograph was taken

The Men Who Buy the Material—

Horace Luckett

PORTLAND shipyard men believe in co-operation. The heads of the purchasing departments of the various organizations have a monthly get-together dinner at which they discuss subjects of general interest. All of the large industrial plants are also represented at these meetings. The result is a fine friendly interest between shipyards and plants that are supplying them with equipment.

Horace Luckett, of the G. M. Standifer Construction Company Steel and Wood Yards, was born in Galveston, Tex. He received his technical education at Texas A. & M. College, at graduation entering the engineering department of the Southern Pacific Railway in 1900 under Mr. Geo. W. Boschke and was associated with him in building the Galveston seawall and Southern Pacific docks. Came to Portland with the O. W. R. & N. Railway, remaining there until February, 1918, when he was appointed assistant to Mr. Bleker, head of the purchasing department of the Standifer company. On the death of Mr. Bleker, Mr. Luckett was appointed to his present position, November 17, 1918.

C. W. Steele

C. W. Steele, of the Columbia Engineer'g Works, was born in Minnesota, and is a graduate of the school of mines, University of Minnesota, in 1907. For some years was with the Oliver Iron Mining Company as engineer and superintendent. Came to Portland to take position as structural engineer and contract agent with the U. S. Steel Products Company in 1911, remaining until 1915, when he became secretary and purchasing agent of Columbia Engineering Works.

H. H. Fisher

H. H. Fisher, of the Peninsula Shipbuilding Company, was born in Davenport, Ia., and lived for a number of years at Kansas City, Mo. Came to Oregon in July, 1904, and knows the shipbuilding game from the bottom to the top, acquiring his entire experience in this line with the Peninsula Company, with whom he started as a laborer, being appointed to the head of the purchasing department only recently.

W. L. Deute

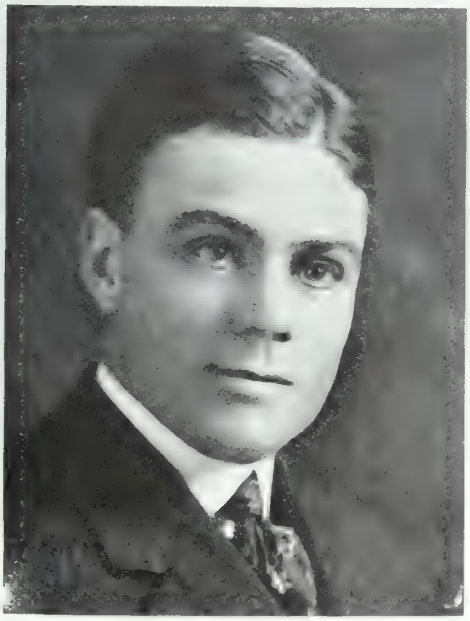
W. C. Smith, of the Northwest Steel Company, commenced work in the Boston engineering department of Stone & Webster. Six years later was sent to Detroit on their construction program; then to Chicago, purchasing supplies; then to Minneapolis on work for the Minneapolis General Electric Company. In 1911 Mr. Smith came to the Brayton Engineering Company of Portland, until they closed their Portland office in 1915. In 1916 he took charge of the Northwest Steel Company's purchasing department.

W. C. Smith

—For the Men Who Build the Ships

Charles Burton

Charles Burton, of the Supple-Ballin Shipbuilding Corporation, was born at Birmingham, England, educated at public and technical schools; for fifteen years was associated with one of the leading construction corporations of the United Kingdom; later practicing quantity surveying. Came to United States in 1909 and travelled directly to Pacific Coast, locating in Seattle; was for three years with E. J. Rounds & Company, general contractors. Early in 1912 moved to Portland, at the request of Porter Brothers and Brayton Engineering Company, as chief estimator and purchasing agent; afterwards associated with Muir & McClelland Construction Company, and Robert Wakefield in a like capacity.



P. S. Sinnock

W. L. Deute, of the Albina Engine & Machine Works, is a native Oregonian and is a graduate of Mt. Tamalpais Academy, San Rafael, Calif. His early business connection was with the Willamette Iron & Steel Co. as assistant purchasing agent, later going to the Coast Culvert and Flume Company of Portland as sales manager and coming to the Albina Engine and Machine Works as head of their purchasing department, Nov., 1918.

P. Sinnock, of the Grant Smith-Porter Ship Company, was born in Quincy, Ill., and received his degree in civil engineering at the University of Illinois in 1909. Previous to coming West was with the Illinois Traction System as superintendent of their light and power plant. Came to the Northwest three years ago in the employ of Grant Smith & Company, doing building construction work on the Fisher Flouring Mills at Seattle, and the Great Northern Railway terminals at Vancouver, B. C., etc. Upon formation of Grant Smith-Porter Ship Company was appointed head of their purchasing department.

H. A. Killam, of the Columbia River Shipbuilding Corporation, is a native of Novia Scotia, and his early business experience was as a shipping clerk with the Milton Iron Works at Yamouth, installing a cost accounting system. From there he went to Marshall Wells Hardware Company at Duluth as assistant in the purchasing department. On the opening of the Portland branch of this company, Mr. Killam was sent to the coast as department manager, which position he held till 1916, when he was appointed head of the purchasing department of the Columbia River Shipbuilding Corporation.

H. A. Killam

R. B. Woodbury, of the Willamette Iron & Steel Works, was born in Wisconsin in 1883, and is a man of wide business experience, having served in the operating departments of Eastern Minnesota, Great Northern, Chicago, Milwaukee and St. Paul and Mt. Hood Railway and Power Companies, covering Wisconsin, Minnesota, South Dakota, Washington and Oregon. In the years 1912 and 1913 he served as purchasing agent and traffic manager of the Willamette Iron & Steel Works, leaving the company on latter named date. In April, 1916, he returned to his old position at the Willamette Iron & Steel Works. On account of the varied activities of the company, he purchases many kinds of materials.

R. B. Woodbury

Pacific Coast Shipbuilding Returns

Albina Engine and Machine Works, Inc., Portland Ore.

Purchasing Agent, **W. L. Deute.**

[illegible] Nos. 7 to 19, 300 by 44 by 21.5; engines 22-36-60, 1400 h. p.

Allen Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **G. E. Hunt.**

Two Allen type vessels, 274.6 B. P. by 44.9 by 26.4.

American Concrete Pipe & Shipbuilding Co., Seattle, Wash.

One 7,500-ton concrete steamship.

One 150-foot steam concrete tugboat.

Two concrete scows, 120 feet long.

Ames Shipbuilding and Dry Dock Co., Seattle, Wash.

Purchasing Agent, **Mr. C. A. Barron.**

Twenty-seven vessels under contract, mostly 8800- ton freighters. "Western Ally," launched November 9th.

Anacortes Shipbuilding Co., Anacortes, Wash.

Purchasing Agent, **Will W. Dunn.**

Six wooden vessels, Ferris type, 281 by 46 by 23.6; engines 19-36-56; 1500- h. p. watertube boilers.

Anderson Shipbuilding Corporation, 602 Alaska Building, Seattle, Wash.

Purchasing Agent, **H. E. Thompkins.**

No. 6, 270 by 43 by 24, 1200-h. p. Scott water-tube boilers, 3-Island type; 3000 ton.

No. 7, 270 by 43 by 24, 1200-h. p. Seabury boilers, 3-Island type, for Oriental Navigation Co.; 3000-ton.

Nos. 8 and 9, 3000-ton dw. motorships. For Christoffer Hannevig, Inc.

Apex Manufacturing Company, Emeryville, Cal.

Purchasing Department, **A Youngholm.**

Three hundred metallic life boats for U. S. Shipping Board.

Thirty metallic life boats for shipyards.

Twelve Catamaran rafts for ship yards.

Astoria Marine Iron Works, Astoria, Ore.

Purchasing Agent, **Dan Donovan.**

Completely outfitting 20 Hough and Ferris type wooden vessels.

Contractors for United States and French governments.

Babare Bros., Old Town, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. Babare.**

Four wooden freighters, Ferris type.

Ballard Shipbuilding Co., Ballard, Wash.

Purchasing Agent, **Mr. T. W. Smith.**

Three wooden steamers, 215 by 40 by 18.

Ballin Water Tube Boiler Co., Portland, Ore.

Sixteen Ballin type water-tube boilers for eight steamers. For the Supple & Ballin Shipbuilding Co.

Twelve Ballin type water-tube boilers for six steamers building at the G. M. Standifer Construction Corporation.

Barnes & Tibitts, Alameda, Cal.

Purchasing Agent, **Mr. F. F. Monson.**

Installation of machinery and fitting out four vessels for Emergency Fleet Corporation.

Benicia Shipbuilding Corporation, Benicia, Cal.

Purchasing Agent, **L. S. Jones,** Alaska Commercial Bldg., San Francisco, Cal.

Hulls Nos. 2735, 2736, Ferris type. Deliveries, March and April, 1919.

Bethlehem Shipbuilding Corporation, Ltd. (Union Works Alameda Plant), San Francisco, Cal.

Purchasing Agent, **William M. Tobias.**

Eight 12,000-ton dw. steel freighters. Two delivered October 17th.

Eighteen 12,000-ton dw. steel tankers.

Contracts for six additional freighters.

Cameron-Genoa Mills Shipbuilders, Ltd., Victoria, B. C.

Purchasing Agent, **Mr. P. D. Bannerman.**

Four Wooden freighters, 250 by 43.6 by 25, 950 h. p., 2800 tons dw.

Ralph J. Chandler Shipbuilding Co., Wilmington, Cal.

Six wooden vessels, 281 feet long.

Chilman's Shipyard, Hoquiam, Wash.

Purchasing Agent, **Mr. Iver Chilman.**

Two 3-mast auxiliary schooners 130 by 33 by 14. One 300-h. p. engine, for Belgian interests.

Coast Shipbuilding Company, Portland, Ore.

Ten wooden freighters, Ferris type, 281.6 and 268 by 46 by 26, 1400 h. p.

Contracts for four additional Ferris type freighters. Deliveries [illegible]

Columbia Engineering Works (Linnton), Portland, Ore.

[illegible] Agent, **Mr. C. W. Steele.**

[illegible], 188 by 36 by 15.2; two 120-h. p. Skandia engines [illegible]. Delivery February 15th, 1919. For Chris [illegible]

No. 1[illegible] by 36 by 15.5; single screw Avance 320 h. p. [illegible] March, 1919. For Chr. Christensen, Jr.

No. 1[illegible] by 36 by 15. Delivery April, 1919.

Columbia River Shipbuilding Corp., Portland, Ore.

Purchasing Agent, **Mr. H. A. Killam.**

Nineteen steel merchant ships, 8800 tons dw., General Electric turbines, Scotch ma[illegible] Deliveries 1919. Five of above now on ways.

Commercial Boiler Works, Seattle, Wash.

Purchasing Agent, Mr. J. H. Fox.

Contracts for:

156 Scotch marine boilers, 14 [illegible] inside dia. by 11 ft. long, H. S. 2695.5 sq. ft., W. P. 2[illegible] lbs. [illegible] vessel building on Pacific Coast. Delivery, twelve completed boilers per month.

Coos Bay Shipbuilding Company, Marshfield, Ore.

Manager, **Mr. J. H. Polhemus.**

Contracts for six Ferris type vessels. Length over all 281.6, 3500 dw. tons. Deliveries starting November 1st.

J. Coughlan & Sons, Vancouver, B. C.

Purchasing Agent, **J. Joseph.**

Four 8100-ton dw. freighters, 400 by 52 by 31, 3000-h. p., three Scotch marine boilers. For Dominion Government.

Crowley Launch & Tugboat Co., San Francisco, Cal.

Purchasing Agent, **John L. Crowley.**

Six 28-foot launches with 10-h. p. engines.

Four 45-foot launches with 50-h. p. engines.

Eight covered barges, 125 by 40 by 12.

Derrick barge, 75-ton lifts, 125 by 50 by 12.

J. F. Duthie & Co., Shipbuilders & Engineers, Seattle, Wash.

Purchasing Agent, **E. C. Gaumnitz.**

Two freighters, 423.9 by 54 by 29.9, geared turbines, 2650 h. p.

Ten 8800-ton cargo vessels, 2500-h. p.

Five 8800-ton cargo vessels, 425 by 54 by 29.9. Scotch boilers.

Elliott Bay Dry Dock Company, Seattle, Wash.

Local repair work, cleaning, painting and overhauling.

Elliott Bay Shipbuilding Co., Seattle, Wash.

Purchasing Dept., **C. A. Morrow.**

Six vessels, 260 by 46 by 26.

Contracts for five 3500-ton carriers.

Elliott Bay Yacht & Engine Co., Seattle, Wash.

Large amount of repair work.

Feeney-Bremer Company, Tillamook, Ore.

Contract for two wooden ships. Ferris type, 281.6 by 46 by 26.

Foundation Company of British Columbia, Ltd., Victoria, B. C.

Purchasing Agent, **Mr. D. D. Long.**

Twenty 3000-ton dw. twin screw wooden steamers, 293.2 by 47.6 by 23.6, two Scotch marine boilers.

Foundation Co., Portland, Ore.

Local Purchasing Agent, **G. M. Raymond.**

Twenty steam auxiliary schooners, each 280 by 45.6 by 25 feet (moulded); twin engines, triple expansion, 425-h. p. each.

Foundation Co., Tacoma, Wash.

Purchasing Agent, **Mr. Whiteside.**

Seattle Office: Smith Building.

Twenty 5-mast auxiliary schooners 275 by 46 by 24. Twin 350-h. p. steam engines; two watertube boilers. For French government.

Duplicate order now pending.

Fulton Shipbuilding Company, Wilmington, Cal.

Purchasing Agent, **A. H. MacFarland.**

Four Hough design wooden steamers.

Eight Ferris design wooden steamers.

Grant Smith-Porter Ship Company, Aberdeen Shipyard, Aberdeen, Wash.

Purchasing Agent, **Mr. Z. A. Toye.**

Contracts for eleven Ferris type steamers.

The Grant-Smith-Porter Ship Co., Portland, Ore.

Purchasing Agent, **Mr. Pritchard.**

Contract for eight Ferris steamers. Delivery first half of 1919.

Contract for fourteen Ferris type ships. Delivery last half of 1919.

Grays Harbor Motorship Corporation, Aberdeen, Wash.

Purchasing Agent, Mr. H. L. Rich.

Twelve 4000-ton ships of Ward type. For Emergency Fleet Corporation. Deliveries about two a month.

Great Northern Concrete Shipbuilding Company, Vancouver, Wash.

Purchasing Agent, **Mr. Pacquet.**

No. 3, Concrete hull, 100 by 25 by 12.6. Delivery February, 1919.

Nos. 4, 5 and 6, Same as above.

Hammond Lumber Co., Eureka, Cal.

Purchasing Agent, **W. R. McMillan.**

Seven steamers, Ferris type.

Hanlon Dry Dock & Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **C. J. Foard.**

Twelve cargo vessels, 320.9 by 46 by 26.9; three water-tube boilers. For Emergency Fleet Corporation.

Harrison & Lamond, South Vancouver, B. C.

One auxiliary schooner.

D. W. Hartzell, Inc., Winslow, Wash.

Schr. "Snow and Burgess," Str. "Hyak," barge "Palmyra," Str. "Roosevelt," Schr. "Taurus," Milwaukee Barge No. 4 and Drummond Litherage Barge were docked, repaired and overhauled during the past month.

Helser Machine Works, Inc., Portland, Ore.

Purchasing Agent, **Mr. H. P. Rasmussen.**

20 large size hawser reels for Pacific Coast Shipbuilding Co.

12 same as above for Pensacola Shipbuilding Co.

30 same as above for J. F. Duthie & Co.

44 same as above for The Columbia River Shipbuilding Co.

56 8¼ by 8 single geared winches, single gypsey.

28 8¼ by 8 single geared winches, double gypsey.

56 9 by 9 single geared winches, single gypsey.

All of above winches for Southwestern Shipbuilding Co.

180 cargo winches for Schaw-Batcher Shipbuilding Co.

200 9 by 9 cargo winches.

300 8¼ by 8 cargo winches.

Hesse-Martin Iron Works, Portland, Ore.

Purchasing Agent,- **Mr. R. M. Hoffman.**

All auxiliary machinery for ten wooden steamers building by the G. M. Standifer Construction Co.

All auxiliary machinery for twenty-four wooden steamers building by the Grant-Smith-Porter Ship Co., at Aberdeen.

Anchor windlesses, cargo winches, steam capstans and steam steering gears for eight wooden steamers building by Supple & Ballin at Portland.

Forty steam cargo winches for ten steel steamers building by the Northwest Steel Company.

One hundred and thirty anchor windlasses, forty steam steering gears and fifty hand steering gears.

Herzog Electric & Engineering Company, San Francisco

Two 750-h. p. single gear, double reduction De Laval turbines on S. S. "Johanna Smith."

One Herzog double electric steering gear on M. S. "Katherine" at Hanlon Shipyard.

G. W. Kneass, San Francisco, Cal.

Peterson No. 16, 42x12, 50 h. p. Union gas engine. For Peterson Tow Boat & Lighterage Company.

Peterson No. 18, 52x14, 80-h. p. Union gas engine. For Peterson Tow Boat & Lighterage Company.

Peterson No. 20. 64x18, 110-h. p. Union Gas engine. For Peterson Tow Boat & Lighterage Company.

"Phyllis," 50x12, 60-h. p. Union gas engine.

"John" and "Ellen," 21x7, 12-h. p. Atlas gas engines.

350 metal life boats for Bethlehem Shipbuilding Corporation, Union Plant.

100 work boats for Emergency Fleet Corporation.

Kiernan & Kern Shipbuilding Co., Portland, Ore.

Purchasing Agent, **Mr. McCall.**

Six composite steamers of Ballin design.

Kruse & Banks, North Bend, Ore.

Purchasing Agent, **Robert Banks.**

Six hulls, Ferris design, 286 by 46 by 28.

Llewellyn Iron Works, Los Angeles, Calif.

Builders of Marine Engines, Boilers, Tanks, etc., for Emergency Fleet Corporation.

Long Beach Shipbuilding Company, Long Beach, Calif.

Purchasing Agent, **Mr. John Craig.**

Ten steel vessels of 9000 tons.

Eight steel steamers, 8,800 deadweight tons each.

Los Angeles Shipbuilding & Dry Dock Co., Los Angeles, Cal.

Thirty-two 8800-ton dw. vessels, 410 by 54 by 29.9, 3500 I. H. P. three Foster water-tube boilers. For Emergency Fleet Corporation. Delivery 1919-1920.

The Wm. Lyall Shipbuilding Co., Ltd., North Vancouver, B. C.

Six auxiliary schooners, 235 W. L. by 44.6 by 20.6 moulded. First three launched.

Two 175-h. p. Atlas Diesel engines for 3 of these.

Two 200-h. p. Fairbanks Morse Semi-Diesel engines for the other three boats.

Eight 1500-ton full powered steamers—compound engines—for French Government.

Main Iron Works, San Francisco

Purchasing Agent, **Mr. W. Bingston.**

Boilers for twenty vessels.

Four 150-foot sea-going tugs, 30 ft. moulded beam by 17 ft. depth, equipped with triple expansion engines and two 1000-h. p. Scotch marine boilers.

Installation of machinery in hulls Nos. 488, 489, 1286, 1287, 2190, 2191 and 2192.

Thirty-seven sets of line shafting for Ferris type of vessels.

Five sets of line shafting for concrete ships.

Thirty steam capstans.

All machinery for above sea-going tugs.

Marine Pipe and Machine Works, Inc., Seattle, Wash.

Purchasing Agent, **Mr. E. A. Lamb.**

One 6-cylinder Sumner type heavy oil engine, 650-h. p.

One 6-cylinder Sumner type heavy oil engine, 650-h. p. For Chilean Government.

Two 1200-h. p. triple exp. steam engines.

Martinolich Shipbuilding Co., 306 California Bldg., Tacoma Wash.; Yard at Dockton, Wash.

Purchasing Agent, **Mr. Martinolich.**

Three wooden 4-masted auxiliary schooners, 250 by 43 by 21; twin 240-h. p. Skandia engines. For Norwegian interests.

Matthews Shipbuilding Company, Hoquiam, Wash.

Purchasing Agent, **G. F. Matthews.**

Lumber carrier for Hart-Wood Lumber Company, 250 ft. long, capacity 1,500,000 ft.

Two auxiliary 4-masted schooners, 250 by 43 by 21. Twin 240-h. p. Skandia engines. For Mons Isaakson, Norway.

McAteer Shipbuilding Company, Seattle, Wash.

Purchasing Agent. **Mr. Ramm.**

One steel vessel, 160 by 30 by 16.

Two four-masted schooners, 250 by 44 by 21; Skandia engines.

McEachern Ship Co., Astoria, Ore.

Purchasing Agent, **Mr. O. E. Draper.**

Ten steamers, 286 by 46 by 28; Hough design.

Meacham & Babcock Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **Mr. W. N. Voegtly, Jr.**

Ten hulls, Ferris type.

Moore Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **M. G. Waites.**

Thirty 9400-ton dw. steel freighters.

Twelve 10,000-ton dw. steel tankers.

Fitintg out:

"Mulpua," launched December 1st, 1918.

Motorship Construction Co., Vancouver, Wash.

Purchasing Agent, **J. W. Dougherty.**

Large number of wooden and metal lifeboats and Columbia River fishing boats.

Also contract for 750 lifeboats for Emergency Fleet Corporation.

National Engineering Corporation, Los Angeles, Calif.

Outfitting ships for Emergency Fleet Corporation.

National Shipbuilding Company, Seattle, Wash.

Purchasing Agent, **K. C. Hopey.**

Two auxiliary schooners, twin screw, for Norwegian interests, 280 by 48 by 27, Skandia engines, 700-h. p.; 3500 tons dw.

New Westminster Construction & Engineering Co., New Westminster, B. C.

Purchasing Agent, **Mr. H. M. Fullerton.**

Four 2800 dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

Five 1500-ton dw. wooden freighters, 204 by 40.6 by 17, 550-h. p. twin engines, watertube boilers.

Nilson & Kelez, Seattle, Wash.

Purchasing Agent, **Mr. Kelez.**

Eight wooden hulls, Ferris type.

Northwest Steel Company, Portland, Ore.

Purchasing Agent, **Mr. W. C. Smith.**

Sixteen freighters, 425 o. a. by 54 by 29.9, 8800 tons dw.; geared turbine drive; 3 Scotch boilers fitted for either coal or oil fuel.

Eight freighters, 425 o. a. by 54 by 29.9, 8800 tons dw.; geared turbine drive; 3 Scotch boilers fitted for coal.

Ten freighters, 3000-h. p. turbine engines.

Pacific American Fisheries, South Bellingham, Wash.

Purchasing Agent, **Mr. B. U. Slyster.**

Seven wooden steamers, 281 by 46 by 26, 1500-h. p. water-tube boilers. Deliveries starting October, 1918.

"Bonneterre," launched November 2nd.

Pacific Coast Shipbuilding Co., 317 First National Bank Bldg., San Francisco, Cal.

Purchasing Agent, **Mr. A. C. Lewis.**

Ten 9500-ton dw. steamers.

Pacific Construction Co., Ltd., Coquitlam, B. C.

Purchasing Agent, **Mr. R. W. Holland.**

Two 2800-ton dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

No. 3, Wooden steamer, 250 by 43.6 by 25, 1000-h. p. water-tube boilers.

No. 4, Same as No. 3.

Nos. 5 and 6, 1500-ton full-power barges, 204.8 by 39.8 by 17, 275 I. H. P. engines, 5 water-tube boilers.

Pacific Boat & Iron Works, Portland, Ore.

Two hundred metal lifeboats and 100 liferafts for steel yard in this district.

Contract for several Corser's one-man simultaneous releasing hooks for lifeboats.

Pacific Marine Iron Works, Portland, Ore.

Purchasing Agent, **Mr. V. L. Hamlin.**

Contracts for fourteen 1600-h. p. triple expansion engines.

Thirty-two boilers for Standifer Construction Co.

Sixteen boilers for Supple & Ballin Shipbuilding Co.

Pacific Shipbuilding Corpn., Seattle, Wash.

Purchasing Agent, **C. H. Jones.**

Yard designed with six building ways.

Patterson-MacDonald Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **W. J. Thomas.**

Ten wooden steamers, 281.6 by 46.10 by 27, twin screw, triple expansion engines, 1550-h. p. 30"-15½-25½-42. Two Heine boilers.

Peninsula Shipbuilding Co., Portland, Ore.

Purchasing Dept, **Mr. H. H. Fisher.**

Contracts for twelve steamers, 287 by 49.8 by 27.6. To be equipped with Westinghouse turbines.

"Corvallis," launched November 9th, 1918.

"Brentwood," launched December 5th, 1918.

Puget Sound Boiler Works, Seattle, Wash.

One Scott Patent Water Tube Boiler, 200-h. p. pressure, for Anderson Shipbuilding Co.

Contracts for condensers, water feed tanks, boiler casings and smoke stacks.

Large amount of local marine repair work.

Puget Sound Bridge & Dredging Co., Seattle, Wash.

Purchasing Agent, **Mr. Moore.**

Complete installation of machinery for twenty-four wooden vessels.

Two wooden hulls, Grays Harbor Motorship type.

Six 5,000-ton wooden hulls.

Geo. F. Rodgers & Co., Astoria, Ore.

Purchasing Agent, **W. N. Browning.**

Contracts for two 3500-ton cargo carriers

Six hulls, Ferris type, 3500 tons dw., 281.6 by 46 by 26. For U. S. Shipping Board.

Rolph Shipbuilding Company, Eureka, Cal.

Purchasing Agent, **John D. Stelling.**

Three wooden steamers, to be fitted with 1000-h. p. triple-expansion engines and two Union Iron Works Heine boilers. To builders' account.

Three four-masted barkentines, 1,650,000 feet lumber capacity. To builders' account.

Sanderson & Porter, Raymond, Wash.

Purchasing Agent, **Mr. Wm. Evans.**

Six wooden hulls, Ferris type, standard wood steamships, Delivery 1919.

"Anthon,' 'launched November 9th.

San Diego Marine Construction Co., San Diego, Cal.

Purchasing Agent, **C. W. Stose.**

No. 132, "U. S. No. 2," 35 by 7 by 2, 150-h. p.

No. 135, "U. S. No. 3," 40 by 7 by 2, 200-h. p.

San Francisco Shipbuilding Co., 310 California St., San Francisco, Cali,.

Three 7500-ton dw. freighters, reinforced concrete, at Government Island plant in Oakland Estuary.

Schaw-Batcher Company, South San Francisco

Purchasing Agent, **Mr. G. B. Merritt.**

Eight single-screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2500-h. p. Curtis turbines, 4 Heinie boilers.

Fourteen single-screw freighters, 8800-ton dw., 427 by 54 by 29.9; 2800 i. h. p. reciprocating engines; three Scotch boilers. Deliveries 1919.

"West Avala," launched November 3.

Schofield Engineering Company, San Diego, Cal.

Contracts for eight concrete ships of 7500 tons.

Seaborn Shipyards Company, Tacoma, Wash.

Purchasing Agent, **P. J. Anderson.**

Fourteen hulls, Ferris type. Deliveries by April, 1919.

"Fort Russell," launched November 6th.

Four-way yard prepared for any kind of wood construction.

Seattle Machine Works, Inc., Seattle, Wash.

Purchasing Agents, **Frank H. Wheelon** and **D. Crause.**

Eight 2700-h. p. triple-expansion engines for Skinner & Eddy Corporation.

Six 750-h. p. triple-expansion engines for Pacific American Fisheries.

One 500-h. p. triple expansion engine for McAteer Shipbuilding Co.

Seattle-North Pacific Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **Lyle C. Bankson.**

Ten freighters, 402.5 by 53 by 34.5. Parson turbine, three Foster boilers. Deliveries 1919.

Skandia Pacific Oil Engine Co., Oakland, Cal.

Purchasing Agent, **Mr. L. M. Bliss.**

Twenty 825 B. H. P. Werkspoor Diesel engines for installation in 5000 tons steel fabricated motorships.

Six 500-h. p. Skandia oil engines; four 240 h. p. and six 120 h. p. engines.

Additional engines of smaller capacity.

Skinner & Eddy Corporation, Seattle, Wash

Purchasing Agent, **Mr. H. G. Seaborn.**

Contracts for sixty 9600-ton dw. freighters.

Sloan Shipyards Corporation, Olympia, Wash.

Purchasing Agent, **Mr. L. P. Byrne.**

Fourteen freighters, 281.6 by 46 by 26, 19-32-56 by 36; 1400-h. p.

Smith & Watson Iron Works, Portland, Ore.

Purchasing Agent, **Mr. H. W. Bates.**

Contracts to furnish all castings, fittings, condensers and auxiliary machinery for thirty-two ships building by Columbia River Shipbuilding Corporation.

Somarstrom Shipbuilding Co., Columbia City, Ore.

Four wooden steamers, Hough design, 288 feet long.

Four wooden steamers, Ferris type.

South Bend Shipyard Co., South Bend, Wash.

Purchasing Agent, **Mr. Trieber.**

One four-masted topsail schooner, 250 by 43 by 21, 2500 tons dw.

Southwestern Shipbuiding Co., Los Angeles, Calif.

Twenty-three single screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2800 i. h. p. reciprocating engines; three Scotch boilers. For U. S. Shipping Board.

Standard Vault & Metal Works, Portland, Ore.

Purchasing Agent, **Mr. R. G. E. Cornish.**

Life boats, life rafts.

Sheet metal equipment for ships.

G. M. Standifer Construction Corp., North Portland, Ore., and Vancouver, Wash.

Purchasing Agent, **Mr. H. Luckett,** Vancouver, Wash.

Four wooden freighters, 281 by 46 by 26; 1700-h. p., Ferris type.

Five composite steamers, Ballin design, 4500 tons.

Fifteen steel steamers, 9500 tons. Delivery early in 1919.

Stephens Bros., Stockton, Cal.

Two wooden towboats, 50 by 13 by 8, for Island Transportation Co.

One towboat, 40 by 11 by 6, for Bay and River Dredging Co.

Nine 65 by 14 passenger launches, each equipped with two 90-h. p. 6-cylinder Wisconsin motors. For the Delta Transportation Co.

St. Helens Shipbuilding Co., St. Helens, Ore.

Purchasing Agent, **Mr. Barnett.**

No. 42, schooner, 286 o. a. by 48 by 27; to the order of Chas. R. McCormick & Co.

"Colinda," launched November 14th.

W. F. Stone Shipbuilding Co., Oakland, Cal.

Purchasing Agent, **Mr. Frank Stone.**

One 65-foot freighter.

One 65-foot tug.

Four 150-foot wooden hulls for seagoing tugs, 30-foot molded beam by 17 ft. depth.

Supple & Ballin Shipbuilding Corporation, Portland, Ore.

Purchasing Agent, **Mr. Burton.**

Eight 4500-ton steamers, Ballin design, 309 feet o. a. by 44 by 26, diagonal planked, steel reinforcing on top sides, single screw; 1500-h. p.

Nos. 9 to 12, Same as above.

Tacoma Shipbuilding Company, Tacoma, Wash.

Purchasing Agent, **Mr. D. D. McKay.**

Contracts for six Ferris type vessels. For U. S. Shipping Board.

T. R. Trahey, Ballard, Wash.

One oil barge, 110 feet long and 32 feet wide, capacity 150,000 gallons. For General Petroleum Company

Tregoning Boat Co., Seattle, Wash.

Purchasing Agent, **Mr. C .Tregoning.**

[illegible] of lifeboats and ship power launches.

Todd Dry Dock & Shipbuilding Co., Tacoma, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

Ass't Purchasing Agent, **Mr. J. R. Wood,** Tacoma.

Eight cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 watertube boilers.

Twenty-four cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 S. E. S. boilers.

All of above for Emergency Fleet Corporation. Deliveries by January, 1920.

"Cascade," cargo vessel, 380 by 53 by 23.9, 2500 h. p. three S. E. S. boilers. For Emergency Fleet Corporation. Delivery March, 1919.

Todd DryDocks, Inc., Harbor Island, Seattle, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

General drydock and repair work.

Union Construction Company, Oakland, Cal.

Purchasing Agent, **Mr. Chas. L. Froding.**

Contracts for 10 steel ships of 9400 tons.

Vancouver Shipyards & Engine Works, Ltd., Vancouver, B. C.

Contracts in hand for two wooden vessels.

Wallace Shipyards, Ltd., North Vancouver, B. C.

Purchasing Agent, **Mr. C. Wallace.**

Three steamers, 300 by 45 by 27, single screw, reciprocating engines.

Contracts for four 8,100 dw. steel vessels.

Western Canada Shipyards, Ltd., Vancouver, B. C.

Five 195 by 39.8 by 17 watertube boilers.

Willamette Iron & Steel Works, Portland, Ore.

Purchasing Agent, **Mr. Sidney F. Woodbury.**

177 high-pressure, three-furnace, Scotch marine boilers for vessels building in Pacific Coast yards.

Building and installing all machinery on Northwest Steel Company's hull, 15 to 24, inclusive.

Building and installing all machinery on G. M. Standifer Construction Corporation's wooden hulls, 24 to 29, inclusive.

Wilson Shipbuilding Company, Astoria, Are.

Purchasing Agent, **W. G. Wray.**

Eight wooden vessels, 281.6 by 26, Ferris type.

Wilson Shipyards, Inc., Seattle, Wash.

Three building-ways ready for constructing wooden vessels up to 3500 tons.

Wright Shiywards, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. P. Wright.**

Five wooden cargo carriers, 3500 tons each. First launching November 1, 1918.

Yarrows, Ltd., Esquimalt, B. C.

Two shipways suitable for building vessels up to 350 feet in length.

Marine repairs a specialty.

OTHER SHIPBUILDING COMPANIES

American Shipbuilding Company, Warrenton, Ore.
Ballard Marine Railway Company, Seattle, Wash.
Chico Shipbuilding Co., 4185 Arcade Building, Seattle, Wash.
Clapp & Reed Shipbuilding Company, Seattle, Wash.
Columbia River Shipbuilding Co., Vancouver, Wash.
Craig-Wilde Ship Company, Los Angeles, Cal.
Wm. Cryer & Son, Oakland, Cal. W. E. Cryer, Purchasing Agent.
Fellows & Stewart, Inc. V. B. Stewart, Purchasing Agent, Wilmington, Cal.
French-American Shipbuilding Corp., 418-420 Marsh-Strong Bldg., Los Angeles.
Halstrom Shiubuilding Co., Inc., Seattle, Wash.
International Shipbuilding Company, Columbia City, Ore.
King & Winge Shipbuilding Co., C. B. Winge, Purchasing Agent, Seattle, Wash.
Marine Iron Works, Seattle, Wash.
Mare Island Navy Yard, Mare Island, Cal.
Muller Shipbuilding Company, 410 I. N. Van Nuys Building, Los Angeles, Cal.
Oceanic Shipbuilding Co., Milwaukee, Ore.
John E. Price & Company, Hoge Building, Seattle, Wash.
Port Blakeley Shipyard, Port Blakeley, Wash.
Puget Sound Navy Yard, Bremerton, Wash.
T. B. Puck & Co., Honolulu, T. H.
Raymond Shipbuilding Co., Raymond, Wash.
Sehrs Shipyard, Port Townsend, Wash.
South Bend Shipbuilding Co., South Bend., Wash.
Southern California Shipbuilding Corporation, 405 Trust & Savings Bldg., Los Angeles, Cal.
H. D. Stewart Shipbuilding Company, American Bank Building, Seattle, Wash.
Union Timber & Products Co., O. L. Craven, Pres., Port Towsend, Wash.
United Shipbuilding Corporation, Hoge Bldg., Seattle, Wash.
U. S. Steel Shipbuilding Corp., Ltd., Los Angeles, Cal.
Varney Shipbuilding Corporation, Seattle, Wash.
Washington Shipbuilding Corp., C. E. McMasters, Pres., Burke Bldg., Seattle, Wash.
West Coast Shipbuilding Co., H. W. Hellman Bldg., Los Angeles, Cal.

Navy Department,
Washington, D. C., 19 December, 1918.

SALE OF U. S. NAVAL VESSEL.—Sealed proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 12:00 o'clock noon, 31 January, 1919, when they will be publicly opened, for the purchase of the U. S. S. KNICKERBOCKER now at Bensonhurst, L. I. Appraised value $12,000.00. The vessel will be sold for cash to the bidder offering the highest price, above the appraised value. Forms of proposal and bond, and information concerning the vessel, and the terms and conditions of sale, may be obtained upon application to the bureau of Supplies and Accounts. JOSEPHUS DANIELS, Secretary of the Navy, 19 December, 1918.

In the Marine Insurance World

MARINE INSURANCE IN 1918

By Special Correspondent

London.

TAKEN as a whole, it may be assumed that the results of underwriting during 1918 will work out satisfactorily. This will not be due to the results of marine risks, but rather to the profitable character of war risks. In fact, the war risk business has had a marked effect on marine insurance results all along, for, in spite of the large amount of tonnage sunk, the premiums charged for war risk always worked out at a profit for underwriters when taken over the period of twelve months. The cargo account for 1916, which now has been wound up, will be found in most cases to have been a loss, or, at any rate, only a small profit, but the war risk premium will have put it right.

The cargo account for 1917 is running off satisfactorily, but this is due again to the results of the war. This year, 1917, was the heaviest for tonnage sunk by submarines and the effect of war losses was reflected upon the marine claim account, for boats sunk immediately became "arrivals" on the marine side of the account, thus reducing probable claims for particular average, theft, etc., which would have been made under ordinary circumstances upon underwriters. The volume of business done in 1918 was maintained throughout the year in spite of the large amount of cargo controlled by the British and American governments which was uninsured. This was due to the enormous increase in the values of all commodities, which enabled underwriters to secure a share of insurances offering.

American Companies New Factor

The prospect for the future is, however, by no means reassuring. The market in New York has been increased enormously since 1914 by the formation of new companies and by the entry of large fire companies into the marine market; the London market, although it has not expanded to the same extent, has also been augmented considerably, and there has been a large increase in new companies in Scandinavia, France and Italy. Although the German market will cease to exist as a market for re-insurance, so far as the allied nations are concerned, the general marine insurance market is wider than it ever has been, and with the loss of war premiums underwriters everywhere will find a difficulty in securing a satisfactory premium income. The strong concerns, of course, will have their regular business and will rely on their record for stability and prompt payment of claims, but the newer elements will only be able to secure business by the cutting of rates, and there is no doubt that we shall enter upon a period of gradually reducing rates with the weaker concerns finding themselves against the wall.

Another point of importance for consideration is the character of vessels by which cargo will be insured. A large number of first-class liners have been sunk, while others have been lost by marine perils. These boats have not been replaced, as they would have been under ordinary conditions, and liner owners have made up the deficiency, as far as possible, by the purchase of tramp steamers. These tramp-built steamers now appear as liners, and, in consequence, cargo is insured by them at the liner rates. It is needless to labor the argument unduly, but it will be evident that steamers built for the carriage of bulk cargoes are not suitable for taking general cargoes in the same way as vessels specially constructed for a definite trade. Then, again, the mercantile marine has been increased by the addition of a large number of steamers and auxiliary motor vessels built of wood, which owing to the exigencies of war were constructed with speed and from wood which could not have been seasoned. Time only will decide their suitability for general trading, but from the results already shown the experiment will probably prove a costly experience for underwriters. The position has been met by underwriters in London, who are renewing open covers for 1919 with the proviso that liners or steamers shall be of steel or iron and that motor vessels will not include vessels propelled by auxiliary power.

Little Profit in Sight

The insurance of the hulls of steamers also will present a difficulty. In the ordinary course it is difficult to forecast the result of a "time" account until after the end of the second year. Owing to the war the cost of repairs has been steadily mounting up and the exigencies of war conditions have necessitated the postponement of repairs which were not absolutely necessary. Underwriters have found, for example, that the fourth-year claims on the 1915 account, which should have been comparatively small, are equal to the third-year claims on a normal account; and those of long experience are of opinion that, from present indications, the accounts for 1915, 1916 and 1917 are likely to run out with little or no profit at all.

In 1918 the losses from collision were abnormal, being more than five times the average. This is put down to war conditions and the convoy system, and it is to be hoped that losses in this direction will become normal again. There was an advance of 10 per cent in the rates of premium for British steamers, and the 15 per cent disbursement clause is still maintained, while at the end of the year there was a general agreement that the returns for laying up should be a minimum of thirty days. The Institute Time clauses have been amended so that this return shall not apply to a vessel "under repairs" instead of "under average," as heretofore. This was due to a decision in the Florence case. A further alteration made was also the result of a legal decision. The clause covering sue and labor charges has been amended so that claims under this clause shall be treated in general average.

American Business Unsatisfactory

Although American hull insurances have been freely written in the London market during 1918, there has been a good deal of dissatisfaction as to the basis on which the business has been offered. The renewals have been offered at the rates paid on the previous policy, while British-owned steamers have been subject to an increase in premium. On the other hand, it is known that the cost of repairs in the United States has increased at a greater ratio than the cost of repairs in the United King-

FIREMAN'S FUND
Insures Hulls, Cargoes
HEAD OFFICE: CALIFORNIA AND SANSOM

JOSEPH HADLEY, European Agent
3 LOTHBURY, E. C.
LONDON

G. KIRKHAM SMITH, Special Agent
714-715 BOARD OF TRADE BUILDING
PORTLAND, ORE.

FRANK G. TAYLOR, GENERAL AGENT FOR WASHINGTON, OREGON, ALASK

dom. The reason for the immunity of American hulls from these increases is apparently because the risks are started in the American market without an increase and the order is sent to London for the balance left over. This leniency on the part of American underwriters is incomprehensible to their British confreres. It is possible, of course, that the leading underwriters only wrote small lines in order to conserve their connection, knowing that the business might prove unprofitable; and, with a largely increased market, the necessary amount of cover was secured which enabled the brokers to force the British market to follow at the same rates.

It is a little difficult to forecast the reception that American business will receive in the London market in 1919 because it is not known on what terms the renewals will be offered, but it is probable that in the event of rates remaining the same there will be some difficulty in placing any large amounts.

The Necessity of Adequate Marine Insurance Facilities for the Development of Foreign Trade

By H. S. Bates,
Pacific Coast Manager, Willcox, Peck & Hughes

ADEQUATE marine insurance facilities are as essential to the proper conduct of foreign trade as adequate banking facilities. In fact, insurance and banking go hand in hand in the development of trade. In these days of high values and limited markets the marine insurance broker has become more than ever a necessity. It is to him that the merchant looks for the proper handling of his insurance and the prompt settlement of his claims.

Owing to the fact that the modern broker must have facilities for placing the business of his clients in the markets of the world, it has so developed that he must also have facilities for the prompt collection of losses from underwriters in these various insurance markets. This has resulted, in the case of almost all successful marine insurance brokers, in their operating in conjunction with and as a part of their organization an average adjusting department devoted exclusively to the preparation of loss statements, presentation of same to underwriters and collection of losses for the assured.

Banks Require Certificate

The modern broker must enjoy the confidence of the bankers of his community, who are, in practically all cases, called upon to accept his certificates of insurance as evidence that the merchandise represented by the documents filed for banking purposes is insured with underwriters of good security. This condition has been brought about by reason of the fact that the merchant on cable instructions, or otherwise, has purchased and shipped goods, with instructions to insure same, the value of which far exceeds the capacity of his local marine insurance market. The broker in turn has had to wire his connections in New York, London or elsewhere for the additional insurance required. Upon receipt of confirmation by wire that this insurance has been arranged as ordered he in turn issues to his client a certificate of insurance setting forth the terms and conditions under which insurance has been arranged by him, which certificate the merchant uses in completing his documents for banking purposes, and without this the business cannot be consummated.

The responsibility of the broker is very great. It is his obligation to his client to see that the business is placed at fair rates and that the underwriters abroad offering to accept the business afford equally good security as those at home who are known personally to the assured. This necessitates having his own house in London and other large centers.

New York Is Cotton Market

He must also know the markets of the world and use them with reference to the various classes of business entrusted to him to insure. In some markets underwriters specialize on certain risks and shy at others. For instance, San Francisco is the sailing vessel market of the world; New York is the cotton market of the world for insurance purposes; whereas London underwriters, particularly the underwriters at Lloyds, have their own specialties, and, in fact, are divided into groups to handle some special line of insurance with which they are particularly familiar.

The broker must know all these things and more He must be familiar with the laws of foreign

NSURANCE COMPANY
reights and Disbursements
REETS, SAN FRANCISCO, CALIFORNIA

W. H. WOODRUFF, Special Agent
230 BYRNE BUILDING
LOS ANGELES

O. G. ORR & CO., Managers
ATLANTIC MARINE DEPARTMENT
37-43 WALL STREET NEW YORK

D BRITISH COLUMBIA, 264 COLMAN BUILDING, SEATTLE, WASHINGTON

countries so far as effecting the settlement of losses, both on hull and cargo, is concerned. On this account practically every successful brokerage house has its average adjusting department, which follows the various ventures cleared through the office so far as relating to forms, clauses, claims, losses and disputes.

Great Trade With Orient

In the case of general average losses where the brokerage house has insured the ship owner it is necessary for the house to have facilities both abroad, on the Atlantic and Pacific seaboards of our own country and in practically every large center in the interior of the country, in order to arrange the security from the various consignees who in many cases number into hundreds. The adjuster is also called upon by the clients of the house to prepare or pass upon charter parties, bills of lading and in fact all contracts of a maritime nature. In fact, the marine insurance broker with his average adjusting department is a necessary part of every transaction in foreign trade under modern conditions.

Our own house is looking toward the Orient for great trade development after the war. The business already has shown great expansion and our many clients interested in Oriental business predict great development as soon as tonnage is available and the present necessary restrictions are removed.

South America, Central America and in fact the foreign trade of the world is open to development by San Francisco merchants wherever they may go. In this development the way will have to be prepared by the insurance brokers before the first transactions can be consummated.

THANN TAKEN TO HAVANA

The steamship Thann, which went ashore in Cuba, has been floated and taken to Havana. There will be a general average of about $250,000 on this vessel—$105,000 jettisoned cargo, $100,000 salvage claim and some $50,000 damage to hull and engines in floating her. She had a rice cargo, loaded at San Francisco, valued at about $500,000.

GIVEN UP AS LOST

The Standard Oil tanker George Loomis, from San Francisco for Coos Bay December 19, has been given up as lost, and there apparently is no hope that any of the crew have survived. The vessel last was sighted off the Oregon coast. Her crew was nineteen men. The Loomis was one of the older vessels of the Standard Oil Company, having been built at San Francisco in 1895. Her gross tonnage was 691; net, 401; length, 175 feet; beam, 27.4 feet, and depth, 16.5.

The appointment of G. L. West as underwriter of the marine department, Pacific Coast branch, Phoenix Assurance Company, Ltd., of London, and the Union Marine Insurance Company, Ltd., of Liverpool, has been announced.

OUTLOOK FOR NEW YEAR

In a brief review of the insurance field of 1918, J. B. Levison, president of the Firemen's Fund Insurance Company, has this to say of marine insurance:

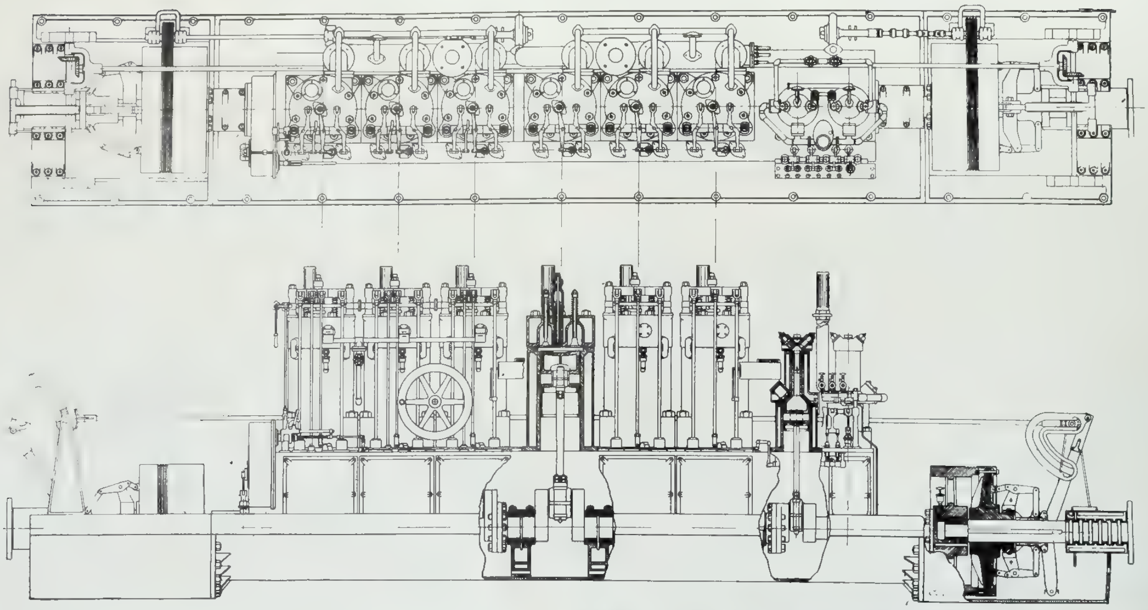
"Marine premiums for 1918, taken as a whole, will show a considerable shrinkage as compared with 1917, due to the government taking over practically the entire mercantile fleet of the country and the prohibition respecting imports and exports. War risk business was also reduced in the aggregate.

"Losses, on the other hand, have been heavy, owing to the fact that every vessel, without regard to age, condition or fitness, was pressed into service, and safeguards and aids to navigation largely eliminated as demanded by the exigencies of the situation."

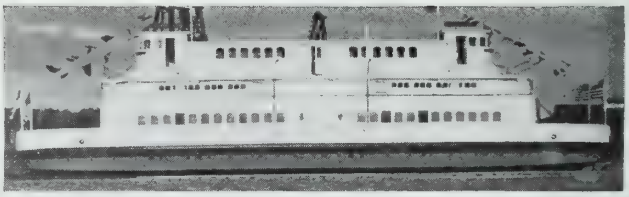
AMERICAN COMPANY FORMED

An all-American marine insurance company, the purpose of which will be to coöoperate in the plans of bankers, industrial leaders, and the government, to extend the foreign trade operations of American business interests, has been formed under the auspices of leading banking, insurance, shipping, and industrial interests, says the Guaranty Trust Company. The company has been incorporated in New York State with a capital of $1,000,000 and a paid-in surplus of $1,500,000. Before the war most of the marine insurance business of this country was handled by German and English companies. It is expected that the increase of the American merchant marine will require a vast amount of insurance to be written, and it is hoped that much of this business will go to this strictly American organization. The company is to be known as the Bankers and Shipping Insurance Company.

First Diesel Built on Pacific Coast



Above: Diesel engine for double-end ferry boat, Vashon Island, said to have been first marine Diesel built on the Pacific Coast. It was a 250-h. p., built by the Atlas Imperial Gas Engine Co. Below is the ferry boat Vashon Island, now in service at Seattle.



Early in 1916 the Commissioners of Kings County, Washington, built at Seattle a double-end screw ferry boat for the service from Seattle to Vashon Island. The Atlas Imperial Gas Engine Company designed and built a special Atlas Diesel of 250 h. p. for this vessel, and the builders claim that this engine is the first marine Diesel built on the Pacific Coast. The operation of this ferry has been highly successful. During two and one-half years' constant service it has never been necessary to lay up on account of engine trouble. As will be seen in our illustration of the sectional drawing of these engines, power is transmitted to the propeller shafts by means of large cone clutches. This is in line with early Diesel practice in Russian marine installations, as described in a former issue of Pacific Marine Review.

The Vashon developed speed and power well in excess of specification and has been in every way an unqualified success. She is 120 feet in length by 36 feet beam.

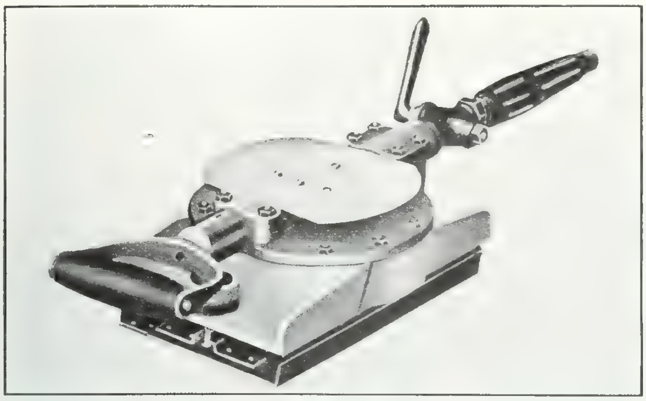
Gas Engines in Alaskan Service

Mr. Harold Morgan, who is general manager of the gas engine department of the Enterprise Engine Works of San Francisco, is in Seattle on an extended trip to become better acquainted with Enterprise engine users on Puget Sound. He is making his headquarters at the Hotel Sorrento.

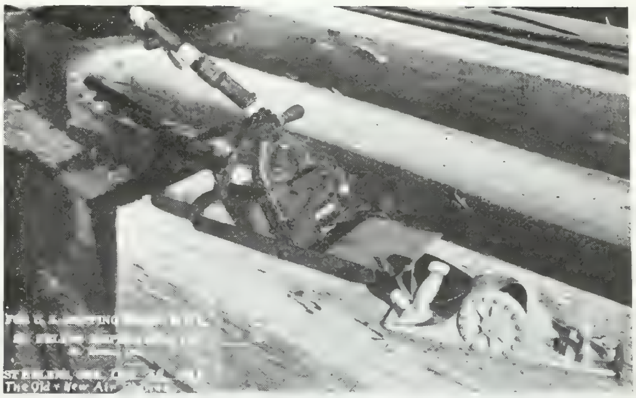
Increasing numbers of Enterprise engines are being used in northern waters; only recently several of these high-grade gas engines have been shipped to Ketchikan, Alaska.

Mr. Morgan is an authority on marine type gas engines and, with his associates, has spent many years in developing a reliable engine. The success of their efforts is indicated by the splendid engine which now bears their name. The illustration shows the Alasco No. 3," which is a 50-foot boat owned by the Alaska Codfish Company, and which left San Francisco for Unga, Alaska, on a non-stop continuous run. She is powered with a 40 h.p. three-cylinder Enterprise engine. Included in her cargo were several Enterprise engines which were being shipped for Alaska service.

Alasco No. 3



Model D air dubber



Old weighs 22 pounds, new style 11 pounds

New Invention Speeds Wood Shipbuilding

THE Shipbuilders Pneumatic Tool Company of Portland, Oregon, have developed an air driven dubber which is not only speeding wood shipbuilding in yards where it has been tested out under the severest of conditions, but also has been found to cut down accidents in such yards in marked degree.

"The Air Dubber, or as the Shipbuilders Pneumatic Tool Company terms it, Model 'D,' is the most wonderful pneumatic machine I have ever operated," is the okeh given the new invention by Max Maxmillan, who is the air expert of the production and efficiency department of the United States Shipping Board, Emergency Fleet Corporation for District 11, which embraces the famous Columbia River wood shipbuilding locality. Mr. Maxmillan's statement of performance of the new machine is that of a competent expert, for he has followed the pneumatic tool business for over twenty years. He has designed and operated all kinds of pneumatic tools and was sales manager for the William H. Keller Pneumatic Tool Company of Grand Haven, Mich., and the late William H. Keller is referred to in the trade, as the "father of pneumatic tools."

The Model "D" is a refinement and development of the Model "K," the same company's so-called "wood hog." The wood hog for rough work naturally weighed more than the company's highly successful air planer and only on outboard and frame dubbing work was it found too heavy for one man to operate easily. Safety engineers' statistics disclose that 80 per cent of the accidents in the wood shipyards are due to the use of the adz, so the necessity for a light, fast cutting tool was at once apparent. The new dubber not only provides a machine to do the outboard work and frame dubbing, but also at the same time reduces the accidents due to the use of an adz to a minimum for it replaces the need for and use of that tool entirely.

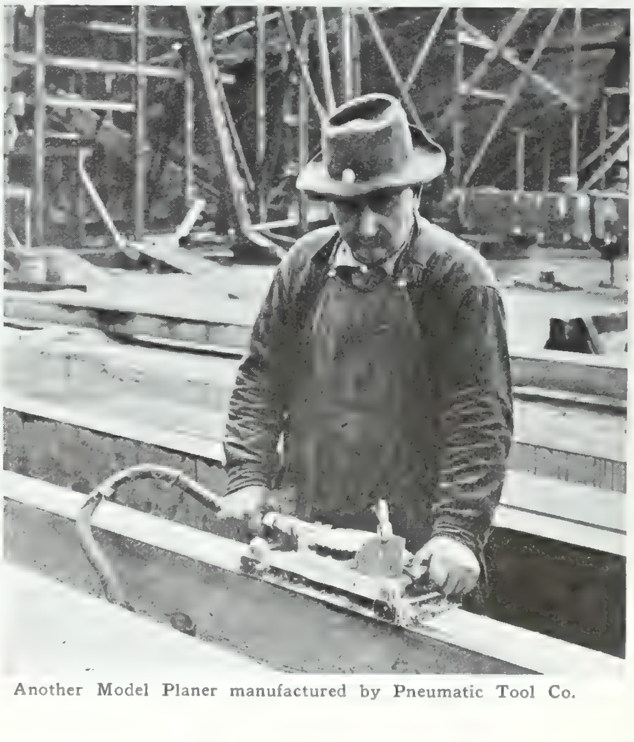
The new dubber weighs but eleven pounds, the weight of the wood hog thus being cut practically in two, so that it is easily operated by one man, a man who, by the way, can be trained in a short time to handle the machine skillfully and efficiently, whereas years are required to become expert in the use of the adz.

The dubber has the greatest cutting capacity per pound ever produced. It is light enough for a man to use anywhere, and cut in any position or direction, and powerful enough to make a cut one-quarter inch deep and six inches wide across a stanchion as easily as pushing a knife through cheese. The machine will work on all kinds of woods irrespective of the degree of their hardness.

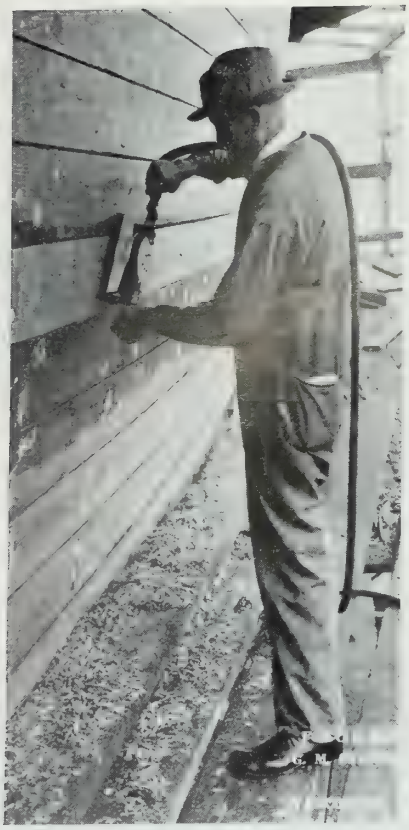
In producing the dubber the company has been working toward light weight tools in order to make the workman's task lighter, thereby increasing speed and efficiency at the same time, and it has solved the dubbing problem without resort to the scaffolding and tracking a heavy machine would require.

The first machine designed was placed in the yard of the Allen Shipbuilding Company of Seattle several months ago for try-out tests and report on performance. An idea of how remarkable was the new dubber's performance may be readily gathered from the statement that the shipbuilders were loath to return it to the Portland inventors and only did release it for a period of thirty-six hours for the tool company's engineers to complete designs, when it had to be returned for use in the Seattle shipyard again. And the Allen

Model D dubber in use



Another Model Planer manufactured by Pneumatic Tool Co.



Model "D" Planer at work on skin planking

yard has won many honors in wood construction in District 10, in which it is located.

In reporting to the Shipbuilders Pneumatic Tool Company on the performance of the machine, the Allen Shipbuilding Company, through Frank P. Allen Jr., its president, said:

"The Air Dubber, your latest pneumatic machine for speeding ship production, will pay for itself, in savings it effects, every two weeks.

"Above you have one result of our check on its performance.

"You will recall this machine was installed some months ago, and it has been in daily operation since, undergoing the hardest of tests. In fact, it has been on the job continually, with the exception of thirty-six hours, when we returned it to your engineers to aid him in completing designs.

"The little machine is nothing short of marvelous in the manner in which it does all outboard and frame dubbing and we have found in certain classes of work it replaces five men, releasing them for other essential departments, while in others, its man-replacement runs as high as ten or more workmen.

"Our costs were watched carefully and as closely checked, disclosing that one machine would pay for itself every two weeks.

"The Air Dubber, as compared with the time-honored adz hand method, is as the racing automobile to the horse-drawn vehicle.

"There are no two ways about it. The Air Dubber is a success. It is safe, speedily efficient, saves time and labor which cuts costs and increases the builder's profits. In addition, it eliminates the accidents due to the use of the adz."

After several months of tests, during which the machine has been developed and refined, the company has made ready for quantity production and orders for the new dubber are pouring in from shipyards throughout the United States and Canada, mainly because of the remarkable performance of the company's other air tools, for this is the first account of its latest invention.

A LARGE STOCK OF HARDWOOD

Now that Uncle Sam has lifted restrictions on building, the promised country-wide building boom is at hand. In view of this fact, builders are taking the few weeks before the new season to line up the available stocks in readiness for the activity which 1919 will certainly bring.

In the matter of supplying stocks in their own particular line, White Brothers, the San Francisco hardwood dealers, in preparation for the coming needs, have just issued a partial stock list showing the quantities available in the hardwoods especially adapted to builders' requirements. This list is dated December 10, 1918, and in the foreword makes the following points:

"'Preparedness' has been the keynote of our business ever since 1872—'preparedness' in point of always carrying on hand, at our yards, the largest stock of dry hardwoods in the West, ready for immediate delivery.

"Now that all building restrictions have been removed, and the demand for hardwoods utilized in building homes, factories, warehouses, business or public buildings is bound to increase very rapidly, it is well to note how easily 'hardwood headquarters' can supply your needs."

Then follows a list of dry hardwoods suitable for building, interior trim, etc., which White Brothers have at their yards, Fifth and Brannan streets, San Francisco, ready for immediate shipment. The list includes ash, birch, gum, jenisero, mahogany, maple, Oregon maple, plain and quartered oak, poplar, teak, walnut, hardwood flooring and Wybro-veneered panels.

The showing made by this stock list proves that there is no scarcity of hardwoods on the Pacific Coast and that builders may be secure in the knowledge that their hardwood requirements can be promptly furnished.

The Chicago Pneumatic Tool Company announces the appointment of A. M. Brown as district manager of sales, 1740 Market street, Philadelphia, succeeding G. A. Barden, who remains in Philadelphia as sales representative for the company.

For some time past Mr. Brown has been located in the New York offices of the company as assistant manager, compressor sales division.

L. F. BODY GOES WITH GLIDDEN

Popular Clevelander Severs Connection to Become Associated with Glidden Company

L. F. Body, well known and popular Cleveland paint and varnish man, has joined the sales organization as manager of railway, street railway and marine sales, of the Glidden Co., Cleveland, starting on December 1st.

L. F. Body

Mr. Body has been identified with paint and varnish interests for many years. He began his career with the Sherwin-Williams Co, back in 1902, where, after many promotions, he rose to the managership of railway and marine sales in 1912.

In 1915 he severed his connection with Sherwin-Williams to become sales manager of the Master Builders Co., of Cleveland, which position he has occupied successfully ever since.

In Mr. Body the Glidden Co. is getting a man whose success has been built up through perseverance and concentrated well-organized effort. His friends will be glad to learn of his new position.

Graphical and Mechanical Computation. By Joseph Lipka, Ph.D., Assistant Professor of Mathematics in the Massachusetts Institute of Technology. 264 pages. John Wiley & Sons, New York City, and Chapman & Hall, London. $4 net.

Professor Lipka deals with slide rules, scales and charts of the engineer and engineering student.

Mr. L. G. Buske, who for twenty-eight years has been connected with the Shaw Electric Crane Company of Muskegon, Michigan, as erecting engineer and service man, has resigned his position, and is identifying himself in a responsible position with the Champion Engineering Company of Kenton, Ohio, engineers and manufacturers of Champion cranes.

Heavy Oil Engine Factory

The Gulowsen Grei Engine Company of Seattle, Washington, was incorporated with a paid-up capital and surplus of $760,000. The plant, costing $700,000, is equipped entirely with the most modern and up-to-date machinery available. It covers six acres of ground and has 1000 feet of water front on Salmon Bay, just above the government locks connecting Lake Washington and the Sound. The A. Gulowsen A. S. of Christiania, Norway, was established in 1889 and placed its first marine engines on the market in 1902. The company centered all its efforts on quality and service and has grown to be the largest marine engine factory in Norway. It has perfected an engine, embodying strength and reliability in its every feature. The company has simplified its design and has made "economy" its watchword of operation. That the efforts of the company have been appreciated, is evidenced by the fact that there are more "G. G." engines in use among the fishing and work-boat fleets of Norway and of Northern Europe than of any other make of engine. The Gulowsen Grei heavy oil engines have been awarded the first prize in every exhibition wherein they have been entered in competition with other makes of engines.

The Christiania plant at present has a capacity of 15,000 b. h. p. a year. The Seattle factory has the same capacity. The Seattle factory is manufacturing 80 b. h. p. and 240 b. h. p. engines, and patterns are being made for the 360 and 540 b. h. p. sizes.

Above: Exterior of the foundry, Gulowsen Grei Engine Company. Center: Assembling department. Below: Exterior of the machine shop

RECREATION THEATER

Formal Opening of the Latest Innovation of the Bantam Ball-Bearing Company

Trust the Bantam Ball-Bearing Company to be "Johnny-on-the-spot." They are all live wires from W. S. Rogers, Miss Nellie Scott and C. B. Heath, right down through. They do things. Their latest is a corker. The company, in accordance with its efficiency policy, has just fitted up a large room as an "employes" recreation theater." It is exclusively for employes and members of their families not employed in other business or factories.

The room is in the factory proper and is about 80x20. At one end is a stage and at the other one of the very latest and best movie machines. The room will seat about 250. It is thoroughly equipped with chairs, tables, reading matter, etc., and will be used as a rest and recreation room during noon hour and after hours. Twice a week moving pictures will be shown. Arrangements are being made for the serving of meals to employees. The whole thing will be in charge of the men and the various committees have already been appointed.

The schedule is as follows:

Mondays—Committees and rehearsals, 7 p. m. to 10 p. m.

Tuesdays, Thursdays and Fridays—Reading room, 7 p. m. to 10 p. m.

Wednesdays — Motion pictures, 8 p. m.

Saturdays — Motion pictures and vaudeville, 8 p. m.

Luncheons and concerts every noon hour.

W. G. McPHERSON COMPANY

The W. G. McPherson Company, heating and ventilating engineers and manufacturers of marine sheet metal work, have been engaged in business in Portland since 1891. Their business has steadily grown to its present dimensions, giving employment to over 120 men exclusive of the office force, which consists of C. J. McPherson, vice-president and manager; R. G. McPherson, secretary and treasurer; W. G. McPherson, president; together with D. G. Duncan, head bookkeeper, his assistants and stenographers. They are capitalized at $100,000, with a substantial surplus and the concern is what is known as a close corporation, all the stock being sold by the people mentioned above and R. B. McPherson, a brother of its president.

Foreseeing the demand upon manufacturers for ships' heavy sheet metal work some three years ago, they installed about $10,000 worth of special machinery, to which they have added other machines until at the present time there is no doubt but they are by far the best equipped concern in the Northwest for the turning out of considerable quantities of sheet metal work from three-eights to all lighter gauges of sheets and plate work, whether the articles be ships, boats and life rafts or smoke stacks and kitchen paraphernalia for any ship.

Their principal aim, whether the work to be accomplished be the heating or ventilating of the largest of public buildings, or the building of the smallest part of ships' sheet metal equipment, has always been to do more than exacted by the specifications or the expectations of the customers, to avoid all "extras" and to give the best possible service in both material and time of delivery to the end of keeping all old customers and building such a reputation for square dealing as would insure to those people anxious to avoid misunderstandings and attendant worries exactly what they wanted, without any overcharges on account of extras, or rejections of work at inspection periods by reason of faulty or improper construction.

The fact that a great amount of work is turned over to W. G. McPherson Company without competitive bids is indicative of the high regard in which this company is held amongst its customers.

Brown Cranes in Shipbuilding

The Saginaw Shipbuilding Company of Saginaw, Mich., has been doing a great deal of shipbuilding work for the Emergency Fleet Corporation. In order to take care of the expansion in its business, new crane equipment was necessary. A contract was placed with the Brown Hoisting Machinery Company of Cleveland, O., for two large electric rotating cranes, mounted on portal piers. These cranes travel on tracks, spaced 18 feet centers. They span a railroad track and are high enough to allow freight trains to pass under the portal. Mounted on the top of the portal is a rotating and hoisting mechanism. This rotating and hoisting mechanism also carries the operator's cabin, and from this cabin the one operator controls all movements of the crane, including traveling along the track, raising and lowering of the boom, rotating in a complete circle, as well as hoisting and lowering the load.

One 82-horsepower motor of the General Electric induction type is used for performing all crane functions. The controller is a reversing General Electric drum type. The electrical current is 440-volt, 3-phase, 60-cycle, and is taken from a conductor system along the crane runway.

The crane is fitted with collector rings between the revolving superstructure and the portal pier to allow continuous rotation.

The hoisting machinery consists of two hoisting drums, one operating the main hoist, which has a capacity of 15 tons on a three-part line, the other drum operating an auxiliary hoist of 5-tons capacity on a single line.

All movements of the crane are operated through friction clutches of the balanced type. For hoisting and lowering the boom a spur gear-driven mechanism is used, so that the boom may be hoisted or lowered with a 4-ton load on the hook. Each crane is equipped with a boom 100 feet in length, and the radius may be varied from 100 feet maximum to 40 feet minimum.

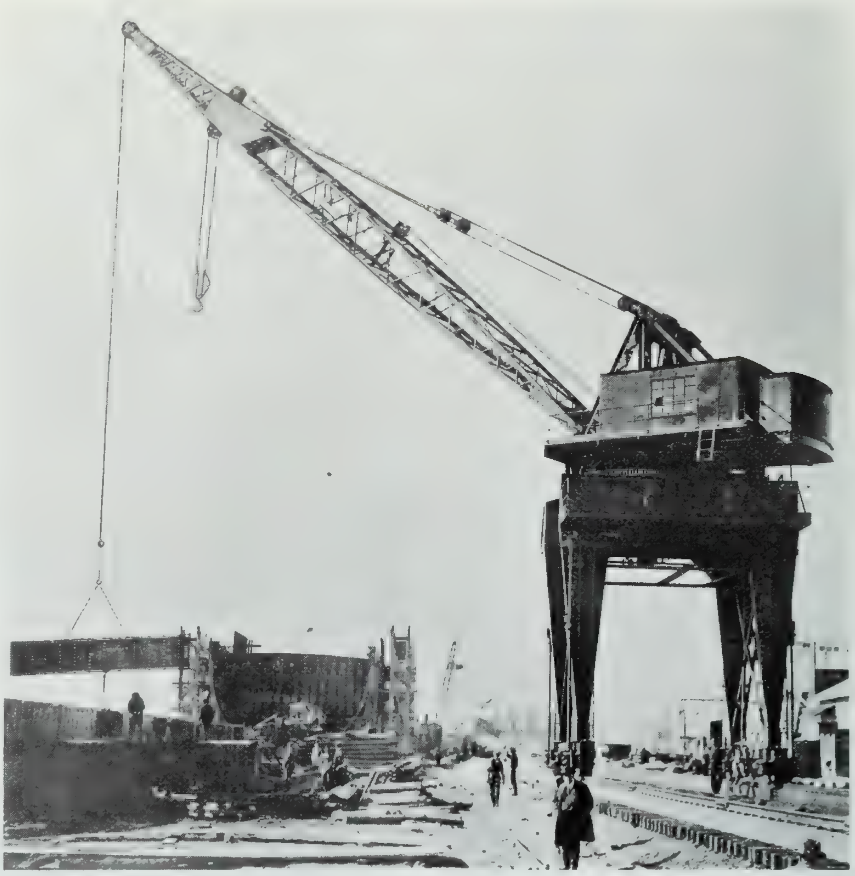
The motions of hoisting, traveling and rotating can be performed simultaneously and at the following speeds: Hoisting 15-ton load on main hoist, 30 f. p. m.; hoisting 5-ton load on auxiliary hoist, 100 f. p. m.; rotating full load at rate of ½ r. p. m.; crane travel on straight track, 300 f. p. m.

The entire machine is mounted on four two-wheel equalizing trucks. These trucks are connected to the portal pier legs by means of pins, allowing the trucks to equalize on uneven tracks. Wheels have chilled treads with double flanges.

The crane is provided with ladders and hand rails, so it is easy of access to the revolving superstructure.

The crane is used for placing plates, machinery, etc., in ship construction, and, on account of its height and great reach, the entire ship can be covered.

The picture shows one of these cranes in actual operation.



Brown electric rotating portal crane of Saginaw Shipbuilding Company

Concrete Engineers' Handbook. By G. A. Hool and N. C. Johnson. 885 pages; numerous illustrations, diagrams and tables. McGraw-Hill Book Co., 239 West Thirty-ninth street, New York.

A very complete manual, "prepared to make available in concise form the best of present-day knowledge concerning concrete and reinforced concrete, and to present complete data and details as well as numerous tables and diagrams for the design and construction of the principal types of concrete structures." The authors have drawn material from a very wide range of sources, and have performed the work of editing in a very praiseworthy manner. Especially are they to be congratulated on the very complete table of contents, index and cross reference, which greatly facilitate the use of this work as a handbook by engineers.

The shipbuilder or shipowner, however, who is looking for specific information on use of concrete in shipbuilding will be disappointed, as the treatment of this highly interesting and timely phase of the subject is limited to an appendix giving a reprint of the report of the Joint Committee of the American Concrete Institute and Portland Cement Association.

Take Davidson Agency

The Wilbur L. Hiller Company, Inc., Mr. D. B. Catton, manager, have recently taken over the Pacific Coast agency of the Davidson Tool Manufacturing Corporation of Brooklyn, N. Y., manufacturers of milling cutters, bridge reamers, large twist drills, flat form tools, of Davidsonized high speed steel.

Davidsonized steel means a process of intensifying and making the molecular structure more homogeneously continuous, obtaining results from the various alloys heretofore believed impossible, hence the steel becomes decidedly tougher with approximately 50 per cent greater resistance to abrasive wear. Consequently, the cutting efficiency has been increased quite 50 per cent, as tests have proven.

As there is a big demand for this class of tool on the Pacific Coast, we predict a splendid business for the Davidsonized products under the able representation of the Wilbur L. Hiller Company, Inc., on this coast.

Trading with Latin America. By Ernest B. Filsinger. 183 pages. The Irving National Bank, Woolworth Bldg., New York City.

This book, designed to instruct in the methods of and to stimulate trade with Latin America, is presented by the Irving National Bank to those interested. It is complete and evidently authoritative. The minutiae and formalities incident to the export trade are covered adequately. Sections are devoted to the principal Latin American countries.

A Properly Equipped Warehouse

San Francisco warehouse, Edward L. Soule Company

At Potrero and Division streets, San Francisco, the Edward L. Soule Company have for storage of their iron and steel a large warehouse which has been equipped in a very satisfactory way for handling these products.

The equipment consists of a Shepard cage operated monorail hoist of five tons capacity, with a lifting speed of 20 to 60 feet per minute and a maximum lift of 17 feet. The travelling speed is 150 feet per minute. Three lever operated drum type controllers, each with seventeen running speeds, are in the cage, one controller for the lift, another for the hoist travel and another for operating the transfer bridge crane. The very best type of motor, manufactured by the Electro-Dynamic Motor Company, is used on these hoists. This is the same make of motor selected by the United States Government for driving submarines.

The transfer bridge crane of approximately fifty feet span carries the monorail hoist, and the function of the crane is to transfer the hoist from one spur track to another. There are approximately five spurs leading from the crane runway and these spurs are arranged in such a manner as to permit the hoist to cover every square foot of area in the warehouse. The crane is equipped with the Shepard patented locking device which locks the crane to either one of the spurs, enabling the hoist to run on any of the spurs and made the return trip to the crane without the danger of running off the overhead track. The crane is also equipped with baffle plates controlled by the operator in the cage. These baffles are located at each end of the transfer bridge and their purpose is to arrest the hoist and to prevent it from running off the crane when the crane happens to be running between the spur tracks.

The Edward L. Soule Company was established in 1906, and has achieved a fine reputation for prompt and courteous dealings with its many customers. The firm has been handling a large tonnage of straight and deformed bar steel for reinforced concrete construction for local structural work and shipbuilding. They also deal in iron and steel bands, hoops, bolts, nuts, washers, chain forgings, plates, pipes, tubes and casing, rolled steel shapes, rails and accessories, rivets, nails, spikes and screws, sheets, tin and terne plate, special steels, wire, zinc, machinery and hardware.

In addition to their domestic business the Edward L. Soule Company are shipping large quantities of these materials in the export trade.

BOOK REVIEWS.

Modern Shipbuilding Terms Defined and Illustrated. By J. Forrest Pease. 143 pages, 82 plates, 350 illustrations. J. B. Lippincott Company. $2.00 net.

A very complete manual of the elementary aspects of the shipbuilding industry. Two thousand terms used in shipyard practice are defined and illustrated so that the man without a technical education can grasp the meaning and use of the various parts of a modern steamer and can know their relationship to the whole as a finished product.

This book is the most up-to-date publication of its kind that has yet appeared in print. It gives full treatment of the work of assembling ships from standard fabricated parts, and describes in detail the work of welding and the general use of oxy-acetylene flame in cutting operations.

Alphabetical arrangement of the dictionary of terms and a cross reference system from definition to illustrations make this book a very convenient reference volume. It should be on the bookshelves of everyone who is interested in ships and shipbuilding.

American Methods in Foreign Trade: A Guide to Export Selling Policy. By George C. Vedder. 204 pages. McGraw-Hill Book Co., 239 West Thirty-ninth street, New York. $2.

Mr. Vedder takes a curious course to lead his reader to American methods in foreign trade, for his first chapter is devoted to "the fundamental weaknesses of German trade policy," but he draws from German errors morals for Americans, one of which is a criticism of too much paternalism, manifested especially to the writer in the Webb-Pomerene act. Mr. Vedder's book is an excellent treatise on the fundamental principles of foreign trade, these principles being applied to specific instances. There are chapters on the American merchant marine, American banks abroad, the protective tariff, in addition to many dealing with the technique of foreign trade. The last chapter is entitled "German Competition."

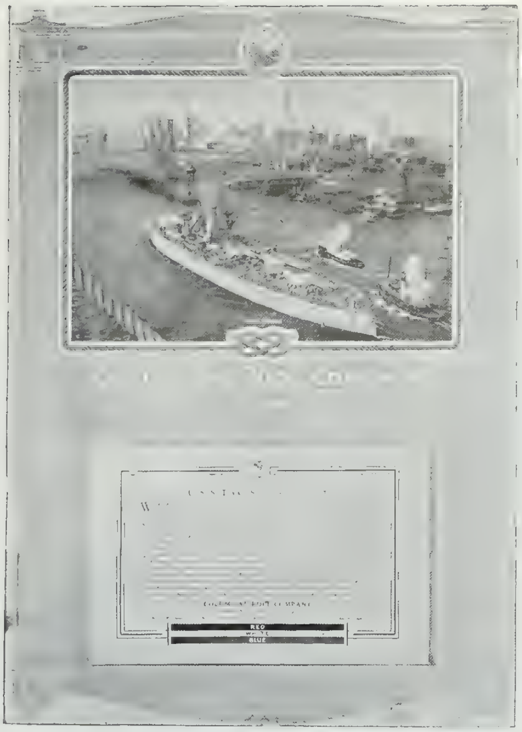
RECENT WORK IN PORTLAND BY NATIONAL HOSPITAL ASSOCIATION

Whence did the 1918 influenza epidemic come? Nobody seems to know. It came like the night, silently, borne on gentle winds.

But there is evidence it came on an east wind. The first case recorded was in Boston, where on September 14th the report of forty-six deaths startled the country. Next day Boston followed this up with a report of 265 deaths.

The disease was ten days in reaching Oregon, where the first case was reported at Fossil on September 25. The first death in this state was reported October 1st, a young woman dying on the steamer "Hassalo" en route from some point in Washington to Portland. During the ensuing sixty-two days the Portland Health Bureau inscribed on its influenza death roll 594 cases of men, women and children who died of pneumonia and related ailments following attacks of influenza. The total number of cases reported officially during the period was 8080, the deaths averaging somewhat over seven per cent. The largest number of deaths occurring in a single day in the city of Portland was 28, on October 31st.

Schools, theatres and all public gatherings were suspended, the working hours in stores and offices were shortened and people employed therein were sent home at 4 o'clock in order to avoid crowding the street cars. The city authorities devoted their energies to combating the disease in all possible measures for prevention and relief. The mayor threw open the public auditorium for hospital uses and there the city's agencies for health—the city Health Bureau, the Red Cross, the State Board of Health, the National Hospital Association and various volunteer workers—strove their mightiest for two months before the epidemic was checked. Invaluable aid was rendered also by the public school teachers and principals, who organized and distributed printed instructions to householders on how to avoid the contagion. A number of soldiers from Vancouver Barracks volunteered as orderlies at the auditorium hospital, where they assisted in the care and nursing of the afflicted, and so faithful were they that after the crisis of the epidemic was passed, Mayor Baker of Portland conferred medals publicly on a score of them. Two volunteer soldier orderlies had given their lives, having caught the disease while on duty in the auditorium. The gratitude of all the city's agencies, including the National Hospital Association, which in a measure is a privately conducted institution and furnishes its own doctors and nurses, has been expressed to these good soldiers, who, in their loyal service to humanity, picked no favorites but worked for all alike.



AN ATTRACTIVE CALENDAR

The 1919 Columbian Calendar is a decided innovation in the way of a marine calendar, inasmuch as it is the first calendar produced by a cordage company wherein a battleship is shown. To quote from the top fly leaf of the calendar:

"What American is there among us who can gaze on this inspiring picture without a thrill of intense pride, satisfaction and security? It is just such battleships that have guarded our merchant marine and thousands of miles of coast line from the attacks of the enemy. Silently, day and night, these fighting monsters plow the high seas, ever watchful of our shipping, constantly on the alert for enemy submarines, ready on the instant to blow them to atoms.

"In no other navy will you find more expert seamen and gunners—every mother's son of them loyal, true blue Americans, gladly giving their lives to the protection of our native land, our homes and our liberty.

"The 1919 Columbian Calendar, we feel sure, is fully in keeping with the times, and that it will be highly prized by every one who is fortunate enough to receive it.

"A description of the U. S. S. Texas undoubtedly will do more than anything else to bring about a realization of the protection afforded by battleships of this type: Length over all, 573 feet; breadth, 95 feet [illegible] inches; full-load displacement, [illegible] tons; speed, 21.05 knots; horse power, 28,373; officers, 100; bluejackets, 857; marines, 72; guns, ten 14-inch, 45-caliber, breech-loading; twenty-one 5-inch, 51-calibre, breech-loading; two 3-inch, anti-aircraft; torpedo tubes, four 21-inch, submerged.

"Silhouetted against the New York City skyline, it makes a picture that will be long remembered."

This calendar should be in the hands of everyone interested in the sale or handling of cordage of any description. Although the supply is limited, the Columbian Rope Company of Auburn, N. Y., offers to send one to any one interested upon request.

Oxwelding and Cutting. A Manual of Instruction. 124 pages, numerous cuts. Published by Oxweld Acetylene Company.

No shipyard is up to date without a complete installation for the use of the oxy-acetylene flame in welding and cutting operations. This comparatively new process has almost revolutionized the industry. This little booklet, therefore, should find a wide field for its usefulness, as it is gotten up in convenient form, with clear, concise text and abundant illustration. Every metal worker should add this pamphlet to his library of trade literature.

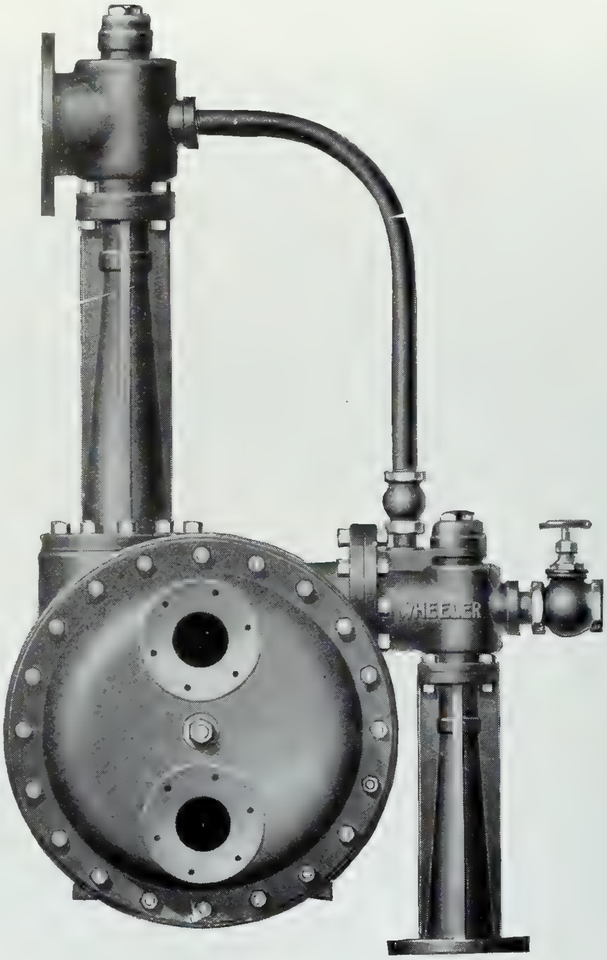
GETS STEAM JET PUMP RIGHTS

The Wheeler Condenser and Engineering Company of Carteret, New Jersey, announces that it has obtained from the Schutte and Koerting Company of Philadelphia, through the alien property custodian, the exclusive right to manufacture and sell steam jet air pumps under patent No. 968,926 in connection with surface condensers, jet condensers, barometric condensers, vacuum pans and evaporating apparatus.

This patent covers the valuable features of two or more steam jets working in series with a condenser between the jets—a feature that enables this type of pump to perform a given duty much more efficiently than any steam jet not so equipped.

The photograph herewith shows this steam jet air pump.

Upon request test data and full information will be sent by the Wheeler Condenser and Engineering Company to any reader of this publication.



Wheeler condenser double steam jet air pump

Shipbuilders' Blue Book. By Walter Kay Crawford. Edited by E. R. Glass. 79 pages, numerous diagrams and tables. Ocean Publishing Co., 25 West 42nd street, New York. $1.50 net.

The experience of thirty years at shipbuilding boiled down and presented in convenient form for the use of apprentices and shipfitters. This little book fills a long-felt want.

BEAR ENGINES FOR SALE

The 4500 horsepower triple-expansion engine from the wrecked steamship Bear, and condensers, pumps and auxiliary equipment, are offered for sale by W. T. Cleverdon, Fife building, San Francisco. The engine was built at Newport News; the weight is about 414,000 pounds, exclusive of auxiliary pumps, shafts, etc., and it is estimated that the present cost would be about $175,000 and that delivery would require fifteen months. The pumps and auxiliary equipment cost $40,000.

The salvage of the Bear will be about $400,000. Mr. Cleverdon's estimate to Lloyd's was $300,000. The amount spent in salvage work thus far is $115,000.

HOT BEARINGS STOP THE SHIP

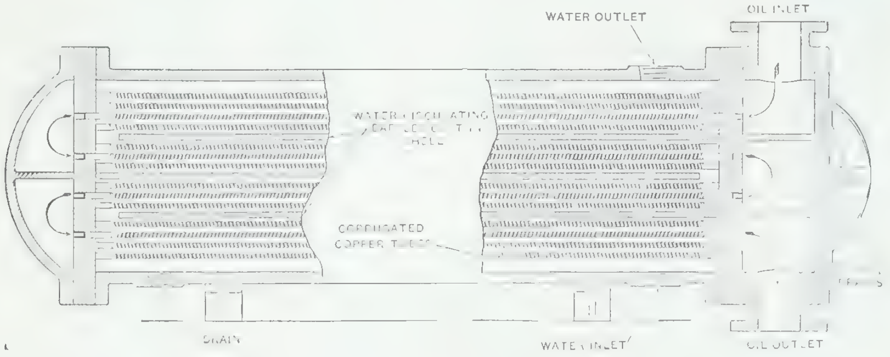
Alberger Oil Coolers will Effectively Maintain the Lubricating Oil at a Safe Temperature

Minimum Space Occupied
Maximum Heat Transmission

Minimum Amount Cooling Water
Minimum Friction Losses

Wainwright Oil Cooler
for Marine Installations

WAINWRIGHT coolers, with the exception of the tubes, are built of cast iron throughout, thereby eliminating the possibility of corrosion from sea water in marine work and assuring durability and long service. By the use of the WAINWRIGHT corrugated copper tube a considerably higher rate of heat transmission is obtained in the cooler as the tube corrugations cause a turbulent action and force all particles of the oil against the wall of the tube.



Sectional View of Wainwright Oil Cooler

BULLETINS SENT ON REQUEST

ALBERGER PUMP & CONDENSER COMPANY

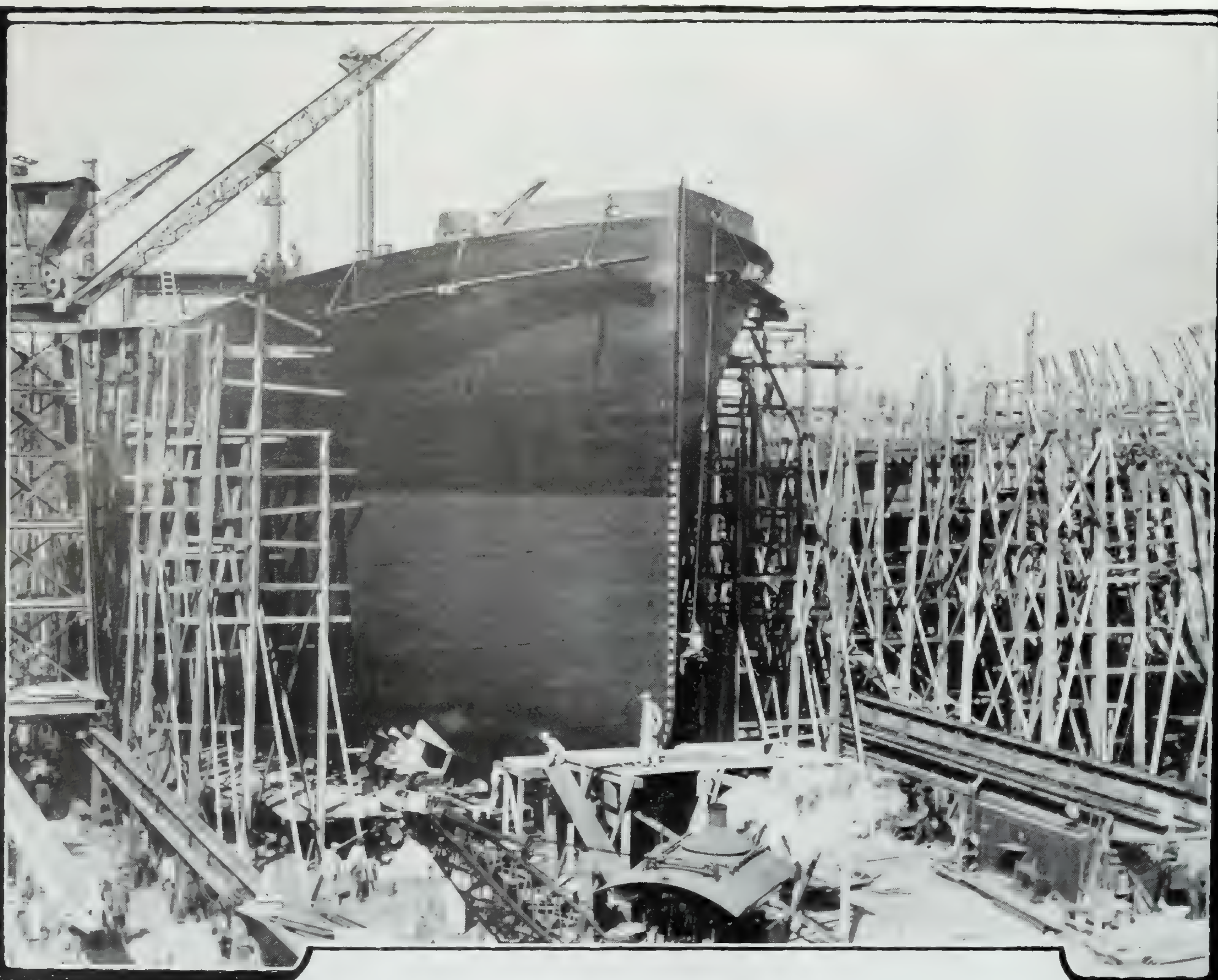
BOSTON
PHILADELPHIA

140 CEDAR STREET, NEW YORK, N. Y.

CHICAGO
ST. LOUIS

Seattle Representative: FRANK WALKER, 404 Central Building
San Francisco: FORD & GEIRRINE, Merchants Exchange Building

Builders of Steamship Engine Room Auxiliaries



Special Paints for Specific Purposes

Our plan of assuming the responsibility for recommending "Special Paints for Specific Purposes" has strongly appealed to a number of the large shipyards, because of the unusually satisfactory results obtained.

Long experience, exceptional facilities, and a complete organization enable us to quickly and economically produce a **special paint for a definite service**—no matter how exacting the requirement.

Our Marine line includes not only such standard paints as Outside White, Red Oxide, Navy Mast Color and Hull Black, but all other paints required in ship construction and maintenance.

TRADE MARK
PABCO PRODUCTS

Pabco Marine Products

Paints, Bituminous Primer and Enamel, Calking Pitches, and Seam-tite (a packing for seams).

Samples, prices and complete information gladly sent. Write or wire.

THE PARAFFINE COMPANIES, INC.
34 First St., San Francisco

Government Subsidy for Merchant Shipping

DUNCAN U. FLETCHER, Senator from Florida, chairman of the Senate Commerce Committee, in a letter addressed to W. R. Tucker, secretary of the Philadelphia Board of Trade, defends the Seaman's Bill. The letter was sent to George F. Sproule, secretary to the Commissioners of Navigation, and we publish here his reply as printed in the Philadelphia Evening Ledger:

"My Dear Mr. Tucker: I want to thank you for your courtesy in sending a copy of the letter addressed to you by the Hon. Duncan U. Fletcher, United States Senator from Florida, dated December 16, 1918, taking exceptions to my arguments regarding the American merchant marine, in which I sustained the views of Mr. Peter O. Knight, vice-president and general counsel of the American International Shipbuilding Corporation, wherein he claimed that because of discriminatory legislation 'no man can own and operate a ship profitably under the American flag,' appearing in the Evening Public Ledger of December 5 last.

"The distinguished Senator questions my statement of the existence of a law which compels the master of an American ship to give a seaman one-half his wages every five days while in port and then quotes the fourth section of the seaman's act, Section 4530, absolutely sustaining my contention, and this practice under the law referred to prevails, as may be ascertained by communicating with any United States shipping commissioner or shipmaster. It seems singular logic for the Senator to deny the existence of this law, and then quote its language definitely disproving his contention.

"If, for instance, it is his view that the law is not applicable unless a vessel 'loads or delivers cargo,' he must surely realize that in ninety-five cases out of a hundred a vessel is at port for no other purpose.

Forced to Make Payments

"He will also find, regardless of receipt or delivery of cargo, vessels are forced to make these five-day payments at every port. It must certainly be an oversight that he fails to recognize any increase in cost of operation for a master to have to either carry a considerable sum of money or negotiate advances at every port, often at high rates of interest. It frequently occurs that a vessel is at a small port where banking conveniences do not exist. Should he continue to fail to see any disadvantage in these enforced and frequent payments to seamen he need only, as I said before, consult the master of American vessels and he will learn of delays in sailing schedules through their having to round up loiterers ashore, difficulty of handling intoxicated seamen frequently unfit for duty when returning on board, increased desertions, etc. If the intent of this provision of the act is to enable seamen to transmit money to their families, a cursory investigation will show that, exclusive of officers, not ten per cent of the ordinary seamen have dependents.

"The Senator states that according to his information, American ships do not feed any better than ships of other maritime nations. In this assertion I hold the Senator is incorrect. While admitting

(Continued on Page 184)

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Victory has left us free to readjust conditions within our plant and we will soon be in a position to fully meet the demands of the trade, when we hope to demonstrate by faithful and prompt service, our appreciation for the consideration shown us by our patrons during the war.

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(Continued from Page 181)

the quality and quantity of food on British ships is almost equal to that on American ships, it might be well to note that exclusive of high-class passenger boats on British, German, Scandinavian and others, the seaman carries his food from the galley to the forecastle and is not provided with a messroom. On Scandinavian vessels crews are fed strictly by the 'scale,' each being given his portion, including his weekly pound of butter. On German ships is found a liberal but not too diversified quality of typical Teutonic food, and food not particularly relished by seamen of other nationalities. On very few foreign freighters are there refrigerating plants, a luxury adding to the cost of operation.

"If the Senator will obtain the daily bill of fare of the average American freighter, he will be surprised to find its standard much higher than that of the middle-class American householder.

Shipowners Too Liberal

"Another item of no small expense is the fact that American vessels almost exclusively supply their crews with mattresses, sheets, blankets, etc. I think no one would begrudge the seafaring man these comforts. Personally I feel they are deserving of them, but our liberality along such lines constitutes one of the many reasons we cannot hope to compete with vessels of other nations in the foreign trade. The only thing to do is to educate the foreigner up to our standards; we can never descend to his.

"I find no fault with the Senator's stand that the United States should be its own judge of the competency of seamen, even though standards of other nations are lax. I feel, however, that as able-bodied seamen of other nations, especially Great Britain, accept as proof of efficiency the record of service denoted in the seaman's certificate of discharge, we should do likewise. Under the La Follette act, unless a seaman has complied with the technical formula required in obtaining a certificate from the United States local inspectors, a procedure somewhat puzzling to an alien, who is often scarcely able to speak the English language, he is not an able seaman. As a matter of fact, the supply of United States certificated seamen is never equal to the demand. Our United States Shipping Board has agreed with the Seamen's Union that no 'A. B.'s' are to be shipped on their vessels until the union supply at a port is exhausted.

"Senator Fletcher again takes exceptions to my remarks and states that our laws do not fix the number of the crew on an American vessel. Inferentially they certainly do and the effect of the La Follette act is to materially increase the number of men on American vessels. The act, for instance, provides 'that while at sea the firemen, oilers and water tenders shall be divided into at least three watches.' Many American vessels that formerly carried but two oilers and two water tenders (their duties being very light), are now required to carry three persons in each of these positions.

"In the steward's department on American vessels a very much larger number must be carried than on foreign vessels. This fact can be so readily established that the question is hardly debatable.

High Wages Big Factor

"I note the Senator still holds to the belief the increase in wages of American officers and crews constitutes only a small percentage of the operating expenses of a vessel, and desires to fortify himself by reference to the report of the special committee of the New York Chamber of Commerce, which was presented to that body on January 7, 1915. He passes over the claim of John Donald, the present acting chairman of the United States Shipping Board, as to the operating expenses of the steamship David in the West India trade, to which I referred. I again draw his attention to Mr. Donald's statement that while under the American flag in normal times, her wages per month were $1235, and when placed under the Norwegian flag they dropped to $680. This in itself constitutes a difference of $6666 a year, or about five per cent on an investment of $130,000. I am familiar with the report of the special committee of the New York Chamber of Commerce. I am also familiar with the remarks of Mr. Irving T. Bush, on pages 149 and 159 of the annual report of the Chamber of Commerce of New York, 1914-1915, wherein he states that from carefully compiled statistics of a steamship which carried 7400 tons of cargo to the River Plate and came back with 6800 tons of grain, a voyage of about three months, and her expenses were $40,760 under the British flag and $42,800 under the American flag. It might be well to refer to the remarks of Mr. Welding Ring, page 170 of that volume, wherein he quotes no less authority than Captain Dollar that 'in a single instance in taking a ship from a foreign flag it necessitated the employment of four additional quartermasters at $70 a month, an extra engineer at $70 a month, three water tenders at $75 a month, and nobody knows what a water tender is on a foreign ship; and the total cost was $680 a month simply for changing the flag on a ship, or $8160 a year.

" 'In addition to that, the difference in the cost for tonnage dues entering every port based on a very much larger total measurement under the American flag. The total cost or the total difference in cost of operating that ship would closely approximate $12,000 a year. Is there any object for an American who can own ships and operate them under the British flag to put them under the American flag and pay that additional amount? The committee had not touched upon the vital points, and why not? An estimate has been made that at the present time there are nearly 2,000,000 tons of foreign shipping owned by Americans. Why does not that shipping come under the American flag? Simply and only because it cannot be operated under the American flag and for the reason that everything is higher. That can be remedied if Congress will pass a bill simply allowing us to operate our ships on the same basis of cost as any other country does.'

New Wage Scale in Effect

"The special wage commission authorized by the United States Shipping Board to adjust wage scale for licensed deck and engine room officers and wireless operators on vessels operated from Atlantic or Gulf ports, has agreed upon a scale, effective January 1, and which is to remain in full force until May 1, 1919. The licensed deck and engine room officers are divided into five classes, according to tonnage, and the wage scale varies according to classification. The classifications are separately based on single and double screw vessels, and the monthly pay according to classifica-

(Continued on Page 188)

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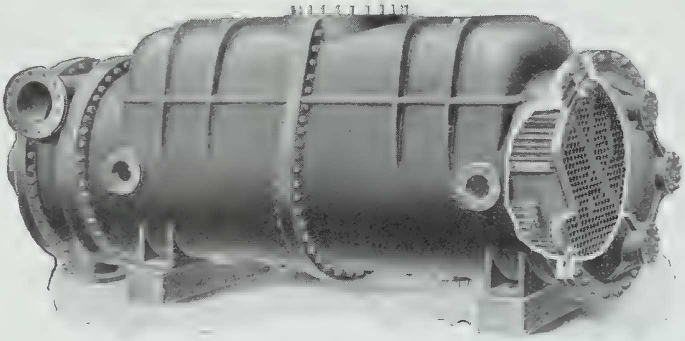

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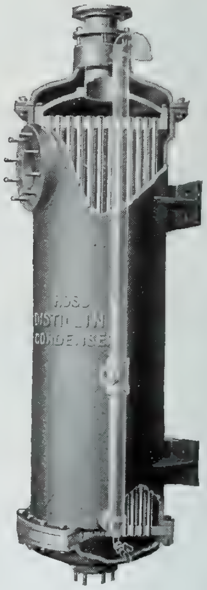

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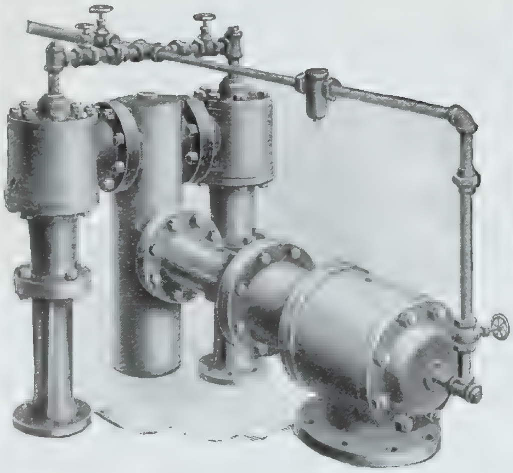

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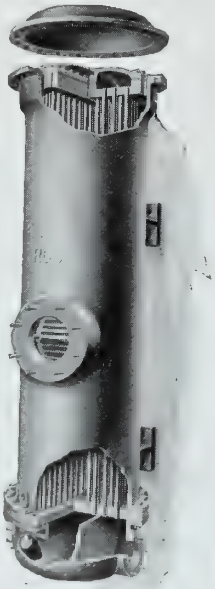

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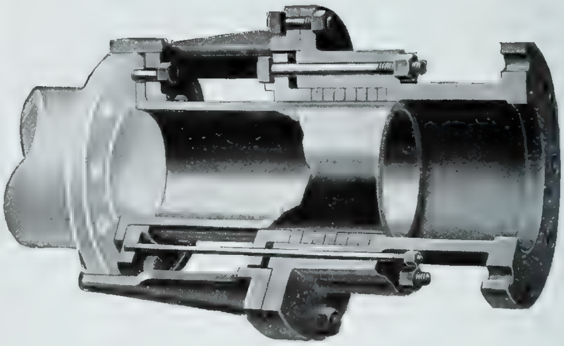

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SHEPARD
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(Continued from Page 184)

tion ranges for masters from $375 to $300. No person cognizant of the trials, tribulations and often harrowing experiences of a ship master will for an instant say this scale is too high, but we are up against the proposition of entering into competition with vessels of all nationalities in the foreign trade. With the exception of some of the high-grade British liners, I know of no instance where the master's wages exceeds $200 per month, and indeed in the majority of cases they range from $100 to $150 per month. The same ratio of wage prevails all the way down the line. I fail to see where the operations of the Seamen's Act will cause a reduction in the difference in wages between American and foreign ships. Such an effect cannot be brought about.

"The Senator questions my statement as to the difference of 50 per cent in the cost of operations between the Admiral boats in the West India trade and vessels of foreign registry which supplanted them. If he desires substantiation of this, I refer him to the remarks of Mr. R. A. C. Smith, president of the American Mail Steamship Company, on page 159, 'Report of the Merchant Marine Commission,' volume I. I am familiar with the fact that the steamships Shawmut and Tremont are now the property of the Panama Steamship Company and are named the Ancon and Cristobal, and that they are still in operation under the American flag. These ships have had a monopoly of Government freight and could charge such rates as they saw fit to make them a profitable proposition. I feel every maritime man will question the Senator's suggestion that bad management and 'high finance' were the reasons of their not proving financially successful. These vessels were built and operated by the Winsors, of Boston and Philadelphia. The late Mr. William D. Winsor was a resident of this city and was regarded as an authority on the American merchant marine. The family was brought up in the business of shipowning and the father before them operated the Winsor Line between Philadelphia, Boston, Fall River and Providence. The family not only enjoyed the confidence of the shipping community, but also of the financial interests of the country.

Forced to Accept Profitless Contracts

"I note that the Senator states the cost of building ships in American shipyards at the outbreak of the war in 1914 was about $45 a deadweight ton as against $35 a deadweight ton in Great Britain. I believe the steamships Plymouth and Franklin were built for about this sum by the New York Shipbuilding Corporation, as their total cost was $507,000 each, but this was at a time when the shipping business was at a very low ebb and this shipyard had employed but 1200 men. The contract was taken in order to keep intact the organization. It would hardly be fair to cite such instances as indicative of the cost of shipbuilding in the United States. The Plymouth was sold before she left the shipyard for $2,600.000. I believe that the steamship Suffolk was built by the New York Shipbuilding Corporation for about $45 per ton. It is a matter of record that for the purpose of prosecuting the war the United States authorized in 1917 an expenditure of $3,571,000,000 to build ships. Of this sum $1,658,000 had been expended up until December 1. The total tonnage under contract, according to the annual report of the Shipping Board, was 14,122,000 tons, which, with requisitioned tonnage, brings the total under construction up to 16,912,000 tons.

"At the time of the signing of the armistice, about 3,000,000 tons of this program had been built. The question which now confronts us is the necessity of completing this program of some 17,000,000 tons. There are no practical shipping men who will contradict the statement that even now under the present conditions it costs about twice as much to build an American ship as one in Great Britain, and twice as much to operate her. This handicap will only be accentuated by Government ownership. What is to become of this tonnage, if completed, is one of the grave problems of the country. We have not sufficient coastwise trade to give employment to such an amount of tonnage, and, as has been so often stated, the foreign trade offers such keen competition it cannot be successfully overcome by an American ship.

"The New York Journal of Commerce, under date of December 31, 1918, suggests there is no alternative other than that the Government sell these ships at a heavy sacrifice or charter them to American shipping firms at rates that will enable them to compete with foreign ships, but in either case the Government will stand to lose millions if not a billion without any compensating advantage.

"I note the Senator's reference to the London Exchange Year Book for 1914, wherein he states it is shown many English ships during the year 1914 indicated annual net profits of from 30 to 100 per cent. It is hard to reconcile this statement with conditions then prevailing. For instance, in 1914 manganese ore was being carried from Bombay to Philadelphia at twenty shillings six pence. Case oil was shipped from Philadelphia to two ports in North China for twenty and one-half cents. Nitrates from the west coast of South America to Philadelphia at seventeen shillings six pence. Grain from Philadelphia to picked ports in the United Kingdom or Continent at one shilling ten and one-half pence. The American ship Dirigo was chartered in December of that year to load 120.000 cases of oil at Philadelphia during the month of January, 1916, at twenty-four cents. Early in 1915, owing to the appearance of the German submarines, freights took an upward tendency and there are one or two instances of steamships having been fixed early that year to load grain at Baltimore for Scandinavian ports at five shillings. During the corresponding period the coastwise trade was at a very low ebb. Coal was being carried from Philadelphia to Boston by schooners at seventy cents and to Sound ports at sixty cents. Coal was shipped to Jacksonville at one dollar a ton, from which should be deducted thirty-two cents for covering the cost of trimming and discharging. Lumber was shipped from the South Atlantic ports to Philadelphia at from $4.50 to $5.00 per 1000. Contrast these freight rates with those now prevailing. These, however, are conditions with which we will have to contend in the not distant future.

"In my opinion, in order to keep our ships in the foreign trade, a subsidy or some other governmental aid is necessary. The late James J. Hill declared in favor of a tonnage bounty on exports or some such measure as would meet the competition of other nations. Otherwise he suggested getting out of the business.

"Yours very truly,
"GEORGE F. SPROULE."

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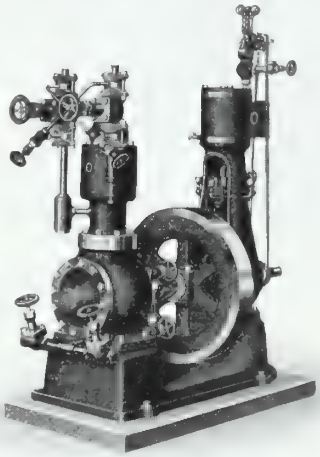

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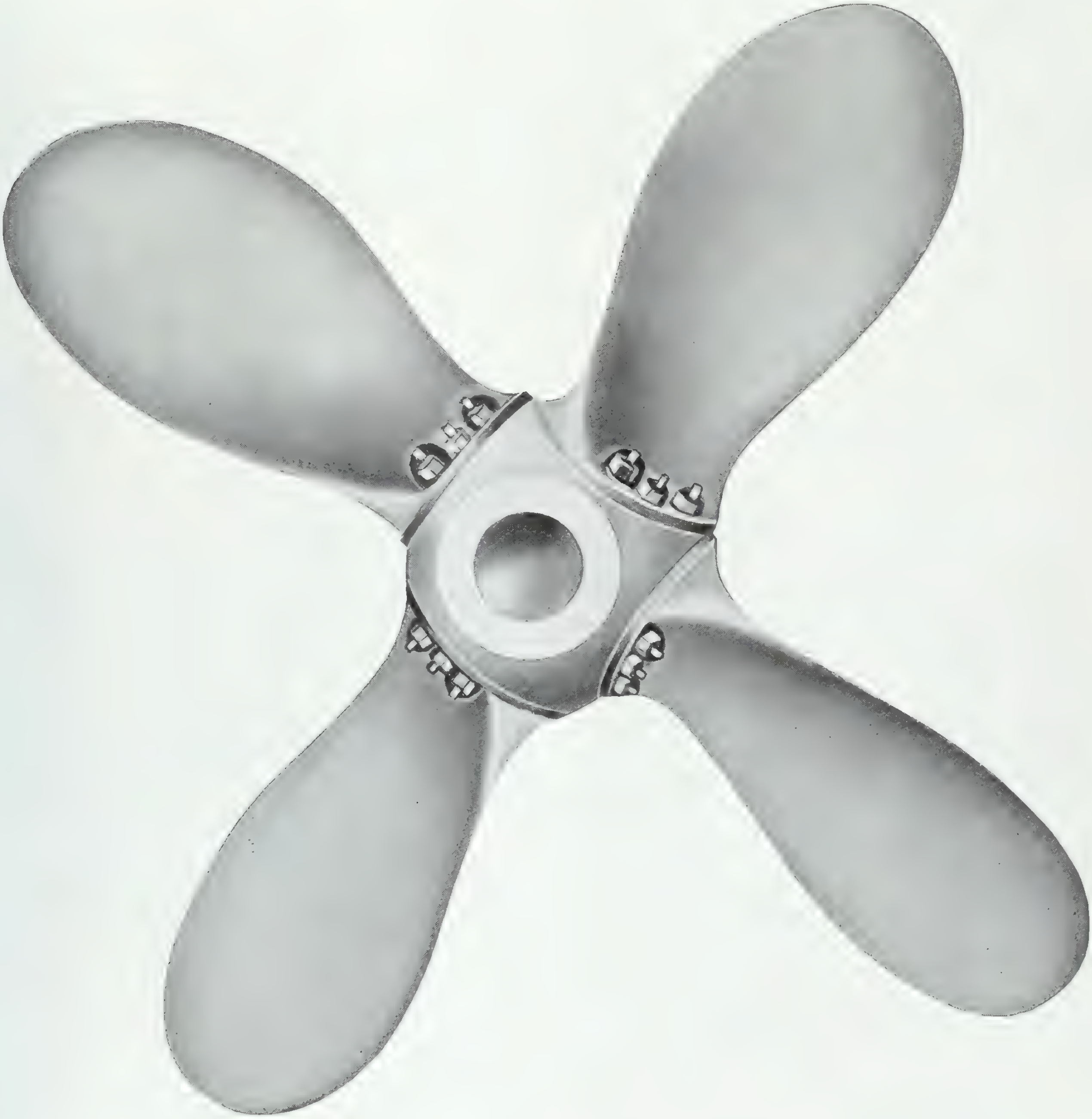

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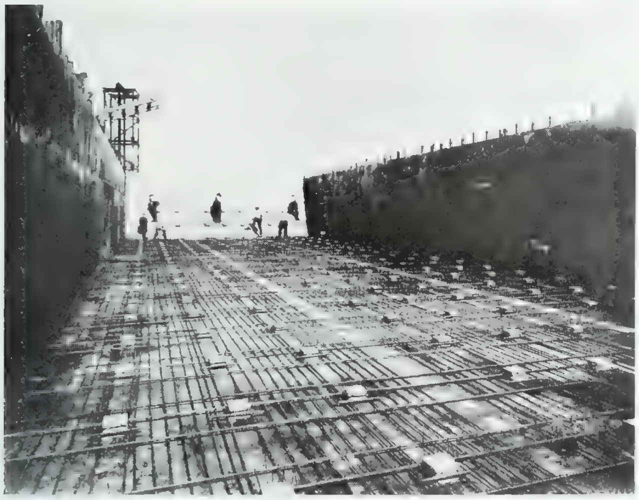
Building Aberthaw Concrete Boats

ONE of the latest developments of the Aberthaw Construction Company of Boston is the construction of concrete boats at its newly-established shipbuilding plant at Fields Point, Providence, R. I., where it now has two 500-ton concrete barges or lighters under construction, with plans under way for other and larger vessels.

In the construction of these boats the Aberthaw system differs in many respects from what hitherto has been the practice in concrete shipbuilding, and is the result of experience gained in twenty-five years of concrete construction.

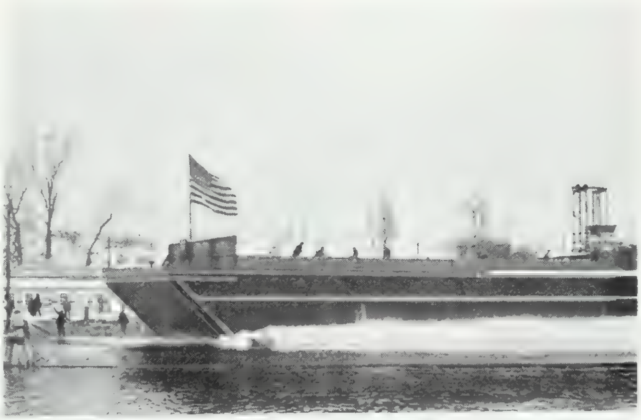
In Aberthaw practice only an extremely high-grade Lehigh Portland cement, ground so that 90 per cent will pass a No. 200 sieve, is used. The sand is a sharp, clean bank sand free from all dirt, vegetable matter, etc., ranging in size up to one-eighth inch. The aggregate is of such a size that it will pass a five-eighth-inch ring. Care is taken in the selection and grading of the aggregate, the maintenance of a rich mixture and the avoiding of an excess of water; and, perhaps what is of the most importance, all batches are mixed for not less than two minutes after all the material is in the mixer, giving a concrete that develops fiber stresses of 4000 pounds per square inch in twenty-eight days. "Setting tests" prevent the use of cement containing an excess of magnesium or iron oxide, which would cause the concrete to set too quickly.


Re-enforcing steel for 500-ton barge

Concreting Proceeds Continuously

In mixing, the stone and a portion of the water first is placed in the mixer, which is turned over sufficiently to scour the sand clean, the remainder of the aggregate, cement and water then being added. In order to obtain best results it has been found that the amount of water required is nine per cent by weight of the cement and aggregate.

The concrete is mixed in a motor-driven four-bag Ransome mixer with side loader for charging and spouting from the tower hopper by means of a short section of chute to a distributing point, thence to buggies or wheelbarrows at the ond of the boat at deck level. From this point the concrete is wheeled along staging at deck level to points where the placing gang is working, whence it runs through a short chute to a mortar box at the level of the placing gang and at this point is shovelled into place in the forms. In no case is the concrete poured through a height of wall more than 3 feet.


Launching an Aberthaw boat

Concreting proceeds continuously from the point at which it starts, working constantly around the edges of material already deposited, so that in no case does any section of concrete stand, whether in the wall or floor, for more than one-half hour before continuing to concrete. When a definite joint is provided, the surface is carefully picked to remove all laitance, washed thoroughly clean and painted with a coat of grout made of neat cement and water mixed to the consistency of cream. Care is taken that the concrete proceeds before the grout gets its initial set.

Ways Part of Formwork

In Aberthaw practice the building ways are actually part of the formwork necessary for supporting the boats. They are built of sound timber not less than eight or twelve by six inches, laid in trenches in the ground at such a depth as to provide a bearing value of four tons per square foot and to obviate the possibility of tidewater erosion. These ways or sleepers support posts properly braced and leveled, which take the girts that in turn carry the joists and panels of the formwork. Throughout the erection of the forms a variation from level of more than one-quarter inch is not allowed.

The forms are made up in panels, every precaution being taken to insure a smooth, true, impervious surface on the outside, the exact dimensions given being rigidly adhered to, as the small sections and high stresses used might be productive of serious results in the event of any deviation from the required concrete sizes. Aberthaw specifications require the panels to be surfaced with a covering of 26-inch galvanized iron, the metal

(Continued on page 207)

A 500-ton concrete coal barge

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(Continued from page 193)

sheets being butt-jointed and tacked in position with the metal stopping exactly at the edges of the panels. Both inside and outside panels or forms are made of sound air-dried lumber with extra cleating to prevent warping and twisting and to provide a smooth, tight surface. The surface of all exposed woodwork is painted with one coat of boiled linseed oil as soon as the panels are made up in order to make them as impervious to weather conditions as possible.

How Forms Are Erected

In the Aberthaw system the erection of forms proceeds as follows: Starting with the sleepers firmly tamped into place, the posts and girts are erected, carefully trued and leveled. These are followed by the joists, floor panels and wall panels in the order named, the wall panels being strongly braced so that they will maintain a position exactly corresponding to the outline intended for the boat. The next step is to place in proper position the bolts, wooden washers and the C. I. spacers ready to receive the reinforcing steel, after which the curved wooden fillet at the outside bilge curve is placed. The inside supporting floor forms and the floor beams sides are erected next, followed by the placing of the inside face of walls, bulkhead walls and pilasters.

The outside shell and deck are three inches thick and are reinforced with round deformed bars of the corrugated or Havemeyer type. The bottom slab and frame are designed to carry an upward pressure of water equal to a head of 11 feet 6 inches, and the side walls and frames are designed on the assumption that the water might be flush with the deck. The sides and the bottom are painted on the outside for greater impermeability, the bottom on the inside being flowed level with a rich mixture. The decks are granolithic finish.

Steel Is Mild Structural

The time required for the setting of wall panels is a trifle over a week, the floor and deck panels requiring not less than two weeks after the concrete is poured. Each barge requires 500 barrels of cement, 75 cubic yards of sand and 130 cubic yards of one-half inch stone, together with approximately 44 tons of reinforcing rods ranging in size from ⅜ inch to 1⅛ inches.

All of the steel used for reinforcing by Aberthaw is of mild structural grade, that used for the longitudinal girders being in one continuous length, butt-welded where necessary, care being taken that the welds are staggered, so that no two welds are within 40 inches of each other. The bars for the transverse frames are made continous in like manner. All intersections of bars are fastened with soft annealed wire wrapped around them and tightly twisted. No steel is placed nearer to the surface than one inch.

The lighters are 112 feet over all, with 34-foot beam and 11 feet 6 inches in depth. The draft empty is 3 feet 9 inches and, fully loaded, 9 feet.

Fifteen Compartments in Barge

The general shape of the barge is that of a rectangular box with the bottom sloping upward at each end and the corner formed by the junction of the sides and bottom rounded off to a 6-inch radius. Four transverse and two longitudinal bulkheads divide the lighter into fifteen water-tight compartments of approximately equal cubical capacity.

The deck of the lighter, which is without camber, is designed for carrying coal or a similar cargo and is constructed to take a uniformly distributed live load of 500 pounds per square foot, while the compartments themselves are well adapted for handling fuel oil. Each of the fifteen compartments is fitted with a hatch set in an iron frame furnished with rubber gasket and suitable provision for battening down. To assist in holding the deck load, a timber bulkhead is built enclosing an area 90 feet by 30 feet. The side bulkheads are 2 feet high and end walls 5 feet in height.

The barges are fitted with cast-iron chocks, cleats and bollards; the majority of the balance of the hardware used being galvanized. Bitts and fenders are of oak, the remainder of the woodwork being hard or long-leaf yellow pine, dressed on four sides. On the sides at either end is the Aberthaw "A" in brass, a mark that represents twenty-five years' experience in concrete construction.

LEGAL LOAD LINES

Senator Fletcher in the Senate and Representative Alexander in the House have introduced bills providing for load lines on American vessels. The act would apply to all cargo vessels of 500 or more gross tons, loading at any American port for a foreign voyage; to American cargo vessels of 500 or more gross tons loading at a foreign port; and, in the discretion of the secretary of commerce, to any vessel loading at any port in the United States or its possessions. The last category would include coastwise vessels.

Provision is made for permanent markings and for the appointing of the American Bureau of Shipping or another association for the survey of vessels, except that the shipowner may nominate an association, subject to the approval of the secretary of commerce. Comity with other nations is provided for, in that foreign vessels complying with regulations of their own country equally effective as those of the United States are exempt from the act.

Collectors of customs are empowered to detain vessels that are overloaded. Fines of from $500 to $1000 and imprisonment are provided for violations.

Would Extend Power of Commerce Commission

Under bills introduced by Senator Pomerene and Representative Esch, amending the Act to Regulate Commerce, water transportation would be brought within the control of the commerce commission. The powers of the commission are extended to transportation "wholly by boat between points on the rivers and lakes of the United States and by water between points on the seacoasts of the United States, and to such carriage of persons and property partly by railroad and partly by water, whether or not both are used under a common control, management, or arrangement for a continuous carriage or shipment."

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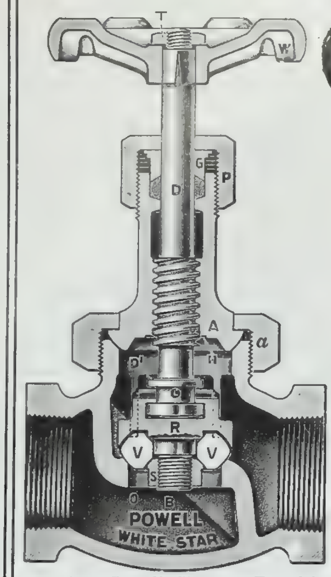

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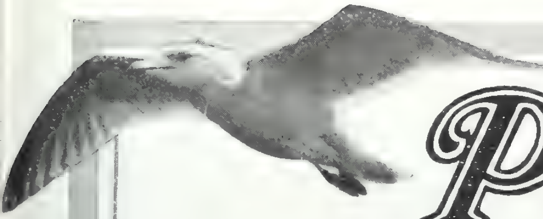

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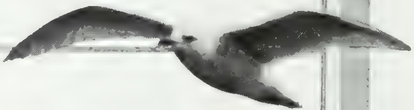

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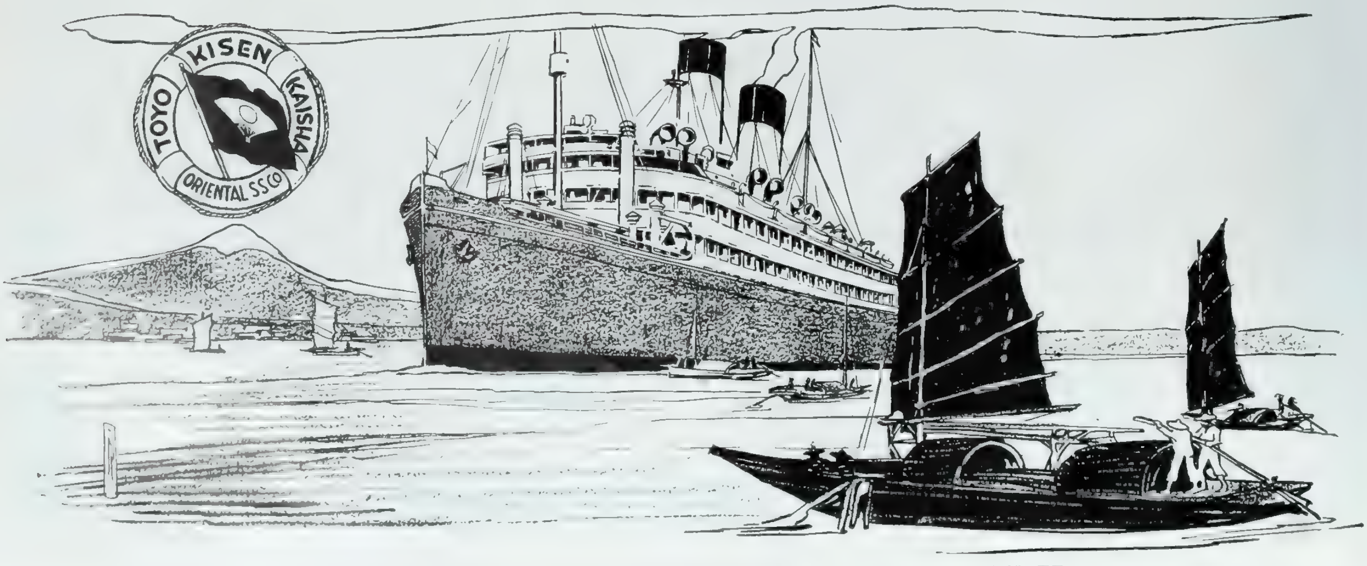

Pacific Marine Review
The National Magazine of Shipping
March, 1919
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San Francisco's Waterfront

By A. J. Dickie

HAVING had, through observation and association, an opportunity to watch the management of San Francisco's waterfront during the years from 1887 to 1904, and then, after an absence of fifteen years, to come back and study its present conditions, the writer is perhaps peculiarly fitted to realize and appreciate the changes that have taken place and the advance that has been made in both the policy of its management and the development of its physical features. One of his first recollections is of the old Fisherman's Wharf near the Presidio. There his gang used to resort, playing hookey from the old Pine street prison (grammar school), and there, for some trifling aid rendered the fishermen in hauling up the crab nets, they would be rewarded with the smaller crabs. At the gang's cache in the nearby sandhills would be found a five-gallon can and spuds, swiped from the home store. Crabs boiled in sea water and spuds baked in the embers of a driftwood fire—Oh boy! Nothing in the culinary line will ever equal those old feasts.

Another early impression has to do with the filth and squalor that were prevalent in those days on the active parts of the Embarcadero: Coming back from a picnic on Angel Island and landing at the old Howard street wharf, slipping on a muddy board, sliding off the walk into the muck in the gutter, ruining a best suit, and getting a sound thrashing, which, however well deserved on general principles, should, for that particular offense, have been administered to the State Board of Harbor Commissioners.

Cry for Relief from Politics

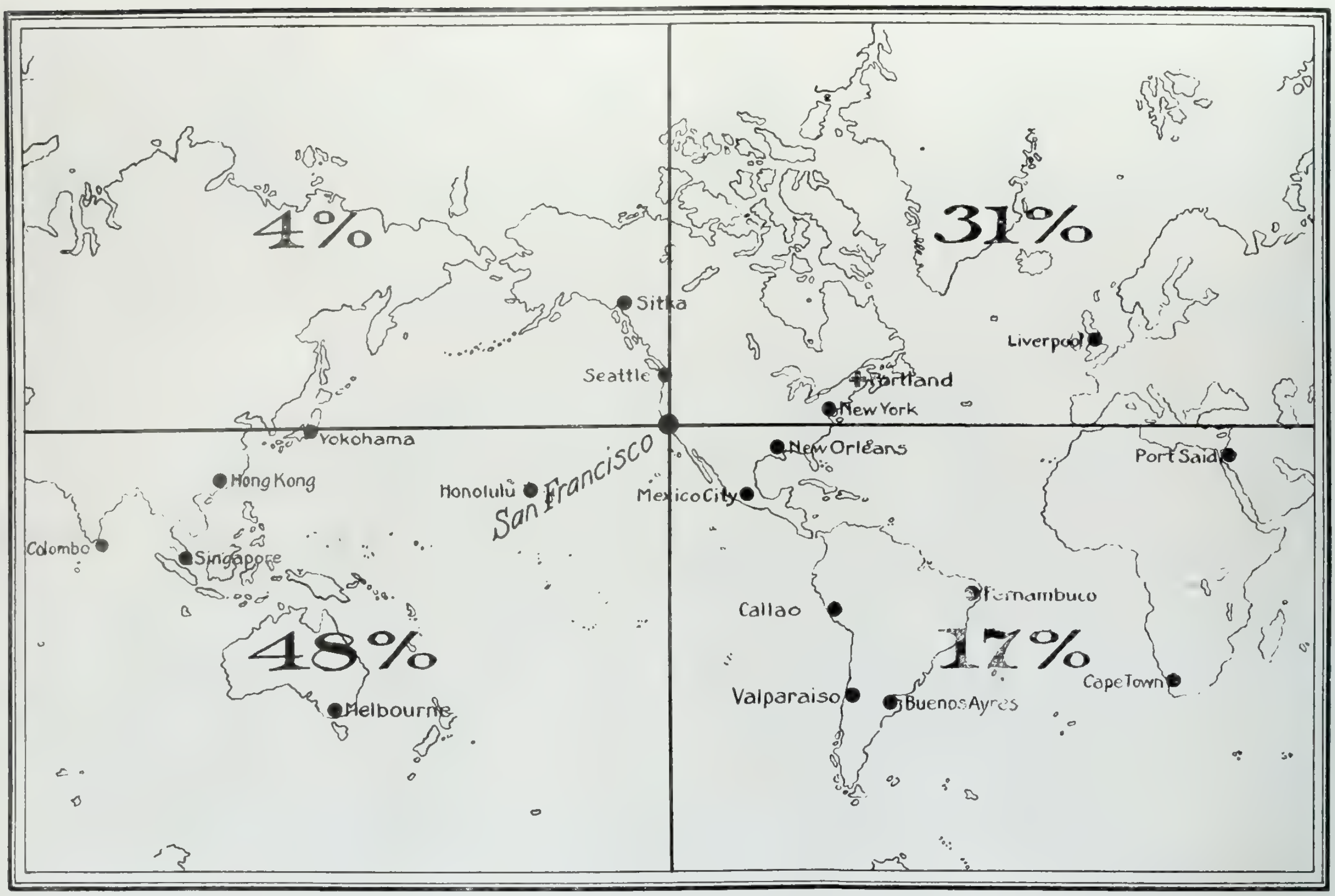
Later, there developed a well-grounded conviction that the mistakes and shortcomings on the waterfront were all due to the ownership of that property by the State of California and its administration through state politics. This conviction was held by a large part of the conservative business and shipping men of the city in those days, and, at almost every meeting of the Mechanics' Institute or the Technical Society, there would be loud cries for relief from this bondage of the port to state politics.

It was, therefore, cause for great surprise to the writer when, shortly after his return, a bill was introduced at the State Legislature with the announced intention of surrendering port control to the city, that those very citizens who formerly supported such action should now be solidly arrayed against it, and those who formerly opposed were now strongly in favor.

Two prime causes are responsible for this complete volte face: First, the release of state politics from railroad domination; second, the growth of the state to the south, taking the balance of political power away from the San Francisco representation in the Legislature. These two political hindrances being removed, the State Board of Harbor Commissioners commenced a constructive program of port development in 1911, and the result today is such a pleasing contrast to the prior conditions that all the consistent opponents of state control are entirely won over, and are in opposition to control by the city. For, as they look back now, in perspective, they can plainly see that it was in those decades when San Francisco dominated state politics and the railroads dominated San Francisco that the waterfront suffered most severely.

All Cards Thrown on Table

When, after six years of the new program, a cry against the harbor board was raised in some quarters, that body with great frankness threw all its cards on the table, and in 1917 invited the co-operation of a committee of San Francisco business men. This committee, after organizing and separating into sub-committees, undertook a careful survey and study of the port and its management, and the report vindicated the harbor board's management in every way. At the suggestion of the present harbor board a similar body has been ap-



Distribution of population of the world relative to San Francisco, and the location of the most evenly distributed prominent ports of the world, prepared by L. C. Hawley of the San Francisco Chamber of Commerce. Commercial supremacy always has followed water routes. When the United States government passed the act and committed the deed which physically severed North America from the South American continent and created a new water route to the Orient, marine affairs were shifted to different channels and ensuing events served to demonstrate that the railroads had not ultimately fulfilled the mission for which they were intended. As a factor in the development of the tremendously wealthy territory west of the Rocky Mountains, the advent of the railroad has been paramount, but the completion of the Panama Canal has placed the city of San Francisco in a strategical position, unparalleled by any city on the face of the globe.

pointed as a permanent foreign trade committee, and with its advice and assistance the development of the port is being pushed even more rapidly than is necessary for the increase in tonnage. That the men on this committee are keenly interested and awake to their responsibilities is evidenced by the unusual fact that at the first meeting called by the chairman, Captain Robert Dollar, every member was present except one, who was on his way to New York, and that one telegraphed his regrets.

On the advice of these committees, changes have been made in the port charges, which it is thought will make San Francisco a more desirable port of entry for ships. Certain improvements have been decided upon and certain others are in abeyance. All this is very clearly and forcibly stated in the article by John H. McCallum, president of the State Board of Harbor Commissioners, which is printed elsewhere in this issue. This article and the diagrams illustrating it will well repay careful study. They refute absolutely the notion that is still held by many San Franciscans that the waterfront needs more piers.

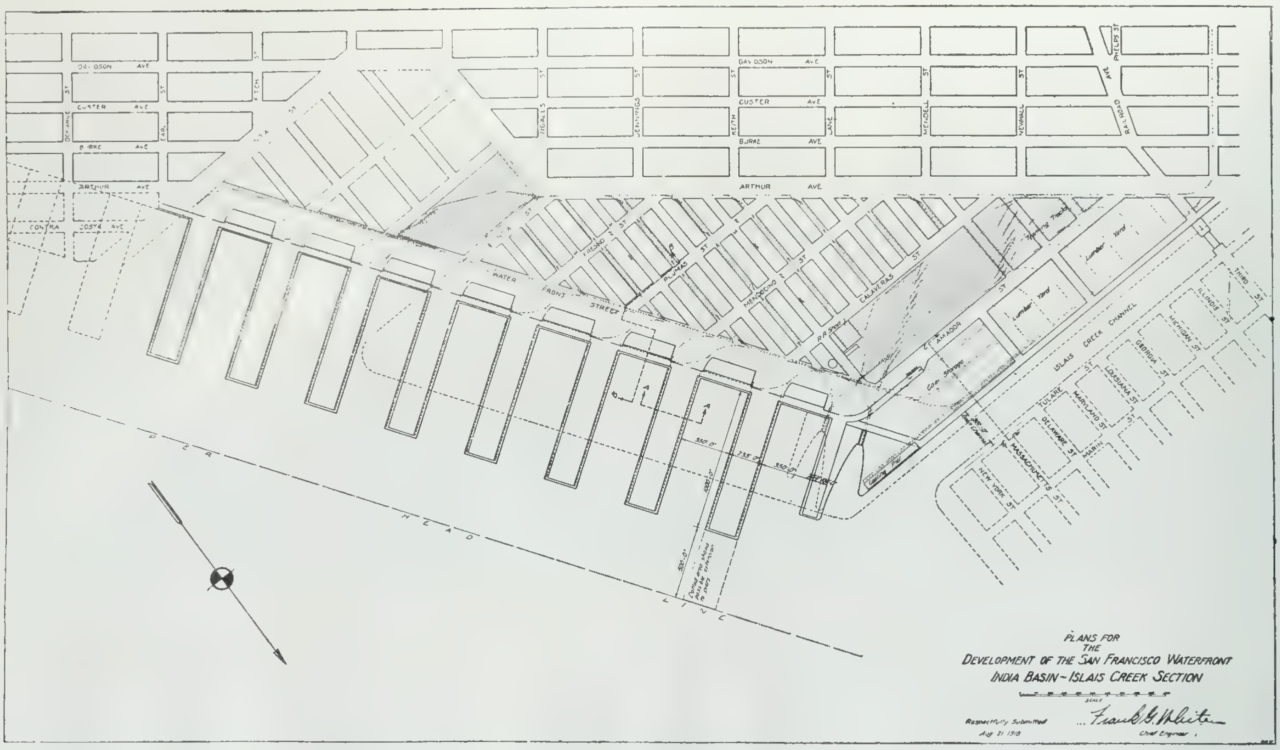
More Piers Don't Mean More Cargoes

We are hearing a great deal these days from various promoters about the expansion of the San Francisco waterfront to the south, and even of joining with San Mateo county, levelling the hills and filling the swales, until in imagination we see twenty miles of level bayshore flanked by a magnificent seawall, from which jut piers and docks innumerable, filled with the shipping of the world, and back of which rise many-storied warehouses and industrial plants busy with great and varied manufacturing processes. This is a very beautiful vision, and we wish that by some stroke of genius the vision could presently be made a reality. But, alas, as we examine the evidence so convincingly arrayed in the diagrams on page 85 of this issue, we must confess that more piers do not mean more cargoes, and more dredging does not mean more commerce.

Why, then, should we spend any more money for piers to the south that may not be used? A careful scrutiny of the pictures of the waterfront taken from Telegraph Hill will reveal the answer to this question. Whether the piers be congested with steamers or whether they be idle, that part of San Francisco immediately adjacent to the active waterfront, and for some distance therefrom, is always congested. In some parts of this area the congestion is so great that it is almost impossible to walk along the sidewalks because of the goods stored thereon.

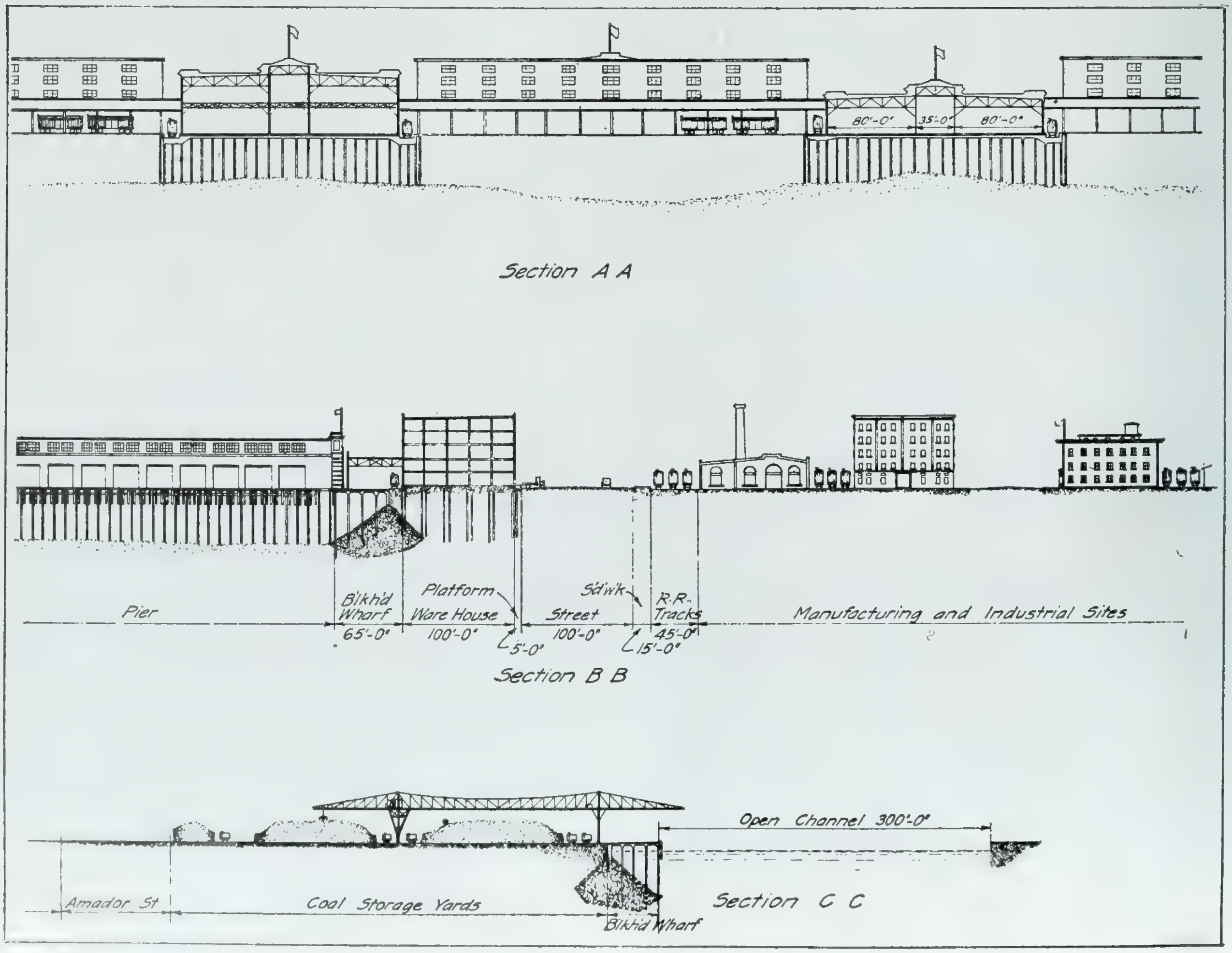
There is little level ground available for warehouses and industrial sites. The larger part of the active waterfront is far removed from the termini of the various railroads entering the city. So the harbor board, with an eye to the future need of San Francisco, has instituted condemnation proceedings on a tract of land to the south of Islais Creek, and has almost completed the securing of title to the same. The total area of the land which eventually will become available is more than 164 acres. It is proposed that this, as shown on the maps, be divided into blocks for warehouse and

Late photograph [illegible] waterfront, taken from the top of Telegraph Hill, February 19[illegible] Pier 35 on the right.
A[illegible] is being done to [illegible] Channel street [illegible]



Proposed plan for the development of Islais Creek. Above is shown the plan of the India Basin, Islais Creek section, of the San Francisco waterfront, proposed by Frank G. White,, chief engineer of the State Board of Harbor Commissioners.

Below are shown typical sections of this plan along the lettered lines indicated. These plans are intended simply to show the possibilities of this section as an industrial and manufacturing terminal. It is intended to carry out this, or some other plan which later experience may dictate to be better, only in so far as the growing needs of the port demand the development.



industrial sites, and be so arranged that all the tracks run in alleys and the main streets, each ending at a pier head, be reserved clear for trucks and drays. The proposed first unit of this improvement will consist of a pier wall on the south side of Islais Creek, coaling facilities, and vegetable oil terminal, as shown on the maps and described in President McCallum's article.

Filling Will Be Necessary

The bulk of the land comprised in the 164 acres is overflow or submerged land, and filling will be necessary. The harbor board at present contemplates the building of a seawall and filling at the inshore side of this wall by the dredging of the adjacent shoals and the channel of Islais Creek. Some of this dredging will undoubtedly be assumed by the Federal Government.

It is intended that the future development of India Basin shall be carried on as the need for increased facilities becomes apparent.

The State Board of Harbor Commissioners has made a wonderful showing on this waterfront development. It has shown a readiness to co-operate with the city authorities and with the business men. Handicapped by some very vicious customs which, under the old regime, had become established waterfront law, the board members have quietly gone about their business and with remarkable finesse corrected the majority of these abuses by firm pressure, gently applied, until that part of San Francisco which was a stench in the nostrils of her best citizens has become a proud boast. Now, therefore, it is up to San Francisco to do her part. She can forget the waterfront and its harbor-handling facilities. That part of her problem is in capable hands, which are working at no expense to her, and striving in every way to work for her benefit. The part for San Francisco to take in this drama of the development of her waterfront is to go out after foreign trade. The thing most needed on the waterfront is cargo. The subject most necessary for San Francisco business men to study is not harbors, but commerce.

Commerce Versus Salesmanship

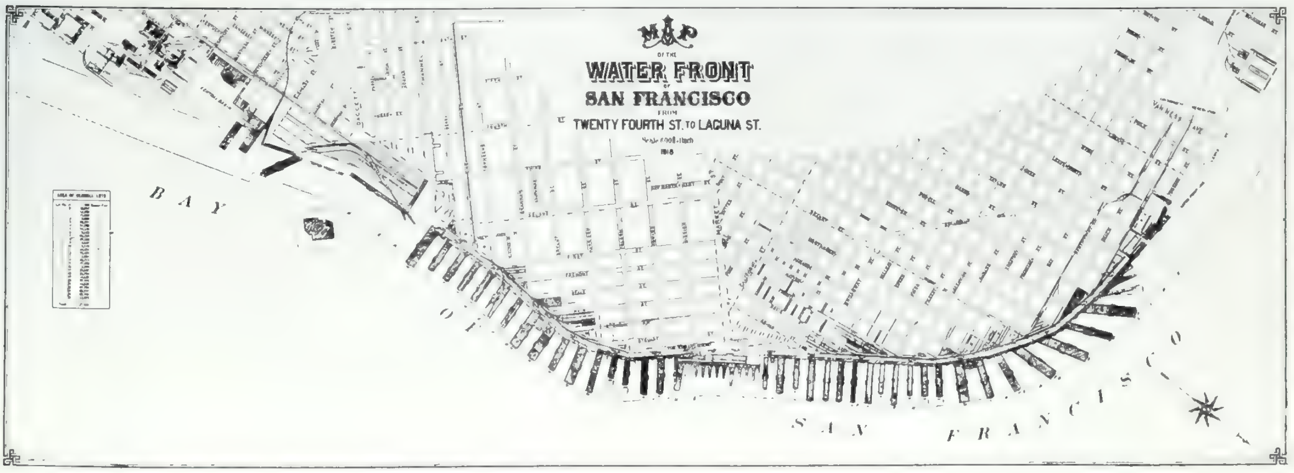
Some of our business men are studying commerce; others think they are when what they really are studying is salesmanship. Curious situations arise out of this latter circumstance. We read in the daily press of a mission of San Francisco merchants to the Dutch East Indies to persuade the people there to buy through San Francisco. At the same time we know that a great Dutch shipping firm with extensive and intimate connections in the East Indies and its own line of steamers has maintained extensive offices in San Francisco under a well-known San Franciscan for some months past. What is the answer? Obviously if San Francisco expects to get trade out of the Dutch East Indies she must send trade out to the Dutch East Indies.

Under present conditions, and especially since the opening of the Panama Canal, San Francisco is much more limited than formerly as to back territory which she may legitimately hope to serve.

Commerce Travels Cheapest Route

We have not the space or the intention to enter here into a discussion of all the complex elements that operate to build up or pull down world commerce. Other things being equal, that commerce will travel the route of most economical carriage. That element limits the commerce of San Francisco to the surplus production and the import requirements of the central valleys of California, the whole of the State of Nevada, and small portions of the adjoining states, possibly as far east as Ogden. In the development of the industrial, agricultural and commercial prosperity of this territory, and the finding of world markets for its produce, lies the future of San Francisco. This finding of world markets for the local surplus means finding local markets for some other fellow's surplus. The population map shown herewith was prepared by the San Francisco Chamber of Commerce. It shows the enormous market that we have at our front door. The Orient trade, always the coveted prize for which commercial wars have been waged, lies before us. Its teeming multitudes have needs innumerable. It has many products, but no difficulty in disposing of them because the whole world is bidding for its trade.

San Francisco has many natural advantages which should give her a decided lead over all rivals in going after this trade of Asia. But these advantages have in the past, in many instances, led to a false assurance of superiority. The harbor is here, the financial strength is here, the docks and piers are here—in short, everything is here that nature and fortune can bestow upon us. Let us, then, apply ourselves to the work with all confidence that, however great the tonnage we may be able to bring to the port, the port will be well able to take care of handling that tonnage.



Reconstruction in Foreign Trade and Merchant Shipping

By Joseph J. Slechta

This article will well repay careful study by anyone interested in the future of the American merchant marine on any real competitive basis. Mr. Slechta makes comparisons here which show that we are actually building into the hulls of our cargo carriers weight handicaps of from twenty to sixty per cent as compared with British practice. He also makes some very constructive suggestions as to how we may best correct these errors in design and build up a distinctively American type of cargo vessel. Of his article for the April issue Mr. Slechta says: "My next paper will elaborate upon other disadvantages under which American ships now operate, and attempt to indicate, so far as may be possible, how these handicaps which I have classified herein as secondary may be eliminated or modified."

IN the first of this series of papers, I chose as a thesis the proposition that a national merchant marine is not an indispensable factor in the development of our foreign trade. The fact that without our own shipping facilities, American exports increased 100 per cent during the fifteen-year period ended with the beginning of the war in 1914, while Great Britain, with overwhelming preponderance of strength in ocean shipping, had to be content with an increase of 50 per cent, seems sufficient justification for this conclusion. Nevertheless, the spirit of our time seems to bespeak dedication to the postulate that an American merchant marine must and shall be made to serve as an adjunct to our foreign trade.

The argument most frequently advanced by the proponents of this policy is that in utilizing foreign bottoms in which to ship American exports, we pay a huge tribute to the nationals of foreign countries. Reference is generally made to hundreds of millions paid out in ocean freights to the owners of ships not flying the American emblem. That this necessarily involves an economic disadvantage is quite as much a fallacy as the long-exploded theory that a nation's foreign trade, to be profitable, must show a favorable balance. Admitting, for the sake of argument, that the disadvantage is real, it surely needs no depth of logic to arrive at the conclusion that in order to convert this unfavorable factor to an advantage by paying ocean freight only to American ship owners, the freight must not exceed that which would be charged by owners of foreign ships; that is, unless we are to revert to the middle-age policy of closing our ports to foreign shipping.

Must Haul As Cheaply

It is axiomatic that American ships cannot serve a really useful purpose in trade development, either for America or for any other nation, unless their owners are able to perform a given transportation service as cheaply as the owners of foreign ships. If American shipping is to be an adjunct to our foreign trade, any possible advantage gained by the retention at home of the amount of freight paid certainly will be more than offset by increased freight charges and by a consequent loss of business, unless American owners profitably can employ their tonnage, while charging no higher freight rates than their foreign competitors.

Private operators of American tonnage need no effort of mine to convince them that, under existing conditions, there is a distinct limitation to the [illegible] to which they may go in quoting competi[illegible] against operators of Japanese, Scandinavian and British tonnage, beyond which limit they may not go without courting disaster. The United States Shipping Board, now the largest single owner of American tonnage, is apparently not yet convinced of this fact. Probably the public, so far as it can form any definite ideas on the subject, feels that it is without means to form an intelligent judgment. But it is certain that before many months go by, with deficits piling up and growing in an accelerated ratio as normal conditions in shipping are restored, the tax-payers will form some very concrete conclusions in the premises.

The farmers, miners, manufacturers and stock growers undoubtedly feel that it might be distinctly to their advantage if American ships were provided to carry most of their exportable surplus to foreign markets. But when producers begin to realize that increased taxation is the result of unprofitable ship operation, as carried on and promulgated by the Federal authorities, they will be assailed with doubts. When they face the losses resulting from reduced foreign markets, owing to cheaper transportation rates from other producing centers, such as Argentina, Australia, Canada and from Europe in manufactured goods, their doubts will become certainties, disillusionment will become humiliation, and all immediate prospects for a sound development of merchant marine strength will vanish.

Our Prosperity Chief Factor

If it seem anomalous to use the columns of a shipping organ, designed to advance the development of American merchant marine power, to set forth reasons why America does not need this particular string to her bow, I hope to regain the reader's generous consideration by indicating throughout succeeding papers some of the very vital disabilities under which we labor in attempting to gain the end so many desire, and to indicate further to what extent and how these disabilities may be overcome or eliminated. The chief of these disabilities, paradoxically enough, lies in the very nature of the bountiful prosperity which this nation and its people now enjoy.

In many respects, ocean shipping is an international and not a national affair. At home certain unfavorable factors are counterbalanced by others favorable to our economic and social development. If the cost of living be high, we have high wages. If interest rates are high, profits are large. But when we put our seamen on international trade routes they demand wages and standards of living commensurate with those of their fellows ashore, whereas their employers come into competition with foreign shipowners who employ seamen from nations where both wages and standards of living are lower than ours. Space does not permit enlargement of this illustration, but it must be apparent to any intelligent man that to attempt anything in the nature of a change in our economic and social situation which would place our people upon an equality with continental countries, or with Japan,—yes, even with England—in order that we successfully and profitably may employ more American ships in our trade than those of foreign owners, would be to exchange the substance for the shadow.

Such a change we certainly are not willing to make; not even the most reactionary, special-privilege enthusiast among capitalistic shipowners could be so short-sighted and selfish as to hope for such an evolution in our present highly-favored position, as compared with other nations and people. But there are other much less intangible factors which militate against us now which we may hope to eliminate or at least modify. To be sure, some of these secondary handicaps spring indirectly from the one which we may consider as primary—that of our superior economic standard. I believe, however, that if our effort be sufficiently serious and intelligent, we may overcome these secondary handicaps without disturbing over much the various elements in our regime of comparative economic superiority.

No Incentive To Go To Sea

By far the greater part of this secondary class of handicaps may well be described as the direct result of lacking incentives. Our young men lack incentive to adopt a seafaring life because the inducements ashore are so much more attractive to those with ambition and the desire for the ease to which we as a people are accustomed. In other words, Americans do not go to sea habitually because they do not have to do so in order to make a living. Yet that is exactly why so many British, Scandinavians, Japanese and Germans follow the sea.

Our masters of industry, our capitalists, lack the incentive to engage in ship-operation because this broad and much favored land offers so many more attractive possibilities for the profitable employment of wealth and energy. Our producers lack the incentive to back whole-heartedly even the soundest kind of a policy designed to develop a merchant marine, for the sake of greater foreign trade, or at least a wider international influence, because there is no pressing economic compulsion about their desire for greater foreign markets. We want foreign markets in order to make our well-filled purses still fuller. The producing nations of Europe want foreign markets because their people cannot exist without them.

Finally, our nation as a whole lacks real incentive to make any sort of vital sacrifices for the sake of preponderance of shipping strength. I never have heard or read a single argument which presents convincing evidence to the effect that our commercial supremacy is likely to be endangered by lack of ships flying the American flag. But the veriest novice must be aware that the commercial imperialism of Great Britain would go down like a house of cards without her sea power in merchant ships. Economic necessity had forced the British to evolve a national policy in shipping which is closely knit into the whole fabric of that people's social structure. That policy is cleverly designed not only with a view to inherent efficiency, but with a view to blocking in every way possible any threat to her preponderant strength which may arise from other nations. In this latter regard, it were charitable to say that perhaps manifestations of that policy, as it is directed against even remotely possible competitors, is unconscious.

Britain Has Paid Dearly

Great Britain has paid dearly for her sea supremacy. It is even open to question whether in the long run her policy has been productive of the greatest benefit to her people. To keep her sons upon the broad stretches of the deep, it has been necessary to maintain a low standard of living and wages among her working classes. Only a nation favoring by every possible circumstance the employment of capital at ridiculously low rates of interest could hope to keep billions employed at an average return for ten-year periods of less than 4 per cent, as was the case with shipping.

With sacrifice so great, as the price of sea dominion, it is not surprising that owners of Britain's ships should fail to be troubled by qualms of conscience in the use of what might be termed unfair tactics in competition.

The British always have shown wisdom, too, in knowing just how far competition could be depended upon to solve their problems. Nothing demonstrates this so well as the tactics of the so-called conferences. For instance, when it became apparent that cut-throat competition with the dreaded German liners was unprofitable, the most powerful of the German companies in a given trade was taken into the conference, on the theory that it was better to have one strong competitor, with a fixed share of the business and ready to be reasonable in the matter of rate schedules, than to have an open field and no favors. Still another way in which the same policy was featured is illustrated in the South African trade. The conference provided a fixed number of sailings from the United States to South Africa, which number was always as small as the traffic would bear, in order to avoid conflict with the larger traffic operated on lines from England to Africa. The German interests obligingly refrained from fighting the African conference in consideration of certain priority rights in other trades. For instance, the Hamburg-American Line maintained its Atlas service from the United States to the Caribbean, practically unmolested by the British steamship companies.

Buy Where It's Cheapest

Great Britain never has been chauvinistic in any feature of her policy affecting her merchant marine. If German steel mills could produce, as they did, large castings for marine engines at lower prices than the steel mills of England, the shipbuilders of the Clyde and Tyne had no scruples about going to Germany for such parts, in order that British operators might be supplied with the cheapest possible tonnage. I venture to say that if marine insurance on hulls and cargo were cheaper and quite as safe in America—as in fact it came to be during the pressure of war upon England's finances—British owners would not hesitate to turn their business from underwriters in London to those in New York. At times underwriters in Germany have made serious inroads upon London's insurance markets, and to a lesser extent the same is true of Norway and France. Underwriters in London always have controlled the business, but to do so they have had to cut their profits uncomfortably at times. They have only recently cut their rates to meet American competition.

In still other and more vitally important ways did Britain before the war suit her national polity to the interests of her merchant marine. With these the writer is principally concerned as showing the second class of handicaps to which America is subjected in an effort to establish a sound shipping regime.

I shall deal, first of all, with the problems which arise in connection with marine insurance and ship classification organization, as they affect the design and construction of ships, as well as the cost of insurance for both hulls and cargo. Prospective owners of ships may well ponder the fact that, ship for ship, British tonnage carries lower rates of hull insurance premiums and lower cargo insurance rates than the ships of any other nation. At the same time British ship designers for fifty years have set the standard for shipbuilders in every country of the world. This is still true, in spite of the fact that the design and structural regulations affecting ships has shown surprisingly little change during the past twenty-five years.

Advances Are Few

In no other field of engineering science have there been so few improvements or so little of revolutionary change in the application of scientific formulae to construction as in ship building. American engineers have been to the fore—in fact, have outdistanced all others in efficiency of design and economy of construction in bridge building, steel and concrete buildings of all types, and railroad engineering. Their study of stress, strain and tensile strength of building materials each year for the last twenty years has revealed hitherto unknown factors of importance in economy of construction, virtually by making one pound of steel do the same word that had been required of two pounds. It is remarkable that very little of this refinement is to be found in ship designing, either in America or elsewhere. It requires almost, if not quite, as many tons of steel a thousand tons of deadweight capacity to build a ship to conform with British Lloyds' specifications today as it did 20 years ago.

It is interesting, in this connection, to note the unique power which is exercised by that marvelous organization known as British Lloyds. Lloyds is by no means the only classification society of importance. There are the Veritas Bureaus of France, Norway and Germany. All of these continental classification societies have exercised a greater influence in marine insurance and in ship designing than has our own Bureau of Shipping. The German marine underwriters, before 1914, carried more shipping risks than those of any other nation, excepting only Great Britain. America, with her vast international trade interests, as represented by a larger aggregate clearance of tonnage per annum than any other nation, has been obliged to look to Europe—in fact, almost wholly to London—for insurance protection on hull and cargo risks. Even shipping on the Great Lakes was dependent upon London underwriters before 1914 for most of its insurance cover. Before 1914, about 65 per cent of American hull insurance was effected with British underwriters; about 25 per cent was divided among underwriters in Germany, France and Scandinavia, and not to exceed 10 per cent was placed with American marine underwriters, the greater part of which was re-insured in London.

Europe Land of Cheap Money

It is not necessary to seek far for an explanation of this situation. Great Britain and the leading continental countries have been lands of cheap money. Marine underwriting, as it has been developed by the vast co-operative system of those interests associated under Lloyds' guiding power, is essentially a process involving one of the soundest forms of investment known to the world of finance. The returns, under normal conditions, are correspondingly low. In England, France and Germany sound investments which year after year net more than 4 per cent are indeed rare. For this reason England, just as she has been the great money market of the world, has the marine insurance business tucked into her vest pocket. Perhaps the greatest asset which has contributed to that end, aside from the purely financial advantages enjoyed and the remarkably efficient organization which has been a century and a half in the building, is the engineering ability of Scotch technical men. Scratch an efficient Lloyds' surveyor anywhere in the world and you find a canny Scotch engineer, usually trained in a marine engineering school of a sort not to be found anywhere else in the world, and almost without exception with a fund of knowledge gained through experience, first in actual shipbuilding operations and then in all the grades of marine engineering practice in seagoing vessels.

Specifications and rules for ship design and construction all over the world are substantially those laid down by Lloyds. The Veritas Bureaus on the continent were founded by underwriters who sought to pay less of a tribute to London. But shipowners and shippers in the continent always have found that, while a part of their insurance risks were underwritten advantageously at home, when it came to the larger risks and heavy volumes of business, at least a considerable part of the cover must be sought for in London. So Lloyds' competitors have been forced to follow closely the system of construction specifications and inspection laid down by Lloyds' engineers. The plain truth is that only a nation whose own insurance market is sufficient to provide full protection against all ocean risks is or can be in a position to maintain a classification system independent of Lloyds' domination. Even in England, where some recalcitrant shipowners, builders and underwriters, chafing under the dominance of Lloyds' control, started a rival classification society, known as the British Corporation, Lloyds is thoroughly the dictator.

Rival to Lloyds

Probably the British Corporation, more than any other classification society, has served to bring into rather strong relief the remarkable conservatism of Lloyds. The Scotch are in everything strong on tradition and certainly the engineers and surveyors of Lloyds' society strikingly exemplify this national characteristic. It is the more surprising, therefore, that it should have been Glasgow shipping and insurance interests which set up an organization in rivalry with Lloyds. The British Corporation was first engaged exclusively in determining load lines, but as it grew in power its functions were enlarged to comprehend all of the functions of a classification society. Lloyds' rules up to that time scarcely had been modified in any particular for fifteen years, and the British Corporation performed a great service to shipping interests by jarring Lloyds out of its traditional conservatism and forcing it to adopt rules based more largely upon the revelations of modern science. The rules of Lloyds' Register are much more flexible than they were, but still not so much so as those of the corporation.

It is gratifying to note that the scepter of financial power is now at least in part wielded in America and that as a result more and more marine insurance is being written in this country. A prominent authority states that most of the large fleets owned by private interests in this country are now being insured to the extent of 75 per cent of the risk in America, with only 25 per cent written in London. Already several score different underwriters, never interested in writing marine policies before the war, have entered the field here, and the end is not yet.

Prominent marine underwriters in this country have no hesitation in saying that as conditions now exist they find no difficulty whatever in handling all of the marine risk business which is offered them, and basing their estimate of the insurability of vessels upon the advices of Lloyds' Register. It must be apparent to all that if the American underwriting market is able to take a greater part of the risks to be covered on American vessels and cargoes, the possibility of Lloyds' Register using its prestige in any way to throw insurance business to London is almost entirely eliminated. That being the case, it is the more imperative that a great effort should be made to establish an American classification society, which can compete in competence and reliability with Lloyds' Register. That is true, for the reason that, as things now stand, Lloyds' Register, if it retains its prestige in American affairs, must be progressive and must give owners and shippers the advantage of the most modern methods possible in the classification of vessels, as otherwise the power of the underwriters in the United States, if it should be thrown against Lloyds, would greatly reduce the scope of their activities, but given the confidence which underwriters have in Lloyds, it is going to be increasingly difficult for an American classification society to compete with them.

250 Experts in States

One needs but to be reminded that the present organization of Lloyds' Register in the United States comprises nearly 250 expert surveyors, inspectors and construction engineers, mostly comparatively young men, with unbounded ambition and energy, and with a training in shipbuilding and ship operation which makes them as highly competent as it is possible for men in their sphere to be.

I regret to record that no such condition exists in the organization of the American Bureau of Shipping. The inspectors and surveyors are in no single instance men trained as above indicated. They are mostly retired captains who have had no experience in construction or engineering, and little, if any, technical training outside of navigation.

Ships that were built before 1914 at Cramps, Sparrow's Point, Camden, Newport News and San Francisco were as well built in every respect as any in the world. Ton for ton of steel, they showed a deadweight capacity as great as that of ships built by the best yards of Britain. Why did not the Shipping Board, instead of pouring out hundreds of millions of dollars upon untried theories of design and construction, and enlisting the services of bridge-builders and skyscraper-builders and water-tank-builders, go to such yards as mentioned above and say: "Gentlemen, you have for many years been engaged in building large and small cargo steamers, which you have successfully sold to Americans who bought them to operate at a profit. These ships are in service and have been tried out. We want your engineers to get together with the operators of these vessels, lock yourselves up in a room somewhere, and do not come out until you have agreed upon a type of vessel which will embody all of the best features as to economy and efficiency of construction and operation which are to be found in all of the various types you have severally produced. Then we want you to say to what extent it is practicable to enlarge your present capacities, given the backing of the United States Treasury, after which you will all proceed to produce with the utmost possible expedition ships of the type you all agree is the best."

Why did not the Shipping Board take full advantage of the skill and lifetime experience of hundreds of trained inspectors and surveyors representing Lloyds' Register in every port of importance on both our coasts? Certainly our participation in war jointly with Great Britain was no time to show a chauvinistic policy by throwing the support of the government treasury to a comparatively infant organization, with at best a handful of experienced surveyors at its disposal, such as the American Bureau.

Altogether Too Much Politics

There was altogether too much politics in the whole proceeding. The wooden shipbuilding program was adopted, not so much to meet an emergency of war, but to throw a sop to the Pacific Coast, which was in serious industrial straits, with no market for its vast lumber resources. In the East the vested interests involved in steel production and construction work, not in any way affiliated with ship building and without experience necessary to visualize its requirements, similarly were favored.

The rules of the American Bureau essentially are those of the British Corporation, but in order to meet the distracted propaganda of the Shipping Board, these rules were allowed to become so elastic as to be almost useless. Bridge and skyscraper builders had acquired no experience in their highly specialized engineering activitiies whch called for the study of how to meet stress and strain as it is met in ship construction by the use of sheer. So they said a vessel needed no sheer to make for strength, and the American Bureau had no recourse but to follow. The same thing was true of the long-proved efficacy in the curve of the deck. Bridge builders and construction engineers could see no reason why a ship's deck should not be built like a floor. Our mills were not fitted to roll the various shapes which long experience has shown to be necessary in efficient ship construction, so heavier shapes, with less strength, were used. Plates were ordered from mills to meet a

Table of Comparisons Between British and American Vessels

Type	Description	Reference	Length. B. P.	Beam	Molded Depth	Draft	Disp. Tons	D. W. Capacity	Horsepower	Weight of Hull	Constant	Per Cent of Excess in Constant
British Type A	1-Deck Cargo	Mar. Eng. July, 1918	400′	52′-0″	31′-0″	25′-1″	11,375	8,580	....	2,225	.259	....
Hog Is. Type A	2-Deck Cargo	Eng. News Rec. July 4, 1918	390′	54′-0″	32′-0″	24′-0″	11,200	7,500	2,500	3,100	.414	60%
Newburgh Ship Yds.	2-Deck Cargo	Emer. Fleet News, Oct. 29, 1918	401′	54′-6″	32′-10″	25′-6″	12,500	9,000	2,500	2,930	.326	26%
British Type C	1-Deck Cargo	Mar. Eng. July, 1918	331′	48′-6″	25′-6″	23′-9″	7,200	5,350	....	1,390	.260	....
Submarine Boat Co.	2-Deck Cargo	Emerg. Fleet News, Oct. 29, 1918	324′	46′-0″	28′-6″	....	7,800	5,500	1,500	1,840	.335	29%
British Type E	2-Deck Cargo	Mar. Eng. July, 1918	376′	51′-6″	29′-0″	23′-9″	9,910	7,420	....	1,920	.259	....
Standard S. B. Corp.	2-Deck Cargo	Mar. Eng. April, 1918	377′	52′-0″	29′-6″	23′-6″	10,250	7,000	2,500	2,680	.383	48%
British Type Z	Oil Tanker	Mar. Eng. July, 1918	400′	52′-0″	31′-0″	25′-1″	11,400	8,405	....	2,425	.288	....
Chester S. B. Corp.	Oil Tanker	Mar. Eng. November, 1918	401′	54′-0″	....	25′-9″	12,650	9,000	....	3,080	.342	20%

Indicative of the haphazard methods followed since the stimulus given to ship building by war conditions began, and of the deplorable results obtained, a table has been compiled, showing comparisons between certain standard types of British vessels and some American vessels built in various yards, of a similar type and size. The figures were compiled from recent marine engineering publications, as shown herein. Taking the first two vessels in the list, it will be seen that Type "A," British vessel, has a deadweight cargo capacity greater by 1080 than a similar vessel built at Hog Island, while the American-built vessel absorbed in the building 875 tons of steel more than the British builder used on a vessel of almost exactly equal loaded displacement. Note that ton for ton of cargo capacity, the American vessel required 60 per cent more of steel than the British vessel. Vessels built by the Newburgh Shipyards require 26 per cent more steel; the Submarine Boat Company, 29 per cent more; the Standard Shipbuilding Corporation, 48 per cent more, and the tank type, built by the Chester Yard, required 20 per cent more steel than a similar tanker built in England.

Block co-efficients vary between .75 and .79.

British one-deck and two-deck types have same steel constant C, showing that the two-deck type takes no more steel than the one-deck.

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certain specified thickness, but the mills said they could not roll them. Most of our steel vessels built during the war have plates fully 20 per cent heavier than were required.

Many Not Seaworthy

The claim has been made that the additional steel represents an added strength, which will greatly increase the life of the vessel. This is the merest conjecture, but even if it were true it is a great waste in view of the faulty construction of most of these ships, which was so hurried that many of them were not seaworthy when launched. Riveting contests resulted in some cases in loose plate-joining and many vessels have required overhauling and renewed riveting after their first trip. If one remembers that to replace a useless rivet with one properly set costs from three to four times as much as to set the rivet properly in the first place, the waste becomes apparent. Such methods defeated the very purpose for which the construction program was entered upon.

Some of the ships built by the Shipping Board were built to Lloyds' rules and under the inspection of its surveyors. It is asserted, however, that in a very large number of cases this inspection was perfunctory by reason of the disregard of Lloyds' recommendations by agents of the Shipping Board. The result is that much of the government's steel tonnage, not to speak of wooden tonnage, is insurable only at rates from 100 to 200 per cent greater than the standard rates for first-class steel carriers. The question arises, therefore, as to why the Fleet Corporation, since it chose to defy age-long traditions in ship construction, did not formulate a policy of scientific examination into the engineering problems involved in producing a lighter ship, possessing all the elements of strength and durability, as well as safety, so long associated with the steel vessel classed 100 A1 in that insurance man's Bible—Lloyds' Register.

It may well be that without an underwriting market independent of London, no effort to improve on ship design and construction will prove successful. Until America is in a position to say to London: "We want such and such a rate on this hull; if you do not want the business, our own companies will take the full risk," no American shipbuilder or owner can afford to ignore Lloyds' association rules, and the chances are that none of us will ever know whether the designs approved by its engineers are capable of improvement or not. But the effort is well worth making in any case. Traditions are difficult things to fight. Isherwood had to come to America to get recognition for his radical departure in ship framing, but after a long struggle Lloyds reluctantly admitted ships of longitudinal framing to full classification. Lloyds fought the Swedish motor ships until it became apparent that the Veritas Bureaus could get insurance protection for this new type of vessel without London's assistance.

We may go far toward divesting our nascent merchant marine of the incubus of at least one series of its many handicaps if it is possible to accomplish the following:

First—Enlist the co-operation of the powerful fire underwriters of America, and other large financial interests, by inducing them to engage in the marine insurance field, which is certainly no less profitable or hazardous, under equality of circumstances, than their present fields of endeavor. It should be noted that a beginning in this direction has already been made.

Second—Induce our leading and experienced ship builders to avail themselves of the same kind of engineering and other scientific talent which has made America a leader of the world in bridge and other steel structural work, in railroading, in automobile building, and in metal production. That is not to say that a hundred thousand dollar a year engineer, trained to build the best bridges, can turn his hand to designing the best ships. Shipbuilding has its own peculiar problems, not common to any other kind of construction, but the same intelligent and creative talent, devoted with undivided attention for many years to these peculiar problems, might well be expected to solve them, as it has solved the problems peculiar to other industries.

Finally, our American Bureau, or other domesticated classification organization, must forget that the rules of Lloyds' Register, admirable as they are, ever existed, and give its attention to the formulation of new and modernized standards by which to measure the strength and safety factors in ocean-going ships. Such a bureau must be concerned, not so much with a competition for business with other classification bureaus, to increase its receipts of fees, but it must build up a sound organization, which can only be done after many years. It must enlist the co-operation of successful builders in training young technical school graduates in several years of building experience, have them placed on steamers as engineers and then take them into its service, where they can serve an additional period of apprenticeship in living night and day with steamers being repaired and built, so that they come to have intuitive knowledge of a ship's every plate and rivet. Only then are they competent to pass on the design of new and old types of vessel construction.

My next paper will elaborate upon other disadvantages under which American ships now operate, and attempt to indicate, so far as may be possible, how these handicaps which I have classified herein as secondary, may be eliminated or modified.

Needs of San Francisco Harbor

By K. Doi,

Manager, Toyo Kisen Kaisha, San Francisco

THE improvement of San Francisco's port facilities, along the lines announced by President McCallum of the harbor commission, when completed, will place our city in the front ranks of American ports. The proposed installation of the labor-saving devices for handling cargo, the increased dock area and betterment of rail service, to and from the docks, should make this harbor most attractive to the ships of all nations.

Unless discriminatory rail rates are enforced, San Francisco is in a position to compete against the shipping of the world, as it is the natural gateway of America to the Orient. New York and Eastern ports, however, are alive to its competition and are exerting heavy pressure to secure such ship rates as would give them the advantage of the long water haul through the Panama Canal as against the trans-continental rail haul which brings San Francisco its merchandise. Our wonderful port, with its improved facilities, must face this competition squarely and fight determinedly in order to win out.

By Robert Dollar

THE plans being carried out by the harbor commissioners in lengthening some piers that do not go out to the harbor line, finishing up new piers now under construction and building a long and large pier at Islais Creek, this along with the building of two or three piers for which plans are being prepared, will give sufficient accommodations for the expected increase in commerce for some years to come.

Better mechanical means for handling cargoes on the wharves are necessary. These will be in operation before long, as they are being planned now; some facilities for the handling of extra heavy lifts are necessary, and I understand this is now being investigated. Storage facilities on the bulkheads also are necessary to relieve the wharves when cargo cannot be moved at once to its destination. When all this is accomplished we will have a harbor that will compare favorably with the best in the world.

Pacific Marine Review
The National Magazine of Shipping

SAN FRANCISCO, CALIFORNIA U. S. A.
Official Organ of the Shipowners Association of the Pacific Coast

Subscription Price, per year (Domestic) $3.00
(Foreign) $3.50
Single Copies . . . . 25 cts

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CHICAGO OFFICE

The Pacific Marine Review is sold at all leading News Stands
Entered as second class mail matter at Postoffice
San Francisco, Cal.

Published on the First of Each Month. Copyrighted 1918 in the United States by Pacific Marine Review

HURLEY'S REFERENDUM

EDWARD N. HURLEY, chairman of the United States Shipping Board, has returned from his European trip, and we are now assured that all the problems that have been worrying shipping and shipbuilding men will be promptly solved. Indeed, the solution is already under way, for we, the people of the United States, are called into consultation and asked to advise the Shipping Board how to operate the merchant marine we now have, and how many more ships, and of what kind we want built in the future. This at first glance seems a very praiseworthy and wise action for the chairman of the Shipping Board to take, but when we consider that the Shipping Board was organized to do for us the very thing that it is now asking us to do, it throws the matter into an entirely different perspective and makes us wonder what is the object of this move.

We, the people of the United States in Congress represented, did in 1915, realizing the need for an American merchant marine, organize a body to be known as the Shipping Board, to whom we gave $50,000,000, and whom we empowered to build and operate ships, to study carefully operating costs and conditions, and to lay out for us such a constructive program of maritime law and practice as would best enable us to operate ships on the high seas in competition with the ships of other nations. The Shipping Board organized another body known as the Emergency Fleet Corporation, which would build and own the ships. In 1917 we gave to the President of the United States sums aggregating over three billions of dollars for the purpose of building merchant tonnage for our war emergency. The President empowered the aforesaid Emergency Fleet Corporation to act as his agent in the expenditure of this money, and it has built and is building a very great fleet of merchant vessels.

A Request for Advice

The United States Shipping Board, therefore, as our agent, has had a wonderful opportunity to study the operation of these ships under the American flag. The accounting department must have the figures from which it can calculate to a fraction of a cent just what is the actual cost of carrying a ton of freight from New York or any other American port to the four corners of the earth. The chairman has repeatedly adjured shipping men, working under great handicaps of official restraint, to be patient, for the Shipping Board was making an exhaustive study of the problems affecting our merchant marine and would soon bring out a workable solution. Mr. Hurley has been to Europe and has there studied the methods of our great competitors at first hand. Repeatedly during this trip he has cabled back that on his return there would be a solution for all our difficulties. It is therefore rather disappointing that his solution should turn out to be a request for advice, especially as the Shipping Board has asked advice already from various advisors much more intimately acquainted than we are with the problems involved, and evidently does not care to act on that advice.

It seems to us that before asking us to advise it, the Shipping Board should decide on a program which it can conscientiously recommend to us. Then we can easily adopt, reject, or change that program to suit ourselves. Unless something of the kind is done there will be talk-fests all over the country, ending in a vote of confidence in the "super-efficiency of the American workman" and the ultra economy of "Coal Oil Johnny."

Machinery of Referendum

The Chamber of Commerce of the United States has been chosen as the medium through which the Shipping Board will ascertain the desire of the people in this matter. Harry A. Wheeler, president of that body, has appointed a committee charged with the responsibility of making a comprehensive study of all of the problems confronting the country in the formulation of a merchant marine policy. It is intended to issue questionnaires to the associations representing various elements interested. Among these will be shipowners' associations, labor councils, foreign trade clubs, local chambers of commerce, merchants' associations, the grange, farmers' unions, etc. The questionnaire will cover such questions as these:

Shall the government continue to own and operate the tonnage in its possession and under construction on government account?

If it does retain ownership, shall it charter ships to operators?

If the ships are sold, shall differentials in the emergency cost of construction and nominal values be absorbed or written off to admit competitive operation?

What, if any, differentials in operation other than cost of tonnage must be met by changes in regulations or amendments to the laws to provide assured success in competitive operation?

What tonnage would be available for sale to private owners, and how could its acquisition be financed?

How should tonnage, if turned back to private operators, be distributed as respects ocean transportation, coastwise shipping and lake transportation?

If the government retains ownership and operates tonnage, what definite shipping routes should be established and what sort of tramp service should be built up?

Let the People Know

How much easier it would be for everyone who is interested in the shipping business but not yet acquainted with the details of that business if the United States Shipping Board would prepare an official document stating frankly just what are the conditions under which it is operating and how much that operation costs; just what the expense of the American ship is now compared with the expense of British, Japanese or Scandinavian ships; just what is the expense of handling freight at various American ports. Surely if the people are to decide on this matter, they should have the most authoritative knowledge on the subject that is to be obtained. The Shipping Board must be in possession of that knowledge and it should place it before the people.

HANDS AND POCKETS

CORPORAL Ellsworth O. Terrill had his hand in his pocket when he went over the top in the vicinity of Hagenbach, Alsace, France, August 21, 1918. He did it to hide something, but was discovered in the act of deceiving his sergeant and for the offense was cited in orders and given the distinguished service cross by General Pershing.

In the coming Victory Liberty Loan there will be many who will be guilty of deception. Many hands will be put in pockets and withdrawn empty. Other millions will go deep in their pockets to bring out savings and then pledge future earnings to make the heroism of Corporal Terrill worth while.

When the time comes for us to put our hands in our pockets to answer the call of our government that is a bulwark for our homes, we should forget our excuses and remember the hand that Corporal Terrill stuck in his pocket. It was mangled and torn; the ribbons of red were centered with jagged pieces of white blasted by the Hun. Because the remnant was less than useless, and if discovered would cause him to lose his part in the counter attack, he stuffed it into his pocket, pursued the enemy and threw hand grenades at the retreating enemy with his left hand.

Suppose we think of Corporal Terrill when we put our hands in our pockets for the Victory Liberty Loan.

PSYCHOLOGY AND SHIPBUILDING

OUR good friend and correspondent, Peter O. Knight, attorney for the American International Shipbuilding Corporation, agents for the United States Shipping Board in charge of construction at Hog Island, has at last let the American public into the raison d'etre for that "greatest shipyard in the world." Peter's latest pronunciamento is to the effect that the chief end of Hog Island was its "psychological effect on Germany." We are very glad that the American International Shipbuilding Corporation has thus taken us into its confidence. As a shipbuilding effort Hog Island has never appealed to us. Its very bigness insures failure. But if it was intended as a "bluff" we are perfectly willing to concede that it is the greatest ever "pulled."

All the more willing are we to admit this when we begin to analyze the elements which made Hog Island a successful laboratory of experimental psychology. Imagine yourself, dear reader, if that be possible, in the position of a Hun who, along in the early summer of 1918, hears the awful news that in Philadelphia, U. S. A., a yard with fifty building ways has just been finished, wherein a 7500-ton steel steamer will be turned out thrice a week. Had this been the first news of America's shipbuilding effort to reach Germany, you would have said: "Impossible! Another American bluff." But had you been hearing for a year that many ships were building in America and even that many of them had been delivered and were carrying goods to France; and had you heard that from one small five-way yard on the Pacific Coast, 2100 miles away from any supplies of ship plate, they were actually turning out two or more 8800-ton steel ships every month; then, if your Hunnish mind were at all impressible by psychological influence, you would sit down with a pencil and figure something like this: Five ways equals two ships a month: fifty ways equals twenty ships a month, and you would then exclaim, "Mein Gott, dey can did it! I gif up der fight!" So you see the credit for the psychological effect comes back to the legitimate shipbuilding industry as practiced on both coasts and the Great Lakes for years before the Hog Island yard was thought of.

And now comes another refreshing voice from the East. Our good friend J. J. Slechta of New York makes the statement in his article in this issue that the ships building at Hog Island contain 60 per cent greater weight of steel than is necessary in ships of their size. If this proves to be correct and is taken in conjunction with the undenied fact that these ships are costing nearly $300 a ton, then in the interest of the shipbuilding industry and of the American merchant marine, it would be better to stop building ships at Hog Island and other fabricating yards. For the war emergency we needed any kind of self-propelling, sea-going freight-carriers that we could get. In trying to get freight-carriers we have found several types that are costly to build and expensive to operate. Now that the war emergency is over and the competitive foreign trade emergency is here, we must eliminate these types. For this emergency we need qualities in ships more than quantities of ships.

PACIFIC MAIL ANNIVERSARY

An anniversary interesting to Californians fell February 28, which was the seventieth anniversary of the arrival at San Francisco of the first Pacific Mail steamship, the "California," which had steamed from the East Coast via the Straits of Magellan. The "California" and the other Pacific Mail vessels, once in the Pacific, transported passengers and cargo to the Isthmus of Panama, leaving the Cape Horn trade to the clipper ships. The steamship "Northerner" of the Pacific Mail fleet followed the "California" by a year.

BRITISH VIEWS ON SHIPBUILDING

At a moment when American shipping prospects are provoking so much controversy it may not be amiss to set out a few facts and circumstances in this connection from a purely British point of view. The British opinion is that the United States cannot make ships pay—that is, in international trade—that it is not worth while trying to do so, and that there is no particular reason why America should trouble about the matter. The situation as viewed in England may be analyzed as follows:

In the first half of the nineteenth century, when ships were built of wood, when the United States were without great steel and engineering industries to absorb so much labor, and when, on the other hand, Britain had such a small population that she could grow nearly all the food she needed, America was, naturally enough, our chief rival on the ocean, while in shipbuilding she beat us. It was not until the seventies that British builders attained a tonnage equal to that launched by United States builders in the early fifties. But since the steel age set in American shipping and shipbuilding have declined (up to the war), while in Britain these twin trades have flourished. Why?

Foundation Is Steel

Let it be clearly understood that the foundation of modern shipbuilding is steel. America, of course, has a huge steel industry—a much bigger productive capacity than Britain. But whereas the British steel industry is specially designed to suit shipbuilding and to provide cargoes for the vessels when they are built, that of the United States is very different. The American steel industry is specially adapted for supplying the huge American home market. It is not suitable for shipbuilding or exportation. This little country has its coal and iron supplies most conveniently situated—its coal mines, iron and steel works, shipbuilding yards and shipping ports, all practically side by side, also has labor peculiarly skilled in shipbuilding and seafaring.

But in America the iron ore is deposited a thousand miles from the coalfields, necessitating two journeys by rail and one by ship before the smelting can be undertaken. And then, when the works turn out their finished products, these, whether for shipbuilding or exportation, have to be carried between 400 and 500 miles to seaboard. This geographical handicap, coupled with high wages, makes American competition almost, if not entirely, impossible on a true economic basis. Just as America can easily beat Britain in agricultural and manufacturing production—that is, in volume of output—so can Britain easily beat America in shipping and shipbuilding, and the exportation of heavy iron and steel goods.

Steel Export History

A little steel trade history is interesting in this connection. Twenty years ago the same was said about American steel as England has recently been told about American shipbuilding and shipping. We were told that the United States possessed such coal and iron ore resources, and were building so many large and highly efficient iron and steel plants, that within a very few years the manufacturers and engineers of that country would sweep British products clean off the world's markets. We were assured in our papers morning and evening, weekly and monthly, that our American rivals were about to "lick creation" in steel and engineering.

What happened? True our American friends built many mammoth steel mills. But did they annex the world's trade and leave us stranded? Not a bit of it. In the last fifteen years before the war, for every dollar's worth of American steel goods exported to foreign markets, there was exported very nearly a sovereign's worth of British steel products. American manufacturers and traders remained supreme at home, but could do very little in the exportation race. Just as the writer predicted twenty years ago that the Americans could not beat us in steel exports, so now he believes they will never come near to us in competitive shipbuilding or shipping.

The same factors that have stood in the way of America becoming the first nation in neutral markets will operate against her in shipping, and its twin trade, shipbuilding. American capital and labor simply cannot afford to compete in these external trades.

Question of Costs

It was proved over and over again before the war that Britain could build and operate ships at little more than half the American costs, and the war has done little or nothing to modify the conditions in favor of our friends. Our assemblage, manufacturing, building and exporting facilities are absolutely unique and our labor, on account of different economic standards, is much cheaper than American labor. It was demonstrated to the United States Foreign Trade Convention just before the war that a tramp steamer built for £66,000 in England would have cost £132,000 in the United States, while the cost of operating would be £80 per month more for wages and £20 more for provisions, etc., under the American than under the British flag.

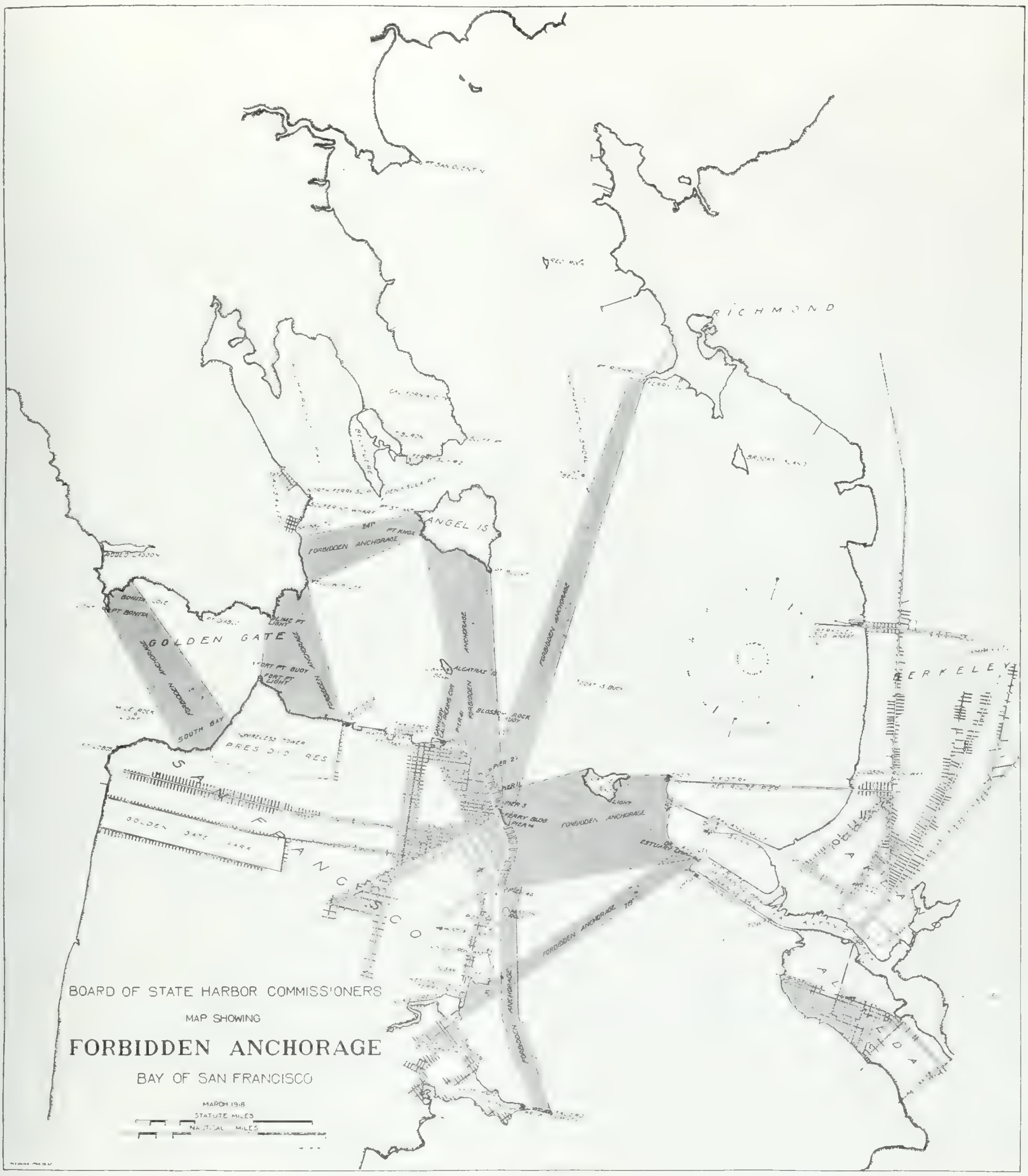
Still more recently, during the war, no less an authority than Mr. Powell of the Fore River Company has testified that our British shipyard wages are about 50 per cent lower and our net output per man 14 per cent higher than those of America.

Competition Not Overwhelming

The war time efforts of our American friends to counteract the effects of the German submarine campaign have been praiseworthy in the extreme. We can never overthank our friends. Every man in this country acknowledges to the fullest extent the splendid work done, and the magnificent service rendered by the United States. In shipbuilding the Americans have done wonders. And in the future they may be our chief rivals, as the Germans were before the war; but American competition will not be overwhelming.

It is worth remarking that the reports and figures lately given out publicly relating to the respective outputs of British and American yards have not been fair to our people. While the Americans have been able to concentrate pretty much on new merchant tonnage, the bulk of our plants and labor have been engaged on special naval work and on abnormal repairs, both merchant and naval, for our Allies, as well as ourselves. The figures simply covering new merchant launchings have been very imperfect and inadequate guides.

Forbidden Anchorage, San Francisco Bay



ALLOWABLE anchorage areas, or the unshaded portion of the above map, are under control of the Federal Government.

Forbidden anchorage areas are under control of the Board of State Harbor Commissioners. The harbor commissioners have recently come to an agreement with the Federal authorities on certain changes in the forbidden anchorage area which were dictated by experience. The most important of these changes is in the fan-shaped belt composing the Oakland ferry tracks. This has now been changed so that it forms almost a parallelogram and includes Man-of-War Row and a portion of what was the most convenient anchorage. The main reason for this is that this portion of the bay is open to southeast gales, and many ships have dragged their anchors here and have caused much damage, particularly to the telegraph and telephone cables which cross from Goat Island to the city. This change in forbidden anchorage will not affect United States naval vessels.

Development of San Francisco Harbor and Its Management

By John H. McCallum,
President, Board of State Harbor Commissioners

THE harbor extends from the Golden Gate on the west to San Mateo county line on the south, a distance of eight and one-half miles, and is owned by the State of California. Its affairs are administered by the Board of State Harbor Commissioners, composed of three members, appointed by the governor, and serve during his pleasure.

The assets of the harbor are valued at some $26,500,000. Of this amount more than $7,000,000 is in real estate, most of which is used for harbor purposes; $13,000,000, piers and wharves; $600,000, belt line equipment; $1,500,000, buildings (including the Ferry building), and the balance in sundry items, such as seawalls, street lighting, etc.

The harbor is maintained by revenues derived from dockage on ships, tolls on cargoes, belt railroad switching, rental of docks, seawall lots, Ferry building, slips, etc.

The harbor has been self-sustaining from the beginning, and must under the law continue to be. San Francisco harbor thus pays its own way, not a dollar coming out of the public treasury or taxes. The revenue must provide not only for administration expenses, replacements, repairs and dredging of water slips alongside of the piers, but must also provide for interest on bond issues and redemptions. Much new construction is also paid for out of current revenue.

Number and Extent of Piers

At the present time there are thirty-nine piers of various sizes in active use, providing cargo area of 5,712,189 square feet, or 131 acres, which would be equivalent to fifty average city blocks. There are fifteen miles of berthing space, or sufficient to accommodate 245 vessels of the average size. Since 1911 twenty-six new piers have been constructed, increasing the cargo capacity over 80 per cent. During the same period the tonnage of the port has increased from 6,598,478 tons in 1911 to 9,701,231 tons in 1918, or an increase of about 45 per cent. (This does not include the tonnage passing over privately-owned docks, such as the Western Sugar Refining Company, the Bethlehem Shipbuilding Corporation, and the United States transport docks at the foot of Laguna street.)

The revenue of the harbor in 1911 was $1,801,536.43; in 1918 it was $2,317,170.55.

Belt Railroad Extension

In 1911 there were six piers served by the belt railroad. Now all but two piers have belt railroad connections. On all of the new piers there is a depressed track on one side and a surface track on the other, thus bringing ship and rail together, which promotes dispatch and makes for cheapness in handling cargo. In 1911 there were but a few miles of belt line tracks. Now there are over forty miles, serving industries located adjacent to the waterfront and the United States transport docks (through a tunnel built under Fort Mason in 1914 at a cost to the harbor board of $270,000), the army post at the Presidio, as well as the docks and piers.

The belt line tracks are connected with the main line of the Southern Pacific at the foot of Townsend street and with the Western Pacific, Santa Fe and Northwestern Pacific by ferry slips at the foot of Taylor street.

In 1911 the revenue of the belt railroad was $148,855. In 1918 the revenue was $527,233.

The San Francisco docks, many of which are constructed of reinforced concrete, are among the most modern in the world, and range in size from 100 to 200 feet in width and from 600 to 1100 feet in length.

Six Floating Derricks

There are available for immediate use for the handling of heavy freight six floating derricks, with a lifting capacity of from twenty to fifty tons, with booms from 100 to 105 feet. Stationary derricks are: one derrick, twenty tons capacity, boom 90 feet; thirty tons capacity, boom 60 feet; one shear leg derrick, 100 tons capacity.

The Board of Harbor Commissioners is committed to a policy of equipping the docks with the most modern labor-saving devices just as soon as the materials are available, thus enabling the ships to load and unload their cargoes in the least possible time. It is also committed to a policy of keeping sufficiently in advance of the commerce of the port in providing sufficient wharf space, so that no vessel will be delayed for a lack of space to discharge or receive her cargo.

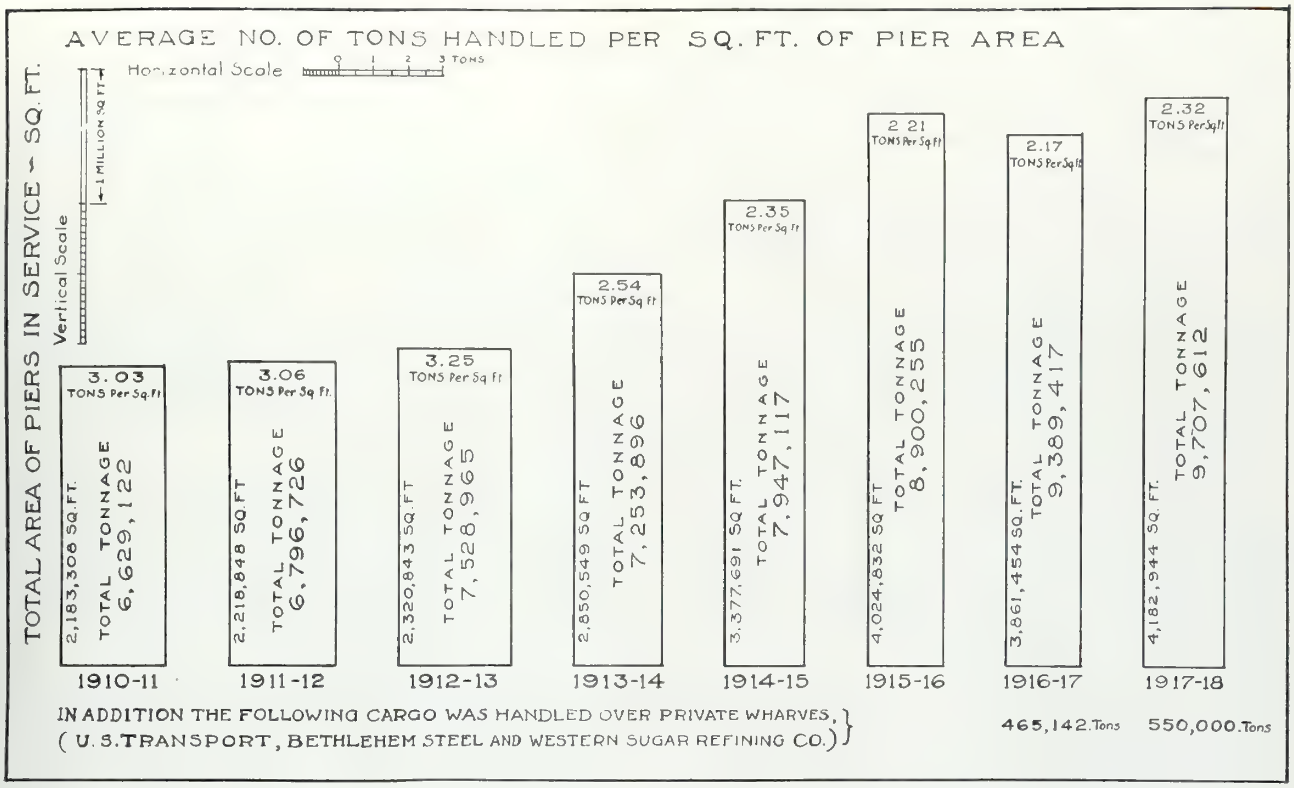
The board is now actively arranging adequately to care for the rapidly increasing Oriental oil business at Islais creek. On this property the board is constructing facilities for the handling of barrel, case and bulk oil. These will consist of a dumping plant, pipe lines, tanks, case and barrel storage, dumping tables, can bailers, etc. In addition, land is available where independent dealers can provide tankage to be served by the board's pumping plant.

Tank Barge Connecting Link

In conjunction with the oil station, there is being provided a tank barge with a capacity of about 700 tons of bulk oil, which will be used as a connecting link between the steamships and the storage tanks and which will be available in case any cargoes are not sufficiently large to justify a steamship company moving to the oil berths.

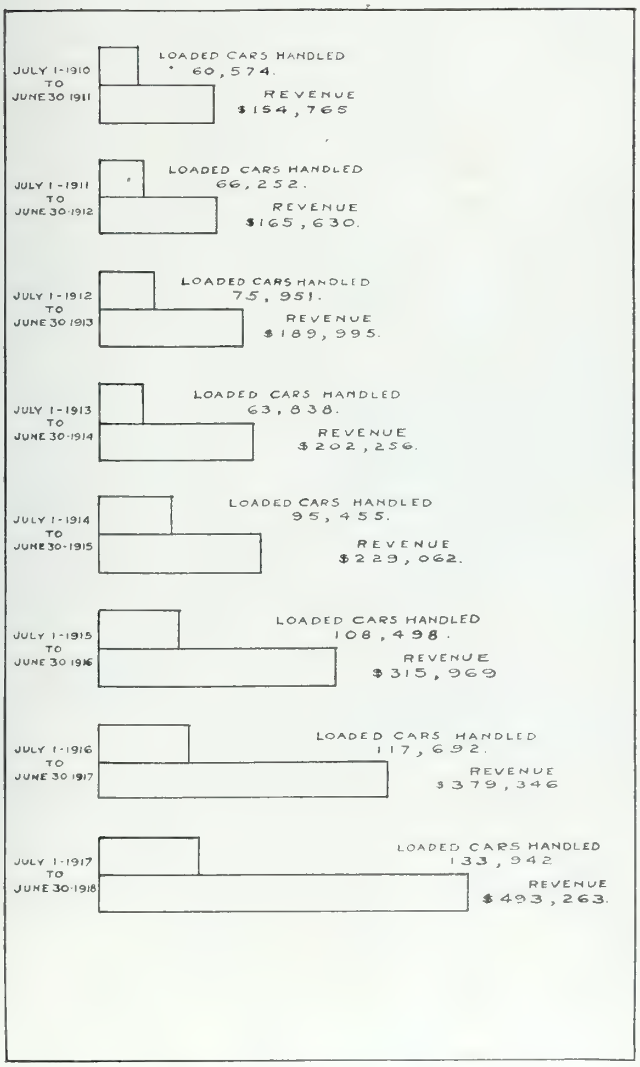
A terminal at Islais creek is under way, which will provide about 2200 lineal feet of bulkhead wharf 100 feet wide, with two-story warehouse 200 feet in width paralleling, with the necessary siding and storage tracks for handling railroad shipments. The construction of this portion of a terminal will facilitate the discharge of through Oriental cargo both in and outbound, and provide accommodation for temporary storage. It will provide cargo space and berths for four steamships, each having a cargo capacity of 20,000 tons.

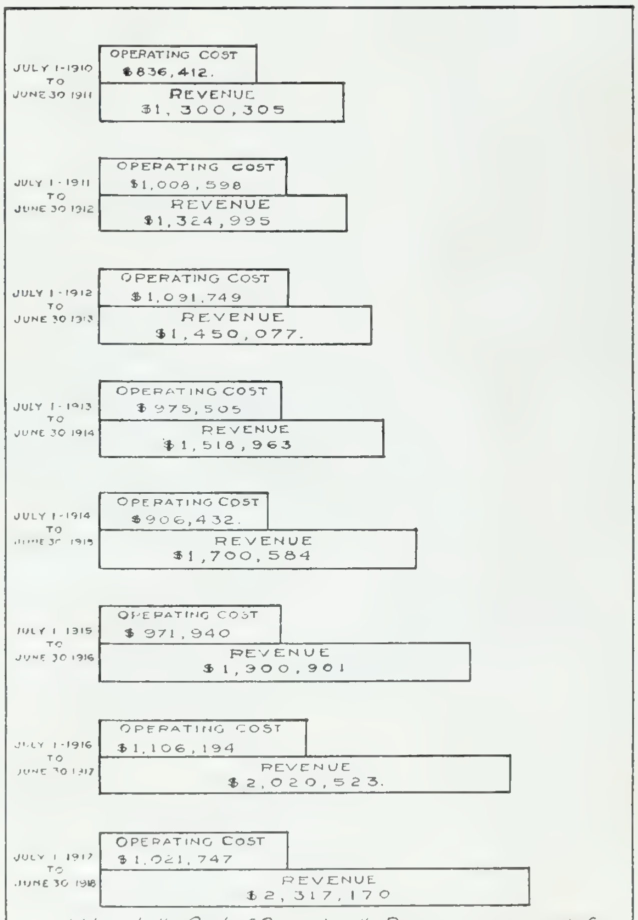
In addition to the above, the board has adopted a program involving the expenditure of some $3,-



IN ADDITION THE FOLLOWING CARGO WAS HANDLED OVER PRIVATE WHARVES, (U.S. TRANSPORT, BETHLEHEM STEEL AND WESTERN SUGAR REFINING CO.) 465,142 Tons 550,000 Tons

COMPARATIVE DIAGRAM OF PIER AREAS AND TONNAGE HANDLED





In addition to the Cost of Operation the Revenue must provide for -
Interest on all Harbor Bonds Outstanding.
Sinking Fund for " " "
Depreciation, if of a nature not possible to make good by Repairs
That portion of any Fire Loss which cannot legally be covered by Insurance

COMPARATIVE DIAGRAM SHOWING REVENUE & NUMBER LOADED CARS HANDLED ON BELT RAILROAD SINCE JULY 1-1910

COMPARATIVE DIAGRAM SHOWING REVENUE AND COST OF OPERATION OF PORT FACILITIES SINCE JULY 1-1910

000,000 for additional improvements to the active harbor of which the following table is a summary:

Proposed Work

Pier No. 1 substructure.
Warehouse on lot No. 4.
Shed on pier No. 33.
Bulkhead wharf at pier No. 5.
Bulkhead wharf at pier No. 19.
Bulkhead wharf at piers Nos. 21 and 27.
Paving Bay street to Union street.
Paving Pacific street to Washington street.
Paving Folsom street to Harrison street.
Connecting wharf piers 39 to 41.
Shed on wharf 39-41, two-story.
Connecting wharf piers 26-28.
Shed on wharf 26-28.
Pier 41, bulkhead wharf building and shed extension.
Shed on pier 37, two-story.
Bulkhead wharf building, pier 39, two-story.
Islais street, bulkhead wall and wing wall.
Islais street, dredging and fill.
Islais street, wharves.
Islais street, shed, two-story.
Pier No. 20, extension.
Pier No. 20, extension shed.
Pier No. 22, extension.
Pier No. 22, extension shed.

New System of Port Charges

On and after April 1, 1919, all vessels engaged in foreign and off-shore trade in the port of San Francisco will be relieved from the payment of rental and dockage.

Tolls, however, on cargo carried by such vessels will be increased to practically three times their present schedule, or about 15 cents a ton. This will make the port charges assessed in San Francisco 15 to 20 cents a ton. It is hoped by this method to attract to this port, under the slogan "Free Port," many vessels engaged in foreign and off-shore trade.

Steamship companies that wish piers assigned to them may have them assigned if they maintain a certain schedule of sailings, and rentals in that case will be reduced to one-half of the present scale.

The port of San Francisco, or rather its administrative executive officers, have enjoyed, in making these changes, the advice and counsel of a committee composed of the leading importers, exporters, ship owners and ship operators doing business at San Francisco, and it is on their recommendation, after due consideration by the board, that the changes have been effected. Counsel of equal value has been asked and had in making its plan for mechanical labor-saving devices for the piers, and in the planning of the Oriental oil terminal about to be erected.

The board has appointed also a standing advisory committee composed of the leading shippers, importers, exporters, warehousemen, stevedoring companies, etc., to act with it and advise it in all matters pertaining to commerce and matters generally affecting the good of the port, and hopes in this way to be enabled to carry out a program that will be constructive and wise and meet the needs of all concerned.

Summary of Advantages

The advantages of the port are:

A safe harbor which can be entered under any conditions of tide or weather.

The entire harbor publicly owned and administered.

Ample facilities for the handling of local, coastwise and overseas shipping with modern piers and wharves affording adequate cargo space.

A public belt railroad connecting the piers with local industries, warehouses, storage yards and transcontinental railways.

Adequate bunkering, ship repair and dry docking facilities.

Quick dispatch on account of excellent stevedoring organizations and facilities.

Climatic conditions, which permit of the handling of cargo economically and without delay every day in the year.

It is the home port for a large number of shipowners. It is the financial center of the western division of the United States; hence, able to adequately finance all commerce entering the port.

The board is bending every effort toward making the port of San Francisco the most attractive harbor for ships on the Pacific Coast, and it asks the co-operation of the people of San Francisco and of California, as well as the people of the United States, to make this port not only one of the greatest ports of America, but of the world.

FOREIGN TRADE COUNCIL PROGRAM

A TENTATIVE program for the Sixth National Foreign Trade Council, to be held in Chicago April 24, 25 and 26, has been announced as follows:

FIRST DAY, THURSDAY, APRIL 24

Convention called to order at 10 a. m. by James A. Farrell, chairman of the National Foreign Trade Council.

Organization of Convention—Election of presiding officers, secretaries, etc.; address of president of convention; appointment of general convention committee. Session topic: "America's Need of Foreign Trade," from the viewpoint of production, finance, labor and imports.

Afternoon Session, 2:30 p. m.—Session topic: "Post-War Foreign Trade Problems."

Evening Session, 8 p. m.—Group sessions.

Group I. "Commercial Education for Foreign Trade."

Group II. "Foreign Trade Merchandising," in co-operation with the American Exporters and Importers' Association.

Group III. "Financing Foreign Trade," in co-operation with the American Bankers' Association.

Group IV. "Advertising for Foreign Trade."

SECOND DAY, FRIDAY, APRIL 25

Morning Session, 10 a. m.—Session topic: "The American Merchant Marine."

Afternoon Session, 2:30 p. m.—Group sessions.

Group V. "Foreign Credits," in co-operation with the National Association of Credit Men.

Group VI. "Direct Selling," in co-operation with the American Manufacturers Export Association.

GROUP VII. "Export Combinations," describing the Webb law in actual operation.

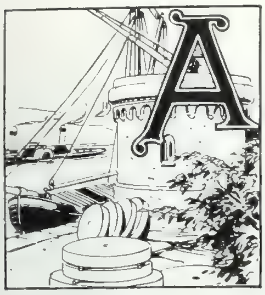
Group VIII. "Ocean Service," in co-operation with the American Steamship Association.

Friday Evening, 7 p. m.—Banquet, Congress Hotel.

THIRD DAY, SATURDAY, APRIL 26

Morning Session, 10 a. m.—Reports of group sessions, report of general convention committee, miscellaneous business, adjournment.

Traveling Gantry Jib Crane: Its Use at Terminals



AT many of the older seaports of Europe there will be found old stationary masts with a swinging boom mounted on masonry and equipped with either power or hand winch. The initial of this article shows this type and is taken from a sketch of the first jib crane erected at the port of Hamburg. By a simple process of evolution to meet the growing requirements for a more flexible mechanism, there has come the modern electrically operated gantry jib crane, a traveling, revolving, hoisting and derricking machine, which has no equal for rapid and economical handling of miscellaneous freight from pier or quayside to ship or from ship to pier or quayside. At all foreign ports this type by a natural survival of the fittest has almost entirely supplanted every other form of transfer machinery.

When equipped with the proper tackle there is no form of freight too difficult for the gantry jib. Pianos or perambulators, Panama hats or pig iron, soda crackers or cement, steel rails or steers, anything and everything, packages, bales, boxes, bundles, are handled with equal ease, speed and safety.

No type of mechanism has been subjected to such thorough tests as the loading and unloading machinery at ports, and the writer desires here to set down a few of the results of these tests and also some general considerations with regard to crane installations and their effect on terminal investments. If the majority of the tests cited are from European and particularly German ports, that is only because the ports of Europe have led the world in the scientific management of water borne freight transfer. Speed in clearing vessels is considered of so great importance that the aim in terminal design was to install cranes enough constantly to take care of the possible maximum demand, even though many cranes should be idle part of the time. The reason for this is that, while a crane costs a few thousands, the terminal cost may run into millions. If, therefore, by installing double the number of cranes needed for average work one terminal is enabled to do the work of two or possibly three, there is a tremendous saving in the investment account and at the same time all vessels are served more promptly and costly delays avoided.

Type of crane installed for transferring bulk material. Hoisting speed a second, 2 feet; slewing 5 feet 3 inches at jib head. Crane travels 7 feet 7 inches, bridge travels 1 foot 8 inches a second

Six-ton, full arch traveling gantry jib crane, showing open slot for the electric conductor and the electric connection between the crane and the slot

European Test Practice

A standard cycle for tests has been established. This consists in lifting the load fifty feet, swinging 150 feet, lowering to the platform, releasing the hook, raising, swinging back and lowering the hook to the starting point.

In 1911 there were in operation at Hamburg 808 cranes. The great majority were 2½ or 3-ton traveling gantry jibs. A few cranes were installed with larger capacity running up to 150 tons per crane. From careful daily records, extending over years of time, the port engineers estimate that one kilowatt consumption at the power station unloads six and one-half tons at the docks, so that at three cents cost a k. w. for electric power we may safely assume that the power cost of unloading at Hamburg was one-half cent a ton.

These 2½-ton and 3-ton cranes under test conditions have made forty to fifty complete standard cycles in an hour. Under ordinary working conditions this figure would be reduced to from eighteen to twenty-five cycles according to the nature of the freight being handled. Under proper working conditions, with a large bulk of the same class of packages, some operators can maintain thirty cycles per hour, so that a 2½-ton crane will transfer from forty-five to seventy-five tons per hour or from 360 to 600 tons per eight-hour day, or let us say an average of 500 tons. The labor cost then of operating the crane, if we pay $5 for eight hours, would be one cent a ton.

Summary of Costs

The cost of the 2½-ton traveling electric gantry jib at present prices probably would be about $12,000. Allowing 6 per cent for interest, 6 per cent for maintenance, 6 per cent for amoritization, we get the figure of one and one-quarter cents a ton for these fixed charges.

Summarizing we have:

Power	½c a ton
Labor	1 c a ton
Fixed charges	1¼c a ton
Total crane costs	2¾c a ton

These figures under present conditions in

America probably would approximate very closely the cost of what would be charged against crane equipment if our large seaports were equipped with cranes to the same extent that prevails in Europe.

In estimating power costs for smaller ports, these figures should be used with a liberal factor of safety, and the writer has usually used 3 cents a ton. Each installation would of course have its own peculiar local factors affecting these cost estimates but from the European tests we may conclude that there is nothing prohibitive about the operating and maintenance costs of machinery of this character.

In order to make available the full capacity of any crane installation, it is necessary to install conveying and tiering machinery on the pier of quay and in the shed and warehouse. The crane transferring from the ship to pier serves only a limited space and unless that space is quickly cleared by conveyors, trucks, cars and drays, it quickly becomes congested and the crane has to sit idle until the pier is cleared.

Quick Dispatch Given

The real benefit and the most remarkable economy effected by proper crane installations is not so much in the reduced cost of transferring tonnage of freight, as in the added dispatch in discharging and loading vessels. As an inducement held out by any port to the shipping of the world, dispatch looms very large with the ship operator. Other things being equal, the port which handles his vessel with the least delay will be his favorite port of entry. No one item is so good an advertisement for a port as quick, sure, safe discharge, and prompt loading.

From barge to open shed—grab bucket for coal, ore and broken rock. The crane is five-ton

Traveling gantry jib cranes for canals with little variation of water level; and Rhine boats with possible free vertical movement from the holds

Chevrons for British Sailors

War service chevrons for the mercantile marine of Great Britain have been authorized by the British Board of Trade, which has made the following announcement:

The Board of Trade have authorized chevrons to be worn by masters, officers and seamen of the mercantile marine, licensed pilots, and fishermen, who have served at sea or have been captured or interned during the war, in accordance with the following provisions:

(1) One chevron may be worn in respect of seagoing service, or captivity or internment in an enemy country, during the period from Aug. 4, 1914, to Dec. 31, 1914.

(2) One chevron may be worn in respect of each or any of the three calendar years 1915, 1916 and 1917, provided that at least three months of the year have been spent afloat in sea-going service, or in captivity in an enemy country, or both.

(3) One chevron may be worn in respect of the remainder of the war when 12 months have been spent since Jan. 1, 1918, in sea-going service (with or without a period of captivity in an enemy country), provided that the period of 12 months has commenced before November 11, 1918, when the armistice was signed.

(4) For certificated masters and officers, licensed pilots, uncertificated junior officers, qualifying for their first certificates, surgeons, pursers, wireless operators, cadets and apprentices, in the mercantile marine, the chevron for 1914 shall be silver, the others gold. For all other officers, skippers, second-hands, petty officers, ranks and ratings, in the mercantile marine, the chevron for 1914 shall be of red worsted, in others of blue worsted.

(5) The chevrons shall be similar to those worn in the Royal Navy, and shall be worn on the forearm of the right sleeve of uniform, sea rig or shore rig; the silver and red worsted chevrons respectively shall be worn below the others.

(6) Chevrons earned for naval or military service in accordance with admiralty or war office regulations may be worn in addition to the mercantile marine chevrons. No permission to wear the chevrons other than this general authorization, will be required by masters, officers, seamen, licensed pilots or fishermen. Chevrons will not be provided by the Board of Trade, but they should be purchased by those authorized to wear them.

(7) Under the defense of the realm regulations it is an offense for any unauthorized person to wear a chevron.

SHOULD CULTIVATE AUSTRALASIA

H. F. Albert, New York insurance broker, considers that Australia, New Zealand and Southeastern Asia are, geographically, and from the inclination of many of their inhabitants, naturally American markets, and that it would pay American shipping men to cultivate them much more than they are doing at present.

Our New Merchant Marine---The Problems of Its Existence and Growth

By the Traffic Manager

MANY articles have been, and are being, written on the question of our merchant marine, some by the experienced shipowner and more by manufacturers, sailor union representatives, politicians, and lawyers. One of the latest is an article entitled, "How the Seamen's Law is Stabilizing Wages," in the Nautical Gazette of January 4, 1919, by Silas B. Axtell, attorney for the Seamen's Union of America. (This designation of Mr. Axtell is corrected in the January 18 issue of the Nautical Gazette by his own statement that he merely specializes in seamen's cases, and that he is not attorney for the Seamen's Union.) The article evidently was so good that it misled the editor of the National Gazette, a marine publication whose staff of writers surely should know something about our merchant marine and its past struggles and disappearance from international trade. That publication on its editorial page writes as follows concerning Mr. Axtell's article:

> "Concerning the contention that American ship operators will be at a serious disadvantage as compared with foreign rivals until such time as foreign crews become familiar with, and demand their rights under, the LaFollette act: It should be observed that this is not likely to prove so grave a drawback to the successful operation of the American merchant marine as is popularly supposed. On American ships, crew wages have been variously estimated to form from four to fifteen per cent of all operating costs. As they form such a small proportion of total outlays, they would not constitute such an insuperable handicap, even if **considerably** higher than those paid on foreign craft."

Some Other Handicaps

If a marine publication takes the stand that the only handicap under which our merchant marine is laboring is one of wages, our legislators surely may be excused for their lack of knowledge on the question. For the benefit of Nautical Gazette, the writer attempts to enumerate below a few other handicaps:

1. Greater investment due to our higher shipbuilding cost.
2. Greater interest on the higher investment.
3. Greater depreciation on the higher investment.
4. Greater insurance expense to protect the higher investment.
5. Burdensome and expensive inspection laws.
6. Tonnage measurement and its greater port charges and canal dues.
7. More expensive food scale compared with that of other nations.
8. Crews: American ships must have the following licensed officers: Captain, first mate, second mate, third mate, chief engineer, first assistant engineer, second assistant engineer, third assistant engineer. British ships carry fewer licensed officers—captain, first mate, second mate, chief engineer, second engineer.

Our United States law makes it obligatory to carry one more **licensed** mate and two more **licensed** engineers than required by British law. Three more men are also required in the engine room of an American ship than in a British ship, and they are known as water-tenders—a job unknown on a British ship. United States Senator Duncan U. Fletcher contends that the increased efficiency of American labor makes up for the added cost. Then why these extra licensed men and water-tenders?

9. Overtime-pay demands. Much sought after on American ships.
10. Higher repair costs. A patriotic American shipowner should patronize American repair yards.
11. Subsidies granted by many foreign flags to their ships.

Delays in Foreign Ports

12. Delays in foreign ports, mostly due to crew drunkenness and desertion by reason of the numerous pay-days granted by the LaFollette Act, and the clause making it impossible to arrest or imprison a seaman for desertion in a foreign port, regardless of his signed contract to make the round voyage or to serve for a stated time, subject, of course, to humane treatment on the part of his superior officers.

The LaFollette law makes an American vessel (owner) liable to damages if the master fails to use diligence to prevent the escape of an officer who has inflicted corporal punishment on a seaman. It does not, however, state that the ship (owner) is liable for damages for the escape of a seaman who inflicts corporal punishment on an officer.

13. The governmental ship fines: Often sailors or licensed men are unobtainable in foreign ports and the ship waits a reasonable time to secure men before sailing, the master knowing that when he arrives back to his American port his owners will be fined for his sailing with a short crew. Often the deserting sailor, after his pay has been squandered, applies to the American consul for assistance, who hears his case (the ship having sailed), and who generally rules that the seaman left behind be transported back to his home port at the expense of the ship which he deserted.

American ships are often fined for the crew smuggling liquor into dry territory, etc., etc.

14. Greater cost of certain supplies and nautical instruments necessary to be purchased abroad, on which the American shipowner has to add freight and duty and a middleman's profit to his purchase.

Other small details could be mentioned which, if added together at the end of an operating year, must be considered by the careful shipowner, but the writer trusts sufficient handicaps have been shown above to prove to the editor of Nautical Gazette that handicaps other than the one of wages exist.

* * *

Now for Mr. Axtell's article itself. He refers principally to Captain Robert Dollar's pamphlet entitled, "The American Merchant Marine After the War." It will be noted in the following quotation from Mr. Axwell's article that he agrees with Captain Dollar in the removal of every handicap on the American merchant marine except that certain portion of the Seamen's Act which gives the sailor higher wages, opportunity for overtime pay, and freedom to do as he pleases in a foreign port.

Quoting Mr. Axtell

"The criticisms of Captain Dollar and his unnamed associates as to tonnage measurements are of course sound. There is no reason why we should persist in a system of tonnage measurement which compels us to pay extra port charges in foreign ports as well as extra fees for the use of our own Panama Canal. The matter of changing the method of our boiler inspections, etc., would seem to be questions for experts to decide. Clearly the legislation complained of should be repealed or amended. The objections which he makes, however, to the portions of the Seamen's Act which relate to the crew seem to me to be largely unmerited and to call for a reply."

Answering Mr. Axtell

The reader may draw his own conclusions.

Quoting Mr. Axtell

"I am informed on reliable sources that there has not been a shortage of able seamen. There has never been a time when the number of able seamen required by law could not be procured by reasonable effort or by the payment of a fair wage."

Answering Mr. Axtell

Mr. Axtell is wrong. Andrew Furuseth testified in Washington on May 3, 1918, at a maritime conference before former Governor Bass of Massachusetts, who was chairman of that meeting at which shipowners and maritime unions were represented, that there was a serious shortage of seamen at that time. The minutes of that conference also contain statements relative to the shortage of officers and engineers. By the "payment of a fair wage," Mr. Axtell means that seamen were available but that they would not go to sea at the agreed rate of wages between the shipowners and the Seamen's Union. Many such "holdups" were attempted on the Pacific Coast.

Quoting Mr. Axtell

"The repeal is also urged of the provision requiring that 75 per cent of the crew must be able to understand any order given to them by commanding officers. It is for the people of the United States to decide whether they want an American merchant marine of coolies, Japanese and Spaniards who care nothing about the United States, who desire to speak only their own languages, and who have no intention of becoming citizens of the United States, or whether they want one composed mainly of Americans."

Answering Mr. Axtell

Mr. Axtell omitted the fact that the greater membership of the Sailors' Union is comprised of Swedes, Norwegians, Finns, Greeks, Germans, Portuguese and Turks. These men do not care to sail with Chinese, Japanese, Mexicans and Spaniards, and yet the Spanish merchant marine at one time dominated the seas. He makes no comments concerning the American negro, yet Gulf statistics show him to be an able seaman.

At the same maritime conference mentioned above, in Washington on May 3, 1918, Mr. Furu[illegible] testified that 70 per cent of the seamen, sail[illegible] firemen, stewards and cooks on American vessels were foreign born and aliens; of the 30 per cent remaining, he stated that 15 per cent were citizens and that the other 15 per cent had taken out intention papers. It is quite noticeable that Mr. Axtell does not preach the doctrine of "American citizens for American ships only."

In May, 1918, the shipping board found it necessary to employ foreign-born ship officers on its American merchant marine, which was promptly protested by the Seamen's Union, who wanted no foreign officers put over **American** crews, and yet, as before stated, Andrew Furuseth admitted only 15 per cent of the seamen in the United States at that time were American citizens. Non-citizenship on the part of these seamen was used as an excuse for their not joining the American Naval Reserve. They preferred to work for higher wages.

Quoting Mr. Axtell

"The third and most strenuous objection of all is made to the enforcement of Section 4530, as amended, of the United States revised statutes, which Captain Dollar in his pamphlet says, in italics, must be repealed. The main portions of the section, as amended, read: 'Every seaman on a vessel of the United States shall be entitled to receive on demand from the master of the vessel to which he belongs, one-half part of the wages which he shall have then earned at every port where such vessel, after the voyage is commenced, shall load or deliver cargo before the voyage is ended, and the stipulations in the contract to the contrary shall be void.'"

Answering Mr. Axtell

Mr. Axtell has omitted, it is hoped unintentionally, to quote the entire law on the payment of wages, and that portion of the law to which the shipowners object reads as follows:

> "Such demands (for wages) shall not be made before the expiration of, nor oftener than, once in five days."

This means that a seaman at the end of each five days can demand two and one-half days' pay. It is this section of the law that hurts and should be repealed. A payday every five days means constant drunkenness, making the crew useless to the ship. One payday in each port should be sufficient, provided the vessel is not tied up in port for an indefinite time. Captain Robert Dollar is correct in his contention that this part of the law should be repealed.

Senator LaFollette's Explanation

The alien seaman has placed additional burdens on our merchant marine, through Senator LaFollette. Mr. LaFollette made the following statement when the Seamen's Bill was being debated in the United States Senate:

> "Mr. President: Of course I am a landlubber and have to take my tutelage from those men who have been at sea. I never shall be able to express my very great obligation to Mr. Andrew Furuseth, who, for the last four years, has called upon me almost every Sunday morning to talk with me about this legislation. Andrew Furuseth is a sailor. He is a Norwegian Americanized; one of the most intelligent men it has ever been my good fortune to meet. For nineteen years he has been sitting up there in that corner of the gallery waiting to be made free. **Whatever I happen**

to know about this subject I have acquired from him."

Andrew Furuseth's great intelligence never lifted him out of the forecastle into an officer's position. He had been lobbying for nineteen years, evidently a free man, and he spoke to Mr. LaFollette almost every Sunday morning for four years on sea conditions nineteen years before. If Mr. LaFollette had given Captain Robert Dollar, a shipowner, two or three Sunday afternoons to present the ship operator's side of the case, probably there would have been no Seamen's Bill. Mr. LaFollette admits that whatever he knows about the subject of seamen, he acquired from only one side, namely, the head of the Seamen's Union of the United States. However, Mr. Furuseth was so highly thought of in Washington that he was next sent as an American delegate in 1914 to the London convention on safety of life at sea. There he met experienced men at the head of their respective professions. He could not convince these men like he could inexperienced senators and left the convention in a huff. That London convention refused to look at shipping questions solely from a sailor's standpoint, and, therefore, Mr. Furuseth was hopelessly out of place.

Better Laws Necessary

We should have better shipping laws. Shipowners throughout the United States urge the repeal of all navigation and seamen's laws now on our statute books which place upon the construction, maintenance and operation of American-built vessels in overseas trade a handicap which prevents competition on a basis of equality with vessels under any foreign flag. Let us substitute therefor laws at least as favorable to American ships as the laws governing our strongest competitor. Japan is now striving for ocean supremacy, and in another generation it may be China. United States Senator Duncan U. Fletcher appeals to the patriotism of our American shipowners and is reported to have said that even if the cost of operating American ships is a little higher, they (shipowners) ought, as a matter of patriotism, keep their ships registered under the American flag. United States Senator Wesley L. Jones, however, disagrees, and his words follow:

"It is all very well to appeal to the patriotism of our laboring people; it is all very well to appeal to the patriotism of our capitalists; but business is not carried out very extensively in the commercial world upon a basis of patriotism. It is carried on upon business lines; it is carried on with the most intense competition, and for profit."

In Loneliness and Storm

By Ralph E. Cropley

THE thrill of the tales which have been coming from off the sea during the past four years has been inclined to make us forget that sailormen have stood the test just as courageously in loneliness and storm as in the enthusiasm of battle. Witness the case of the "Vigilant," an American tugboat that crossed the Atlantic under her own steam in 1916. She was classed as an ocean-going tug, but that was misleading, for her work was only to tow loaded barges of coal up and down the coast between Norfolk and Boston, a trip during which, if the seas became tempestuous, she could take her charges into a haven and anchor till the weather moderated.

She wasn't very much larger than an ocean liner's lifeboat, and when you consider how the waves of the Atlantic can toss about even a liner like the "Leviathan" as if she were a cockleshell, you readily can appreciate the daring it required on the part of the "Vigilant's" crew in a boat which was a hundred times smaller than the "Leviathan." Even in the calmness which usually reigns on the Atlantic in the summer such a voyage would be a pretty risky thing for a tugboat. But in the late fall, with the winter gales coming in—well, the "Vigilant" had to take that voyage because England needed her to assist in warding off the submarine menace.

Didn't Wish a New Flag

Sailors are very superstitious, and in a way they are justified, for it does seem that at times a "hoodoo" hangs over a ship, and in many cases follows her throughout her career. The "Vigilant" always had been a lucky packet as she towed up and down the American coast, but somehow from the moment she started her voyage overseas at New York she began to act cranky and things happened. Perchance it was because a black cat strolled aboard or her skipper walked under a ladder. Perhaps the "Vigilant" didn't like to change her nationality. She did everything she could to remain on the American side of the Atlantic and had her crew nearly crazy at each port she called to coal. Her steering gear broke, her boilers developed a cough, her funnel nearly worked loose in a storm as she navigated the Nova Scotian coast. Yet in spite of all, her crew stuck by her and she finally shoved off from St. John's, Newfoundland, for the long trip across to the Irish coast.

No more had she stuck her nose outside of St. John's harbor than she became smothered in seas like a half-tide rock. Yet on she went, diving into it, until in mid-Atlantic her captain thought her finish wasn't many hours off. The Holland-American liner "Ryndam"—now the American transport "Ryndam"—coming alone, he thought it his duty to abandon the "Vigilant" and save the lives of his crew while he could. But three Americans of the crew, by the names of Ferguson, Smith and Welch, thought differently and refused to accompany the captain aboard the "Ryndam." They were willing to take a chance because they had Yankee pluck and love of fighting against great odds. So the three of them stayed.

Three Men Take Her In

After the "Ryndam" had disappeared over the horizon the weather got worse, which is rather ironical, as, from the way the "Vigilant" was acting, one couldn't imagine any worse weather at sea. She was literally buried at times beneath the waves which swept aboard her. Yet up she'd come and shake the water off her as a dog does after a bath, only to dive in once more. Her deck equipment went by the board and finally her steering gear jammed and she was thrown on her beam ends. Wallowing in the trough of the sea it seemed impossible that she could live another minute, yet the next found her still afloat with Ferguson battened in the pilothouse, Welch at the engine and Smith in the stoke-hole firing the boiler whenever the tug's lurching gave him a minute to keep his feet.

For three days the men couldn't leave their posts! For three days they had neither food nor drink. Supported by their own Yankee grit and love of adventure and the incalculable fortune which frequently sides with a game fighter, weak from exhaustion, Ferguson, Welch and Smith brought the "Vigilant" safely into an Irish port. There are, of course, records of valor which perchance may furnish better reading, but until we entered the war, six months after the "Vigilant's" remarkable voyage, many years had rolled by since there had been such an exhibition of Yankee seamanship.

Left Behind in Storm

And there was the "Miguel de Larringa" which disappeared beneath the waves in February, 1918. As with the "Vigilant," there was no excitement of the danger zone, no bang of a Hun torpedo or whistle of shell-fire—no stimulating presence of a cruel enemy to spur on the sorely-tried crew—nothing but that courage which German barbarism has failed to extract from the makeup of the Anglo-Saxon.

Loaded with grain for the Allies, the "Miguel de Larringa" put out from an American port in convoy with other vessels. As ships go she couldn't be considered other than a tin tea-kettle which one puncture would send to the bottom. She'd seen better days; her engines and boilers were tired and proper care couldn't be given to them in the rush of war. Yet, owing to the rate the Huns had been sinking ships, and the fact that the new American emergency ships were for the most part in the process of being built, the "Miguel de Larringa" was a very valuable unit to the Allies—more valuable than she was when she was fresh from the stocks and in the prime of her youth.

When the convoy ran into a storm, owing to the depth to which she was laden and the weariness of her motive power, the "Miguel de Larringa" couldn't keep up and was soon left behind to struggle on as best she could. The storm intensified in fierceness till she made no headway against it at all and the waves beat about and upon her as if they would soon pound the life out of her.

Cargo of Grain Shifts

Yet all would have gone well with the "Miguel de Larringa"—tea-kettle that she was—if the cargo hadn't shifted. A load of grain is one of most tricky cargoes to carry overseas, as it has no stability and because of its great weight, will break down the walls which confine it unless they are well braced. Something—some brace or stanchion—gave way within the deep holds of the "Miguel de Larringa," and acting like an avalanche, gathering momentum and volume every foot, a small bit of the "Miguel's" cargo, once freed, set the rest a-going and she careened till it was but a question of hours until the sea would engulf her.

The wireless sent out the "S. O. S." signal and a British warship responded to the cry for help. But before she could arrive the seas either had swept away or smashed all the lifeboats the doomed ship carried, with one exception. That one boat could hold only twenty-seven men. The crew of the "Miguel de Larringa" numbered thirty-seven. The captain's name was Williams—good, old Anglo-Saxon—and when it was seen that ten men would have to stay behind he said: "I stay; who are the other nine?"

And because they were real seamen the other nine were there. They included R. S. Marn, the chief officer; seven sailors and a fireman. There was no fuss or flourish about it. All knew they stared death in the face, but were willing to take a chance in order that some other fellow might live.

Sea Takes "Miguel de Larringa"

Without food or shelter for forty hours these ten men clung to the rail of their overturned ship as she slowly sank while the mountainous wintry seas battered her. They saw their mates picked up by the warship. They knew it was impossible for the warship to get a boat near the "Miguel de Larringa" until the weather moderated. For forty hours they held on with the warship standing by unable to rescue them, and when dawn came one morning the warship saw that the "Miguel de Larringa" and her brave men had vanished.

These men, as usual, have exhibited to the world the stuff and courage the men of the merchant ship profession are made of. They had the same coolness and courage that their mates have shown in innumerable circumstances of danger and difficulty, not only during the war but always.

Chamber of Commerce on the Harbor Bill

STATEMENT of position of San Francisco Chamber of Commerce with reference to the proposed bill known as Senate Bill No. 94, providing for the tentative and ultimate transfer of the waterfront of San Francisco and the administration of its affairs from the State of California to the City and County of San Francisco:

The act in question, which is voluminous, covering twenty-three printed pages, was prepared in the office of the city attorney of this city, having had the attention of one of the assistant city attorneys for a period of six months prior to the public announcement of the measure a few days before the convening of the present Legislature. On January 8, 1919, an invitation was extended to the chamber to attend a meeting to be held on the evening of January 9 at which the provisions of the proposed act were to be discussed and the attitude of the chamber toward the measure announced. The chamber's reply to the invitation referred to the importance of the subject and the numerous provisions of the measure as precluding the possibility of arriving at definite conclusions within the short interval allowed.

The chamber immediately referred the proposed act to its maritime and harbor affairs committee, and it has since had the earnest attention of its members and several meetings of this committee have been held at which the various provisions of the measure have been thoughtfully considered.

Committee Opposes Measure

The committee concluded to oppose the measure, its adverse criticisms going to matters of vital substance which it was believed could not be obviated by amendments to the act, and so reported to the chamber. The chamber endorses the views of its maritime and harbor affairs committee and takes this opportunity of making a definite statement of its position.

The chief objection to the proposed act is that the status of our harbor administration would thereunder be held in abeyance until nearly the end of the present century, a sort of dual regency being established, part city and part State administration. Under its provisions the administration of the harbor will not be completely vested in the city until all of the outstanding State harbor bonds have been redeemed (probably in 1989, but not possibly before 1955, the earliest redemption date provided for the last bond issue). When this redemption shall have been accomplished, the governor is to issue a proclamation and the city **must then at that distant day amend its charter providing a detailed system under which harbor affairs are to be managed, governed and administered.** The people of this city should be assured that these charter amendments will guarantee a conservative and business-like management of its waterfront by a commission nonpolitical in character before accepting the responsibility of control, and, on the other hand, the people of the State have the right to insist that these charter amendments shall properly safeguard the principal port of the State before turning over its management to the municipality. Then, again, the uncertainty under the act as to what this local administration is ultimately to be, must for many years hang like a cloud over all plans for financing harbor improvements, and will very seriously handicap movements to put the harbor in condition to handle the shipping which is certain to increase largely in the years to follow.

Further Financing Impossible

In our opinion, if this bill becomes a law, with its dual control, giving the mayor of the city the appointment of the harbor commissioners and at the same time retaining legislative control in the State until the present harbor bonds are all redeemed (from forty to seventy years from this date), it would be impossible to successfully finance further harbor bond issues, if they should be necessary. Would the people of the State with the harbor under the control of the appointees of the mayor be disposed to bond the State during that period for further harbor improvements if needed? Would the people of the city, on the other hand, be inclined to bond the city before complete control of the harbor had been effected? Such an anomalous situation would most probably absolutely paralze harbor financing.

It would seem to be the part of wisdom to require that the charter amendments, in which all interests could be protected, be made before the Legislature is called upon to act in the premises, and this may be done without incurring any loss of time as the proposed act does not become effective, even in part, until the preliminary charter amendments, as provided in the bill, have been adopted and ratified by the Legislature, presumably at its session of 1921. In the meantime, all appropriate charter amendments can be proposed and adopted for ratification at the same legislative session at which action could be taken providing for city control.

Charter Amendments First

The chamber, therefore, deems it essential that the charter amendments be adopted before the transfer is made from the State to the city, and the chamber further believes that such transfer when made should be complete in presenti and not dependent upon conditions anticipated for the end of the century, and that before the present satisfactory administration of the harbor shall be transferred the system and principles of the new administration by the city should be thoroughly considered and fully understood by the shipping and other interests vitally affected, and in order that this may be done the charter amendments appropriate to the purpose should be intimately digested, framed and finally adopted before it would be prudent to seriously consider the surrender by the State of the trust, upon the faith of which large bonded obligations have been incurred.

In order that there may be no misunderstanding as to the chamber's policy as to a municipal administration of its water front, it may be stated in the movement for city control of the San Francisco harbor the chamber took the initiative in 1912, when it declared in favor of municipal control provided satisfactory city charter amendments should first be adopted insuring an efficient harbor administration, divorced from politics. At that time the board of supervisors were requested by the chamber to co-operate in this endeavor, but the board then in office declined to do so. The chamber reaffirms its position then taken.

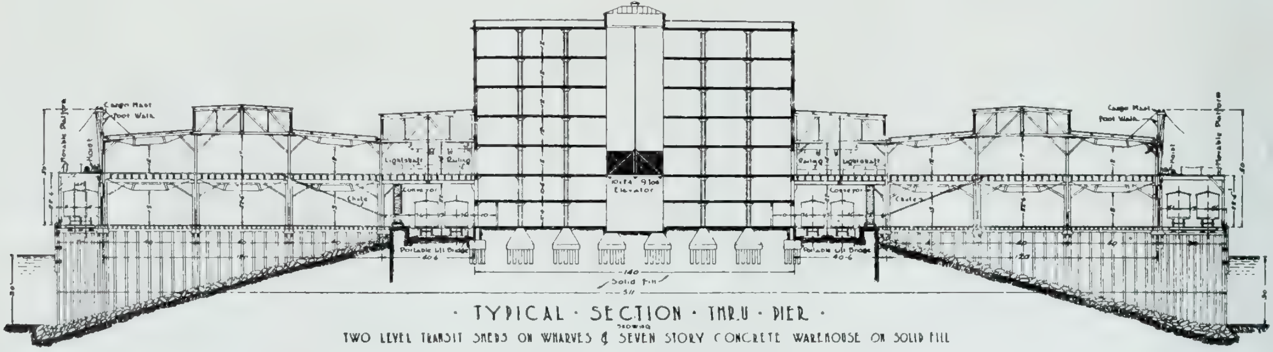
Opportunity for a "Bush Terminal" on San Francisco Bay

By Hamilton Higday

WHILE San Francisco is apprehensive that her trans-Pacific trade may be diverted to the Atlantic seaboard through the Panama Canal, Seattle likewise fears that Puget Sound's Oriental shipping will be grabbed by a conspiracy of financial and political power at the Golden Gate.

Thus both lusty ports tend to forget the magnificent growth in waterborne commerce both have enjoyed, and like Aesop's dog on the bridge are snarling at the mirrored rival with the bone below.

In the last week of this eventful year 1918, perhaps the foremost engineer of the Pacific Northwest, Mr. R. H. Thompson, laid before the Washington Public Service Commission, the Seattle Chamber of Commerce, the Seattle and Tacoma Port Commissioners, the County Commissioners and various mayors, councilmen and engineers in joint assembly, a broad scheme of terminal cooperation and co-ordination, extending south from Seattle thirty-six miles to Tacoma and north from Seattle thirty miles to Everett. The plan includes strategically placed railway storage and classification yards and alternating slips and solid-fill piers nearly 2000 feet long at Seattle, each pier developed with a great U-shaped cargo shed, in the hollow of which a great storage warehouse is to arise, the cost to reach some $15,000,000.



Typical section through pier of proposed Parr Terminal

At Tacoma, a port heretofore developed largely by quay-wharf sheds of the Northern Pacific Railway, a still more ambitious scheme is afoot—a "herringbone" layout of waterway penetrating the tideflats at the head of Commencement Bay and alternate piers and flanking slips sufficient to accommodate seventy ocean-going ships at once.

$6,000,000 Already Spent

It should perhaps be said that this is in addition to the $6,000,000 already expended at Seattle by the Port Commission in six groups of terminal cargo sheds, warehouses, cold storage plants, elevator for bulk wheat, and in addition to the $5,000,000 voted September 10, 1918, for a duplicate of its gigantic Smith's Cove pier on the north frontage of Elliott Bay, contracts for dredging and piling for which have already been let, making provision for twenty-five 500-foot ships at berth simultaneously if necessary at the two solid fill terminals, each of which is a half mile in length and [illegible] feet in width.

Thus while Japanese and other steamship operators on the North Pacific are uncertain of the immediate future of shipping, the communities fronting on Puget Sound are girding up their loins for vast and courageous expenditures. They are betting on America's certain great foreign trade, forgetting their pioneer village jealousies, determined by comprehensive planning and studious foresight to capture a lion's share of that trade. They do not propose to let San Francisco and New Orleans lead in the development of a free zone or "customs free area" within the harbor district, if such legislation is adopted by Congress. A plan is afoot to encircle a large area of shallow foreshore with a seawall and reclaim some 600 acres for an ideally isolated "free port," and to equip that area with ocean docks, water-side warehouses, manufacturing loft buildings, provide industrial sites for refineries and storage reservoirs at shipside for the assembling of Oriental imports, their grading, mixing, and other processes necessary for re-export and transhipment. The port would obviously receive the financial benefits of stimulated steamer service, fuel, supplies, repairs, of labor employed, business profit and shipping prestige attained.

San Francisco Complacent

Quite in contrast to the get-together spirit of Seattle, Tacoma and Everett, communities seventy miles apart, but uniting in a plan of terminal, waterfront and industrial development, the situation on San Francisco Bay was described by an eminent Seattle engineer, Mr. Paul B. Whitham, now U. S. Trade Commissioner in China, reporting on industrial development:

> "There seems to be quite a keen rivalry between Oakland and San Francisco, as a result of which San Francisco and Oakland are not co-operating to an extent that would be advantageous to the San Francisco Bay district as a whole."

Puget Sounders are distressed by the small area of flat lands near deep water, accessible alike to ocean vessels and railway transportation. There is not more than 150 square miles at most of such suitable factory lands, compared with nearly 5000 square miles within the Outer Belt Railway at Chicago.

To men with such perspective, San Francisco city tends to be looked upon as a commercial island, singularly short-sighted in failing to recognize the patent fact that the development of the East Bay communities is part and parcel of her own greatness and metropolitan unity.

The silt-laden Sacramento and San Joaquin rivers, draining the wonderful valley of California with its sixty thousand square miles of riches poured through the Golden Gate cornucopia, have shoaled over two-thirds of San Francisco Bay. Due to this natural geologic process San Francisco became the great city of the Pacific Coast, notwithstanding all the delay and cost and inconvenience of ferries for passengers and freight alike. But commercially she must speedily expand beyond the confines of her hilly peninsula and absorb her tributary metropolitan provinces, just as New York burst from Manhattan to Long Island, Staten Island, the Bronx mainland.

Recently a joint New York-New Jersey Port Commission was created and is actively planning the laying out of $200,000,000 in terminal development and co-ordination to secure harbor, industrial and transportation unity and efficiency at New York City—the greatest single program of seaport expenditure in the world.

A Modern Marine and Industrial Terminal

An opportunity of splendid proportions seems to lie on the western frontage of the east shore of San Francisco Bay to at least equal and in many respects surpass in efficiency and service the famous Bush Terminals of Brooklyn. That channels are now or must be dredged to thirty-five or forty feet of depth to reach piers 1200 or 2000 feet in length only heightens the parallel. Vast areas are yearly being reclaimed in New York harbor by the necessity of constantly dredging her approach channels.

The Bush piers and all the new municipal piers in New York are not less than 1200 feet long. In Seattle, the most successful pier on the Pacific Coast (often handling 100,000 tons of freight a month and equipped with nearly five miles of railway tracks on the pier, depressed and at grade), is a solid fill flanked by dredged channels thirty-five feet deep along its entire half mile of length!

In the Modern Marine and Industrial Terminal several necessary elements are to be found, co-ordinated under a single management or in close co-operation: (1) Piers; (2) Storage Warehouses; (3) Harbor Railway Service; (4) Lighterage Service; (5) Manufacturing Lofts; (6) Industrial Sites.

1. **Piers**—Piers properly serve only transient freights—merely as links between ship and railway car—equipped with suitably large cargo sheds for assembling, sorting, checking and forwarding freight; with necessary cranes and other handling facilities, and adequate railway spurs and switching connections to handle the avalanche of goods from a modern 10,000 or 20,000-ton freighter. It is a singular fact that such an absolutely and self-evidently essential thing as adequate railway connections are often overlooked—the neck of the bottle.

2. **Warehouses**—Where goods must be held for storage a supplementary warehouse system is imperative to avoid criminal cost and congestion on the docks. Behind the Bush piers at Brooklyn rise batteries of five-story brick warehouses, where quantity lots are held aside from the main path of commerce.

The plan proposed by the Parr Terminal Company on a municipal waterfront at Oakland illustrates the best placement of a transhipment warehouse.

Great Terminal at Oakland

This pier is a solid fill 1200 and ultimately 2000 feet in length—virtually two piers back to back—which not only supplies cargo sheds on either side sufficiently large to accommodate a modern cargo vessel of, say, 15,000 tons, loading or discharging, without shifting from her berth or scattering or congesting marks and brands of miscellaneous merchandise. But right down the midrib rise the fireproof warehouses for term storage of goods.

San Francisco is a teaming or "cartage" city. Her enormous wholesale, jobbing and forwarding business and her singular "island-like" topography makes her dependent upon teams, much like Manhattan. But the veriest amateur would admit that freights requiring merely storage, whether free or in bond, would be more efficiently handled if they could be moved on the shortest transverse lines off the dock floor, two or three hundred feet at most, by electric tractor trains to an adequate concrete, automatically-sprinkled warehouse to await final sale or disposition by the owner. Contrast this system with the San Francisco method of manhandling drays, rattling off across the cobbled Embarcadero to an uptown warehouse, and the process repeated when the goods move eastward across continent. In this respect the plan of the Parr Terminal Company takes a leaf out of Seattle's success as a transhipment port and will add to San Francisco's progress and prosperity.

3. **Harbor Railway Service**—Freight trains, all made up and labeled, do not thunder across continent and pull up alongside a ship on an ocean pier—cars nicely stopped opposite the hatch at which goods are desired—for the line engine and crew stop at make-up and break-up yards. There switch engines sort out and drag cars to dock or factory door. Hence the efficient Marine and Industrial Terminal is equipped with ample railway spurs, storing tracks and cross-overs, serving all piers and warehouses at shipping platforms and shipside. The Bush Terminal Company collects 3 cents a hundred from connecting railway lines and gives a dispatch to ships, piers, warehouses and factory lofts which is one of the secrets of the terminal's fame and of Irving T. Bush's millions. What is the obvious burden of lightering freight cars across San Francisco Bay is not disclosed, but it is a waste and delay on transhipped transcontinental cargoes. Furthermore, evidenced by the vast teaming performed, the State Belt Railroad does not connect the piers up with warehouses, factory lofts, industrial plants, etc., as do the belt lines of Chicago and Norfolk. It is a true "harbor railroad," but hardly a "belt line" until it connects up and serves all rail spurs and all industries.

4. **Lighterage Service**—New York's "free lighterage limits" extend over a territory of twenty-six (26) miles. It is a wonderful industrial asset to New York—the greatest manufacturing city in the world—to be able to locate a factory on the waterfront anywhere and be able to reach any railway terminal or any steamship at pier the manufacturer chooses. The Erie Canal boats make free lighter delivery. The Jersey railroads had to meet that

competition. Hence New York's water car-ferry system has been called "the greatest belt line in the world." Thus the Bush Terminals at South Brooklyn are the meeting place of sail and rail of the greatest land and water carriers reaching New York, though that famous terminal group is miles away from the skyscrapers on Manhattan Island.

5. **Loft Buildings**—Where freights collect by the trainload and by the shipload—the goods, wares and merchandise of the seven seas—there is manifestly an ideal place to manufacture raw products and ship out finished articles. The industrial city grows up at the point where "cargoes are broken up." Thus the spectacular element at the Bush Terminal—the most praised shipping terminal in the world, perhaps—is not the 1200-foot docks, nor the five-story brick warehouses across the whole waterfront street, nor the electric switching railway. It is the great factory apartment buildings, block on block of them, housing perhaps 250 different manufacturing enterprises. There the smallest tenant has all the advantages of the richest corporations in conveniences and accessibility of his plant. They are veritable incubators of manufacturing enterprise.

Reducing Disability by Re-Training Crippled Men

By Douglas C. McMurtrie
Director, Red Cross Institute for Crippled and Disabled Men

IN the past our method of dealing with men permanently disabled in the course of employment has been to pay the worker a pension in the form of compensation and forget him and his injury. But the cost of disability in the shipping industry has not been alone in the premiums paid for casualty insurance. There has been the cost involved in the training experience and adaptation of a skilled worker who does not return to his job and fitting of a newcomer to take his place.

There are three means of reducing and approaching the complete elimination of the cost of disability: First, accident prevention; second, thorough medical attention to minimize the disability resulting from the injury, and, third, salvage of the remaining abilities of the worker through rehabilitation for self-support. The first of these has already received wide attention from employers and has wisely been encouraged in a financial way by casualty insurance companies and state funds. The values of the two latter have, however, not as yet been appreciated. Their energetic application would effect a tremendous saving to industry.

Unlimited Medical Attention

Many injuries from which men would completely recover in a short time under adequate and high-grade medical attention are treated for an insufficient time, or by incompetent physicians, and, instead of prompt return to work, the case at best drags along over an extended period, and at worst becomes chronic or develops into permanent disability. Some states require the insurance carrier to provide but two weeks of compulsory free medical attention to the injured man. For the insurance company to take advantage of this limitation is the most short-sighted policy possible, because for every dollar saved in physicians' or hospital fees the insurance carrier pays out later ten dollars in compensation. And what the insurance company pays is actually paid by the insuring employers in their regular premiums.

Unlimited medical attention of the highest grade should be an axiom of casualty practice. It should be insisted upon by employer and workman alike. The best outcome of any injury is to have the employe return to his job as a well man in the shortest possible time. It is well to develop a science of dealing with cripples, but the ideal is to have fewer and fewer cripples with which to deal.

The third method of attack on the cost of disability is rehabilitation for self-support—the re-education of an injured man for an occupation which he can follow or a process which he can perform in spite of his handicap. The science of rehabilitation is new and the experience in it has practically all been gained in the effort to make sound and just provision for the disabled soldier or sailor. Every country among the recent belligerents is today operating a comprehensive system of re-education for disabled soldiers and is placing upon that system more dependence than upon the pension system.

Stipend Is Not Constructive

Paying a man a small monthly or weekly stipend on which he is expected to live in idleness is not a very constructive method. With the breakdown of confidence in the pension system it was realized that the only real compensation for disablement was restoration of capacity for self-support. It was further realized that very few jobs require all the physical faculties, and that in the present-day variety of industrial processes it is possible to find a job in which a man with a given type of disability can function 100 per cent efficient. Some jobs are standing, some seated, others require walking about, some jobs at a bench working on small articles require but little strength, others involve great physical exertion. Still others do not require the sense of hearing; in others the sense of sight is not essential. Finding the future work of the disabled man, therefore, requires expert and painstaking choice, but a successful selection is possible even for the seriously handicapped. The first aim is to place the man back in a different job in his own trade or in a trade closely related. In such a job his past experience will stand him in good stead. Failing this, he can be re-trained for a different line.

Open to Soldiers and Civilians

The process of re-training the disabled is known as re-education, and can best be provided in a special school for crippled men. The first school of this kind in the United States is the Red Cross Institute for Crippled and Disabled Men, established in New York City through the generosity of Jeremiah Milbank. At this school, open to disabled civilians and soldiers alike, six trades are already being taught: Artificial limb making, motion-picture operating, oxy-acetylene welding, printing, jewelry work and mechanical drafting. More will be added as the demand develops. Graduates are already giving satisfaction in the jobs to which they have been graduated, so the enterprise has passed the experimental stage, and in the results attained with disabled soldiers abroad there is overwhelming evidence of the logic and practicality of rehabilitation.

The cost of soldier rehabilitation is being met by the United States Government and by the governments of some of our allies. It will be admitted without argument as desirable that the advantages of re-education be made available to disabled civilians as well, but will not the cost be prohibitive? The fact is that rehabilitation effects a reduction rather than an increase in the cost of disability to industry or to the community as a whole.

$4000 Loss Written Off

A typical case will illustrate how the saving is effected. A worker in Massachusetts was injured by a fall while working inside a submarine and his hand became permanently crippled. In due course his compensation rate was determined and he was referred to the insurance carrier to be paid $10 a week for a long period, with a maximum total payment of $4,000. Since the disability was manifestly permanent the insurance company wrote the case off their books as a $4000 loss and transferred that amount to reserve to cover the weekly payments. After the compensation had been paid for nearly a year a new official of the insurance company began looking over the list of men to whom the company was paying compensation. His attention was directed to the man in question and the latter was requested to call at the office of the company. The case was like many thousands of others susceptible of rehabilitation for self-support, so the insurance company official put a proposition to the man in very frank terms. "I believe that you can be trained to earn a good living. I want you to understand very clearly, however, that this proposal is to the financial advantage of the company, but I also believe it is to your advantage as well. A total income of $10 a week is not very attractive to you and you would probably rather return to work at a good wage than remain idle. If you will consent, the company will send you to a school of re-education and see if we cannot get you back on your feet in good shape."

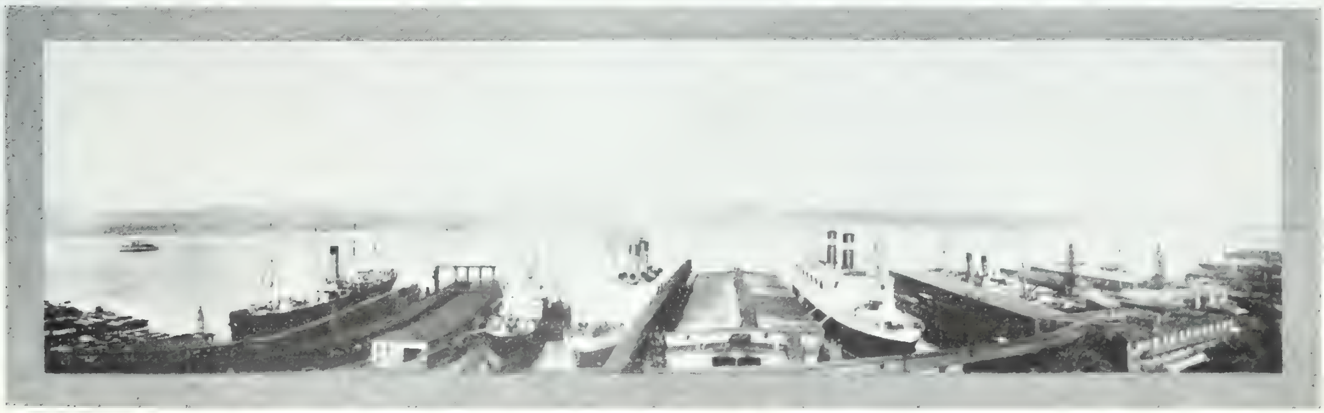
Sent to Red Cross Institute

The injured man consented to the proposal and the company sent him to the Red Cross Institute in New York. They began to pay him not $10 a week as required by law, but $40 a week—$20 to him in New York and $20 to his wife at home. The company also paid liberally his travelling expenses in both directions. In the period of eight weeks he was re-educated in oxy-acetylene cutting and welding and returned home. He is now making not only a satisfactory wage, but twice as much as he had ever earned before the accident took place.

In the whole transaction every party at interest was benefitted. The man was advantaged in that his general living standard was distinctly raised, and the necessity of working for his living could not be considered as a hardship. The company paid less than $500 for his rehabilitation and this expense in conjunction with the $500 already paid in weekly compensation during the first year of idleness made a total for the case of $1000. They were thus enabled to credit $3000 of profit to the account of profit and loss. The community was infinitely the gainer in that the man, formerly an unproductive consumer, became a useful producer instead. The community further gained in the elimination of the disabled man from the category of a prospective dependent, because while compensation might have taken care of him in a very insufficient way during the period of idleness, there would have come a time when compensation ceased and then he would have been in a desperate economic status, indeed—confirmed in habits of idleness, untrained for skilled work and without any source of support.

Must Encourage Education

A more intelligent handling of disability by insurance carriers will, therefore, reduce their expense and will thus cut the cost of casualty protection to the employer. There is needed also, however, some revision of compensation laws so that there may be definite encouragement to insurance carriers to offer opportunity of rehabilitation and definite encouragement to the disabled men to take advantage of it. Practically every compensation case that has ever come to the Red Cross Institute has come on the day his compensation expired. For one year, for two years, or for four years the man has existed in idleness, drawing compensation and cultivating habits of indolence. When his support was cut off he then became interested in re-habilitation.



The Last Blackbirder

By Andrew Farrell

WHAT the masters, past and present, of the British steamer Kestrel will have to say when that vessel is called "the last blackbirder" probably will be brisk, shipshape sailor talk. The Kestrel almost might as well be called "the last pirate" and her masters moored alongside Sir Harry Morgan and Captain William Kidd in the rotten row of reputations, unclean but immortal. For to be a blackbirder in the Pacific thirty years or more ago left little to be desired in the way of infamy.

Witness, for example, Bully Hayes. He was a blackbirder and pirate, to boot. When he needed a vessel he stole one—notably at Hongkong. That was piracy or near-piracy. He kidnapped natives from South Sea islands. And that was known as blackbirding. Some of his captives he sold as slaves; the wives of others, for one reason or another, became widows. He did many, many unspeakable deeds; until, at last, one of his crew (a black Portuguese cook, some say) used an iron bar on his head with telling effect, whereupon Mr. Hayes became merely a dead man and no pirate at all. And soon thereafter the business of blackbirding began to decay.

But in those old halcyon days it was absurdly simple and most lucrative. In Queensland there were sugar plantations, in Chile and Peru nitrate mines, all wanting a plentiful supply of cheap labor. In the myriad islands of the South Seas were potential laborers innumerable, stout, stocky fellows, needing little food and less clothing, credulous as children, preyed upon by their petty kings who did not or could not protect them — in brief, the very fellows that Chile and Peru needed.

Therefore, there appeared a breed of sailors who took a kindly interest in seeing that supply met demand. Besides, good natives were worth from one hundred dollars a head up. And it wasn't particularly difficult to fill a hold with blackbirds. A feast, for example, might be spread aboard ship. Now, the stomach of a South Sea native is an unfathomed void; he never is satisfied; he will gorge from sunrise to sunset and awake in the night to munch a handy cocoanut or pandanus fruit. The whole island would accept an invitation to dine. What so simple, when the hold was filled with jabbering natives, to close the hatches and stand out to sea? Or perhaps it was safer and almost as successful to tender a "contract" for a term of years, or to play on the credulity and truly immense curiosity of the native to persuade him to voyage forth to see the world.

One specific instance may be cited. There are those in San Francisco today who will recall the Tahiti affair, dealt with in matter-of-fact fashion in the following San Francisco correspondence, dated December 10, 1891:

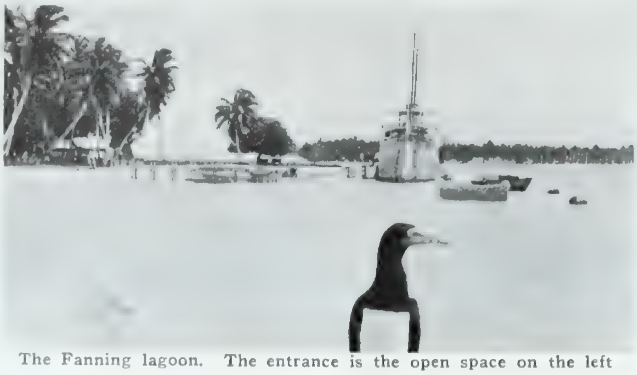
"The brig Tahiti has been given up for lost, and all of her passengers, including the 400 Gilbert islanders, are believed to have been drowned.

"It will be remembered that the Tahiti put in at Drake's Bay last September for new sails and water. She was then under suspicion of being a slaver; she was undoubtedly such, although her owners satisfied the Government officers to the contrary. She had about 400 Gilbert islanders on board, who were under contract to work in Mexico for seven years, but who were virtually slaves."

"Four hundred Gilbert islanders!" That little group of atolls, lying on the equator in 170 east longitude, has been the favorite ground of the blackbirder since his days began. Tales are told of whole villages disappearing into a single hold; discount them, but the fact remains that probably five or six thousand human beings were stolen from the Gilberts alone. And it's in the Gilberts that the Kestrel does her blackbirding today.

However, blackbirding isn't what it once was. The ideas of the British changed it. When Captain Davis of H. M. S. Royalist proclaimed the British protectorate over the Gilberts in 1892 the old order passed. Blackbirding has become respectable today—but not humdrum, because nothing that takes place in the low islands can be that.

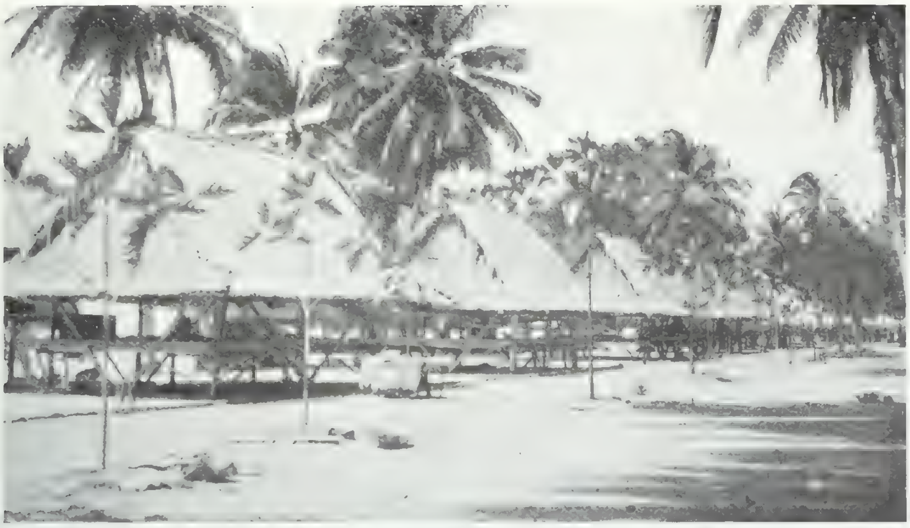
The Kestrel at the wharf, Fanning Island



The Fanning lagoon. The entrance is the open space on the left

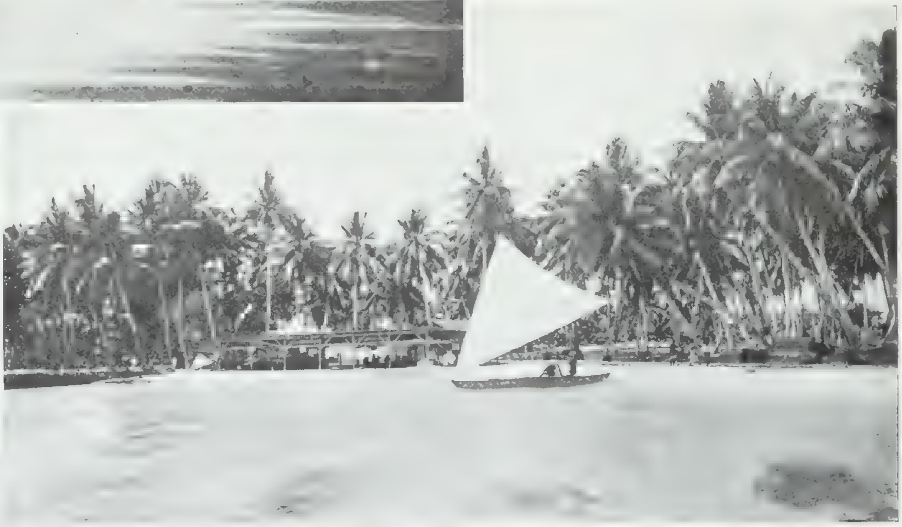
The Kestrel's recruits are for Fanning and Washington islands, wee specks of atolls lying 1100 miles south of Honolulu. There the Gilbertese make copra for the San Francisco market. That copra becomes cocoanut oil, which, in the better grades of toilet soaps, finds its way into a hundred homes in Nebraska and Indiana. But Nebraska and Indiana don't care whether the soap is made of beef tallow or of nuts that ripened on a white, sundrenched island in a purple sea rippling under the southeast trades.

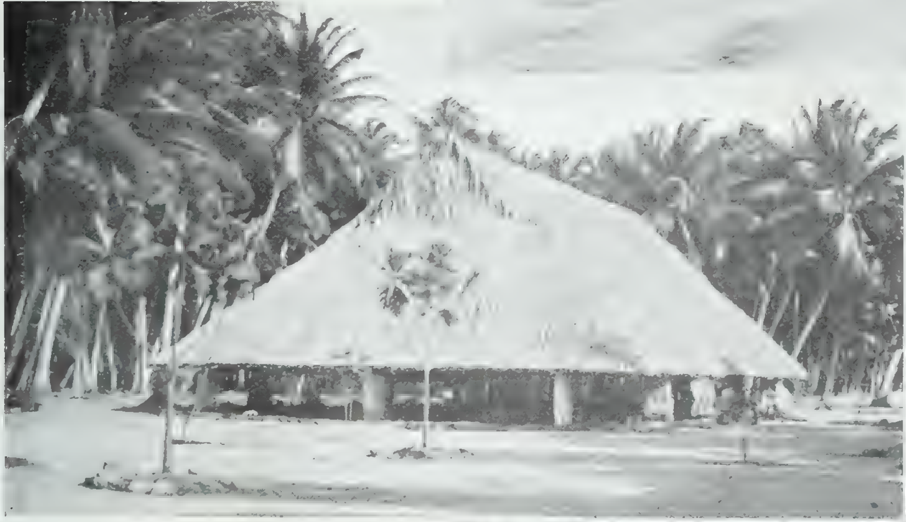
Hosts of old memories troop into the mind of one observing the recruiting of today! Before a license is granted a British commissioner inspects



Among the thatched huts. The native prefers to live close to the ground, but the British law compels him to elevate the floor, as shown in the illustration, and to roll up the mats during the day, so that the soil under the floor may air thoroughly. At evening the mats are hung from the eaves, closing the hut, for even on the equator the nights are somewhat chilly.

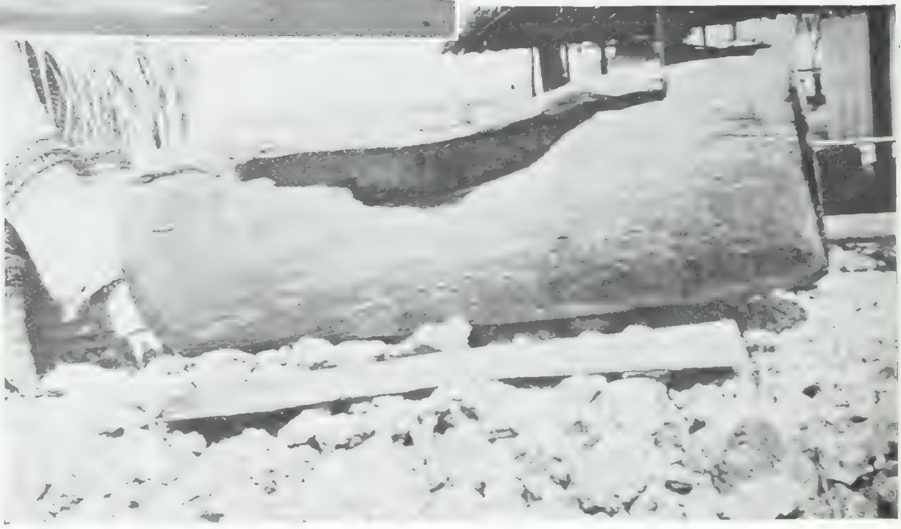
An outrigger canoe of the Gilbert type. With this great sail the light vessel can run at a good speed before the trades inside the lagoon, but it cannot sail into the wind well and really is more picturesque than serviceable. In the canoes there is no iron whatsoever, all boards being lashed together with cocoanut sennit.





The maniapa of the Island of Tarawa. All maniapas are set upon blocks of coral, which, in some cases, were cut bodily from the living reef; the beams and rafters are cocoanut and pandanus logs; the roof is thatch. The small trees in the foreground are young breadfruits, with which the native is learning to piece out his diet.

An old drum on the Island of Butaritari, now dismantled and unused. It was made from a single log and its reverberation, under lusty beating, could have been heard a long distance. If in use it would be mounted somewhat pretentiously and would be covered with a screen of palm leaves. In the old days the natives made miniatures of these great drums, but almost none are to be found now.



the vessel. Recruiting is done in the presence of the kaubure, the native judge-legislators of the island, and usually as well in the presence of the commissioner himself. Terms of indenture are explained in detail in the native tongue. No unmarried woman may go unless accompanied by her parents; a dependent relative, for whom provision is not made, may protest against indenture, and the protest invariably is potent; the contracts must be signed in the presence of the commissioner, who satisfies himself that they are understood fully. The term of service is for two years, which may be extended for one year more if the native desires, but at the expiration of three years he must be returned home. Each and every individual taken from the islands must be accounted for; what food shall be supplied is specified; complaints of ill-treatment or injustice may be made to British officials. In some islands, forty years ago, natives were flogged and salt was rubbed into the wounds. Today, a white man dare not lift his hand against a brown.

Perhaps an apology is due to the masters of the British steamer Kestrel.

That little steamer, once a year or so, devours all the fuel oil her bunkers will hold, for she is setting out on a 7000-mile voyage; loads an oddly-variegated cargo for the Fanning and Washington plantations; bids farewell to the harbor of Honolulu and the serrated ridges of Hawaii, the last high land she is to see for months; points her stubby nose past Diamond Head into the long roll of the Pacific, and disappears into the ways that lead to the atolls.

In the Southeast Trades

Diamond Head dies astern. Northeast trades bluster through the funnel of the Molokai channel and kick up a heavy following sea. Rain squalls vex the blue water in smoking gray; and suddenly, out of one of them, in 18 degrees north latitude, the warm southeast trade appears, without a sign of doldrums. Five days from Honolulu the crew watches the sky for the first trace of land. That is a peculiar thing, of which an old-time skipper, long in the South Seas, will speak in the language of poets, for the peculiar, sunlit, vaporous green of the lagoon of an atoll oftentimes will reflect itself in the sky long before the island itself appears on the surface of the sea. That is, if one is fortunate. Some may watch for it a score of times and never see it.

Fanning Island rises from the water, a brownish green cloud, like a distant rain squall, breaking into a hedge of far cocoanut palms, now seen, as the ship rises on a sea, now gone, as she sinks into a trough. It must be one of the profound experiences of any life, that first glimpse of a coral island. However widely one has traveled, here is something of a new world—a land unstable, fleeting, visible for no more than ten or twelve miles (and then, thanks to the ninety-foot palms that surmount it), rising eight or ten feet above the sea, two or three hundred yards wide, of dazzling white coral and clinkers. And the lagoon inside that fragile ring is something beside which a man could be content to dream his life away—intense, thin green; white threads of surf breaking on distant reef; straw-colored shallows; sapphire, steel-blue and crystal. Here and there a red patch marks a rock. The tide boils in, a broad, arched, purple stream, more terrible than a river in flood, flecked with white-caps, and boils out as terribly on the ebb.

All the Micronesian laborers are astir today—men in their red cotton riris, women in their red cotton holokus, for there is a break in the monotony of copra-making. There is that variegated cargo to be discharged and carried and dragged to the plantation storehouses. And, for some, the time of departure is near at hand; their two or three years have ended, and they are about to journey back to Micronesia with new and costly possessions—hand sewing machines, bicycles and yards of cloth.

A Song of Farewell

There comes a night when the full moon makes land and water unearthly, when the shadows of the palms lie black across the coral beach, and the island gathers at the little wharf. Steam is up in the Kestrel. The whites are at the plantation house; the natives cluster on the sand, and those who are to remain and those who are to go join in a long, monotonous, wailing, harsh and tender song of farewell. Then the Kestrel slips to sea, a fair southeast trade following, and takes her way along the equator to the Gilberts.

Several nights out, Howland and Baker Islands should lie somewhere to port. No man can say whether they do or do not. Put four men on the bridge of a vessel in the low islands and each will see land in a different quarter. The horizon is dim and troubled. By day one may see fringes of cocoanut trees wherever he will. By night there are countless shadows suggesting land, any of which might be a beach. And, if to this danger is added the bland vagueness of the charts, navigation in the low islands becomes somewhat discomforting. Few corrections have been made in the Gilbert charts since the Wilkes expedition of 1840 first surveyed the group. One finds such notations as these: "A very dangerous reef **reported** to extend twelve miles off the southeast point to southward," and "the island is forty, **not** thirty, miles long," and "**reported** to be five miles further west and three miles further south." Not even those who have been often to any given island can speak with certainty after night has fallen. And the equatorial current doesn't run as one expects it to. That is why hulks of vessels lie on the outer reefs.

But the island of Abemama is picked up in the night, although there is disagreement, before sunrise shows exactly where it is.

Abemama, Kuria, Nonouti, Tabiteuea, Onotoa, Beru, Abaian, Tarawa, Butaritari—fundamentally, they are as like as peas of the same pod. Each is broken on the west; from that quarter is the entrance to the lagoon—a fact probably explained by the two tradewinds and the equatorial current, which, coming in from the east, bring fresher water and more food for the coral polyps, so that it flourishes better on that side. Each has its monotony of sand, palm, pandanus and low brush. Each has a Chinese or white trader, although all aliens are "white" in the low islands. Each has its maniapa, or great public building, perched on coral pillars; each its winding paths through the palm colonnades; each its long-streeted little villages of huts raised on stilts.

And in each the word goes about that the Kestrel is in the lagoon—as though the whole island had not known it for hours, for vessels are few and far between in the Gilberts. The British commissioner if present, otherwise the chief native magistrate, dispatches a courier to call the distant villages to their maniapa, where they shall hear the wonders of Fanning and Washington Islands dwelt upon. Eagerly they obey. A hundred barefooted men and women, in different stages of nudity, fringed about by children, some whose nudity is complete, gather on the coral floor and pandanus mats.

Salmon from Columbia River

"And what food will we receive?" asks one.

"Salmon, rice, sugar-water, so-many cocoanuts," comes the reply.

In the low islands; a street through the palm groves

They are pleased to hear of the fish. Alaska and Columbia River salmon almost are a low island staple. The lagoons swarm with fish; the natives prefer that from a tin.

"Fish here; no fat on them," explains the Chinese trader.

"Natives too lazy to fish," counters the pessimistic Englishman.

But there may be something in those old stories of how one kind of fish is poisonous or palatable as the moon changes, or when taken from different beaches of the island.

Now and then there is a tumult on the outskirts of the crowd. A boy sets up a din, which the native policeman hushes. An ambitious young buck wishes to travel to the Fanning metropolis, where bicycles are to be had. His mother objects; he is her only support; the magistrate sustains her contention, and the lad rushes from the maniapa weeping. Not for him that voyage to a far country.

And so the complement of the Kestrel is made up—a few from this island, a few from that—a strange, jealous company—each island bent upon outdoing the other in singing and dancing, in boasts of Samoan descent and in copra-making. "Who are you, to say that you come from Samoa?" so one man reproves another. "We are the Beru folk!" The islands lie in the pleasant summer seas, not a day's journey apart, but the people of each must travel a thousand miles to Fanning Island to learn what manner of men live nearby.

"Perilous, Hair-Breadth Riri"

A handy queue of children forms when the white men depart from the maniapa, the recruiting having been completed. Armed with palm fronds, they serve well in brushing off the myriad flies that blacken the clothing and face—barrel-chested urchins, one hand wielding the fly brush, the other continually clutching the "perilous, hair-breadth" riri that always is on the verge of slipping away and leaving the owner utterly destitute.

Cocoanut syrup is set out in the thatched huts for the white man, or, if he prefers a young nut, the native will scurry up a tree for it. And that same native, at home at the top of a seventy-foot palm, within a few days will be sorely tried by a short ladder on the Kestrel. He will know how neither to ascend nor descend, and will resort to amusing and desperate expedients, such as carrying a woman on his back up that perilous eight or ten feet—he who, ape-like, scurried up a palm trunk only last week.

Never-Stilled Laughter

Thus does the white man confound the brown. But the brown has his revenge—laughter, like the cries of seabirds, loud, harsh, never-stilled. Woe to the white who slips, however slightly, even in the more obscure minutiae of island etiquette! He shall stand for an uncomfortable minute or two in the center of a jeering group. Neither let him endeavor to overawe the native with the wonders of civilization. A Micronesian saw an American phonograph: "We could make it too if we had the material!"

A part-Micronesian girl who, in her fifteen years, had seen scarcely half-a-dozen atolls, was voyaging up to Honolulu. One morning there was an amazing thing: Squarely against the sun rose the long, gray dome of Mauna Loa—a mountain seventy-five miles across at sea-level, 14,000 feet high, snow-crowned, stupendous, awe-inspiring in its immensity.

She shrugged her shoulders.

"Oh, is **that** a mountain?" said the little lady, seemingly in no wise interested.

Curious, brown-skinned, bushy-haired, squat, lumbering, shrill-tongued, annoying children — they chattered far into the night and awoke with the sun; they lolled on their pandanus mats over the decks and were under foot at all times; no place, except the bridge only, was sacred; they were overwhelmingly seasick when the Kestrel buried her nose in the heavy head seas, and they were very, very indifferent as to the time and place of being ill; they made great nuisances of themselves, in short, but they were and are lovable, and no one can think of their islands without thinking of them also, without peopling the moonlight with a chanting circle of dancers, without peopling the paths with folk whose teeth flash when they call out "konamauri!" to the white man.

Weaving mats of pandanus leaf

An Explanation of Merchant Ship Tonnage

IT is not surprising that laymen become confused in attempting to understand the frequent references to tonnage of ships, especially since many people who should know better get rather mixed in their own use of the terms. A technical shipping paper, for example, recently published a statement to the effect that "Displacement and deadweight-tonnage are one and the same thing." Nothing could be further from the truth.

Shippers, exporters, the average citizen, and even the ship owner himself—all are principally concerned with how much a given vessel will carry. This they know if they can ascertain the vessel's "deadweight" capacity. Deadweight, used in the only proper sense of the term, means the number of tons of 2240 pounds which can be loaded on the ship, without putting her down deeper into the water than is safe for her navigation. That includes, of course, not only cargo, but coal or other bunker fuel, water stores, provisions, water ballast, and all other supplies or commodities whatsoever. When it is said, for example, that a certain vessel has a deadweight capacity of 7000 tons, that means that she can safely load a total weight of everything that may be taken on board her equal to 7000 gross tons.

Displacement is a term not generally applied to merchant vessels at all, except in the case of the large trans-Atlantic liners, to which it is applied by the owners for advertising purposes, since it is the largest possible figure that can be used. Imagine a vessel empty of all cargo, lying quietly in a calm body of water. Suppose that all that part of the hull remaining above the water line is cut clean off at the water's edge, and that the deck is then replaced at the new level, or water's edge, and that part of the hull which has been cut off is stowed within the portion remaining below the water's surface. The buoyancy of the vessel in that condition is exactly as it was before—neither more nor less. The total weight of the vessel is exactly equal to the weight of the water which is displaced by the entire vessel so disposed of. To make the illustration still clearer, suppose that in place of a hull of steel, with weight of superstructure and upper shell enclosed within same, we have an infinitely thin shell of the same shape, filled with water. This shell would remain motionless in the water surrounding it, and the weight of the water within the shell would represent the "displacement."

Obviously, therefore, an empty vessel has displacement exactly equal to her actual weight in tons. If the vessel should then be loaded, say with the 7000 tons of cargo and supplies representing her deadweight capacity, her loaded displacement would be equal to her weight empty, plus the 7000 tons placed on board.

Gross register tonnage is the number of tons of one hundred cubic feet each, contained within the hull and superstructure of the vessel. It is ascertained by a rather complicated process of measurement, by which the total by 100 gives the gross register. In Great Britain, most references to tonnage statistics are made on the basis of the gross register, which, it may be noted, bears no fixed ratio to the deadweight capacity.

Net register tonnage is acertained by deducting from the gross register the cubic measurement in units of 100 feet, of all space not utilizable for cargo stowage, such as crew and officers' quarters, engine and boiler or other propulsion space—space used for navigation purposes, chain lockers and the necessary compartments for carrying vessel's supplies and loose equipment. Government tonnage dues are fixed on the net register tonnage.

Suggestions by an American Shipmaster

Letter From Captain W. I. Eyres

THERE has been much adverse criticism through the medium of the public press of the wood ship as constructed on this coast and of the wood shipbuilding programme in general as carried on by the Emergency Fleet Corporation. Having had the opportunities which fifteen months' service as an official of this corporation has given me of sizing up matters pertaining to the construction of these ships, I deem it advisable to make certain statements and explanations in re these matters which I earnestly hope may to some extent place this corporation in its proper light and emphasize the wonderful part which it has taken in winning this war from the entrenched hosts of devilish autocracy and so making this world safe for democracy.

Admit that there have been some of the vessels which developed leakage after having undertaken voyages and that some engine and boiler trouble has occurred to others. What of it? Absolutely nothing! These superficial defects have always occurred to ships and are very easily and cheaply remedied. This should be no reason for denouncing the corporation or any of its officials or the men who have constructed these vessels.

Shortly after the declaration of war our commanding general, General Pershing, called for ships to bridge the Atlantic, metaphorically speaking. American brains, organization, genius and efficiency got busy, and as a result an immense fleet of really good ships has been constructed within eighteen months. What has been accomplished by the United States Shipping Board is the wonder of all nations and of all people interested in maritime affairs. Results on such a splendidly magnificent scale have never before occurred nor have they been even partially approximated since the sons of men began constructing vessels. Pause a moment and reflect—wood hulls fully constructed in eighteen work days; steel hulls up to 8000 tons completed in less than sixty days, and seaworthy—"yes, eminently so." These are consummations which have never before been even contemplated.

These results could have only been accomplished by enthusing the workers with a spirit of sublime patriotism. To demonstrate that the builders of these ships were so inspired, reference may be made to the splendid response that these workers made to the appeals of the Government for financial aid to carry on this war. It may be safely and truthfully stated that no class of citizens so nobly responded to that appeal as did the men who built these vessels for the Government. Mistakes have been made. Sure they have. That was to be expected, but in considering the aggregate of magnificent results obtained, they count but as a negligible quantity, and all thoughtful men with normal minds have forgotten them.

Ferris Type

With regard to the types which have been constructed of wood on this coast for the Emergency Fleet Corporation I will only consider the two most important types—viz., the Ferris and Hough. With regard to the Ferris ship I will state without fear of intelligent contradiction that no better type of wood hull can be built than the Ferris. All competent and practical seamen are aware of this. This design of hull was neither originated nor developed by Mr. Ferris, but is simply a metamorphosis of the Clipper type of hull as built in the decades of 1840 and 1850.

Subsequent to the close of the Civil War New England shipbuilders evolved a type of hull which digressed to a large extent from the accentuated fine clipper lines, but in no sense departed from general form of construction or design. This type was given much more beam relatively; dead rise lowered so to give a bottom upon which the vessel would stand or shift without ballast, and which would sail with the minimum of ballast when light. Large carrying capacity was at this time desired, even at the sacrifice of speed. This type is nothing more than the Ferris ship of today, known as the transom type, and in sailing vessels of this design constructed generally with billet head and elliptic stern, and is well known to all seamen. No better type of hull was ever constructed as a general purpose hull for either steam or sail propulsion. Mr. Ferris did not originate any element or feature of construction entering into the hull which bears his name, as my remarks will suggest. The elimination of hanging knees, as per his design, is a feature that is quite ancient, extra heavy waterways, clamps and shelf-strakes being substituted therefor. His feature of iron diagonal side strapping is at least fifty years old and is highly commendable. By taking advantage of the exceedingly long timbers available on this coast for longitudinal framing it was possible to work these timbers out with long scarphs. This type as constructed is pre-eminently in a distinctive class with no competitors.

Hough Type

The Hough type, which is no more nor less than what is popularly known as the scow type of hull, has many good features, but cannot be considered as in any class with the Ferris ship.

It having come to the writer's notice that there is a movement on foot to transform the Ferris ships on this coast into fore and aft sail schooners, I am of the positive opinion that nothing better could be done with these ships, and I make this statement unqualifiedly. This change can be accomplished very cheaply and with little occupation of time and will serve as a boon to, in a measure, supply the acute shortage of tonnage to transport our Pacific coast timber overseas. These vessels, rigged as above noted, will positively be a success from start to finish. Given that the machinery is taken out of these vessels, it will cost not to exceed $35,000 to rig them as up-to-date, six-mast sailing schooners, and rigged as such it is no stretch of optimism to predict that each and every one of these vessels will pay for herself within the next five years. Considering that the wooden schooner has no rival or competitor in the transport of lumber, which is absolutely a fact, and further realizing that Europe has practically to be rebuilt, and that lumber stocks have become depleted everywhere, and that the great bulk of this material will be drawn from the Pacific Northwest, and that freights on lumber everywhere will be high for many years to come, does not the future of these vessels look bright from a financial viewpoint?

By simply taking engines and machinery equipment out of these hulls and installing a Providence towing machine and reinforcing vessels amidship with additional longitudinal framing, which will not be expensive, they may be equipped as perfectly seaworthy, seagoing, up-to-date tow barges at a cost not to exceed $20,000. Two or three of these vessels may be towed by a powerful seagoing tug and may engage in Panama Canal, Alaska, West Coast and general coastwise trade profitably and successfully. There will be an ever-increasing demand for this class of freighter for the trades as noted.

The machinery, equipment, etc., which would be taken out of these ships is all of high-grade and would be in no sense "scrapped." It is safe to say that the Government would be enabled to dispose of it advantageously and with a minimum loss.

In closing this article I wish to state that it is incumbent on all who have influence that it be exerted to the uttermost to see that every one of these really good hulls—and they are all good or can very easily be made good—is retained under our flag. Do not allow them to be sold to foreigners when they mean so much in financial returns to our Government, and indirectly to all our people. Sell steel ships if they must have them, but these lumber vessels and this lumber trade is a plum which we should jealously reserve for ourselves and our posterity. Ask any practical owner or operator of this type about his experience with these vessels during the past twenty-five years on this coast, or since the fore and aft schooner supplanted the square-rigged vessel as the most efficient lumber carrier, and he will in every instance inform you that the schooner has always paid very large returns on the investment. Some people may say that it is a retrogression. That may, to a certain extent, be true, but dollars count, and I here positively reiterate a former statement of mine, and it is this: The sailing schooner for many reasons has any other type of vessel beat to a frazzle as a profitable lumber carrier and she will maintain this prestige till some means of propulsion is introduced which will be less expensive than wind.

BRITISH YARDS FREED

LORD PIRRIE, the British controller general of merchant shipbuilding, has sent the following letter to all British ship repairing, shipbuilding and marine engineering firms:

"As I have already announced, the shipyards are free to take on private work, and shipowners are now in a position to negotiate direct with shipbuilders with regard to new construction. I am pleased to say that the shipping controller has agreed to authorize shipowners to place their repairs with the shipbuilding and ship repairing firms in such ports as they have hitherto been accustomed to use, or wherever it may be most convenient for the repairs to be effected.

"Also with regard to repairs abroad, I am glad to inform you that shipowners may now place this work through their own agents. I should like, however, to urge upon shipowners the prior claims of the 'home yards.' As large numbers of men are now returning to the shipbuilding industry, British yards will soon be in a position to resume their old work, and it is most essential for our yards to have work all ready for the men on their return."

The sailing schooner will maintain her prestige

Some Chinese Shipbuilding

FROM the earliest times of which we have any record the Chinese people have appreciated the benefits of transportation by water. Their ancient teak junks show wonderful workmanship in wood. They are credited by some historians with the discovery of the mariner's compass and their canal system for both irrigation and inland navigation is one of the wonders of the ancient world. Stifled by the hoary conservatism of a civil service system of free education that had seen no change for 2000 years, this sleeping giant of Asia is just beginning to grasp after the benefits of twentieth century civilization. At the opening of the great European war Chinese life was athrob with one of the most significant revolutions in history. New methods of education, based on Western standards, were being introduced everywhere at the desire of the people. Ancient temples, sacred to Buddhist rites, were being thrown open for use as schools. The new republic had caught a vision, and the people were afire with eagerness to modernize China. When this immense population, or even a small part of it, begins to apply itself to modern manufacturing methods, there is sure to be a great impression made in the trade of the world, and the results already attained with Chinese workmen in Chinese shipyards are sufficiently striking to deserve some comment.

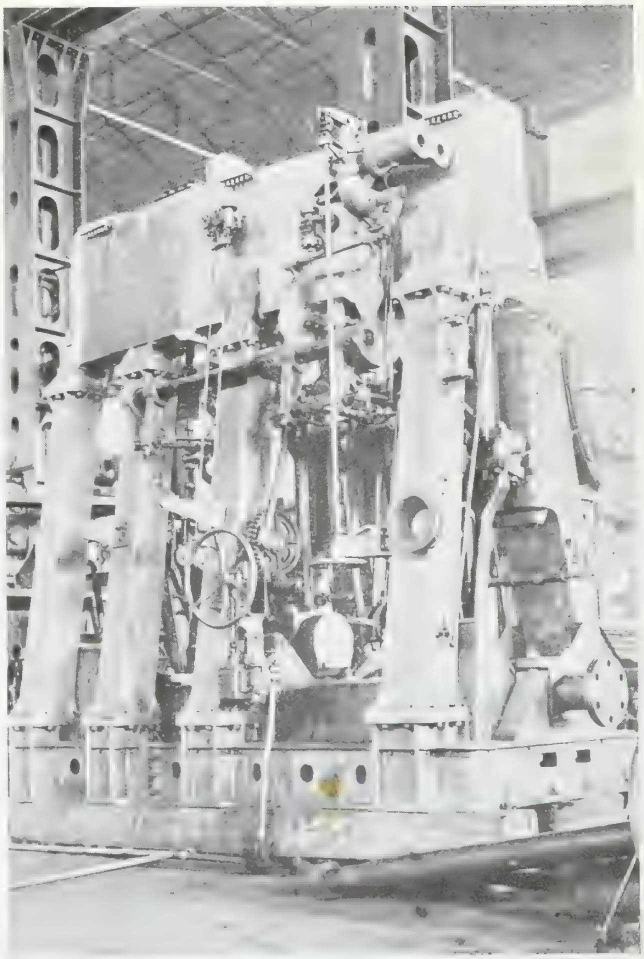
First Yard Near Shanghai

The first modern shipyard was installed by the Imperial Government near Shanghai and is known as the Kiangnan Dock and Engineering Works. It was primarily designed as a navy yard for repairs to Chinese foreign-built warships. There is a very fine group of shops at this plant, with the best of modern tools and facilities, and a large body of skilled native workers under American and European supervision. In July, 1918, this yard was placed at the disposal of the United States Shipping Board and arrangements were made for the construction of four 10,000-ton steel steamers, the steel being shipped from the United States and all other material supplied in China. A little later an option was arranged for eight more ships of the same size.

Other steel shipbuilding plants near Shanghai are the New Engineering and Shipbuilding Works, with six slipways for vessels up to 5000 tons, and the Shanghai Dock & Engineering Company, who are building five British standard 5000-ton freighters.

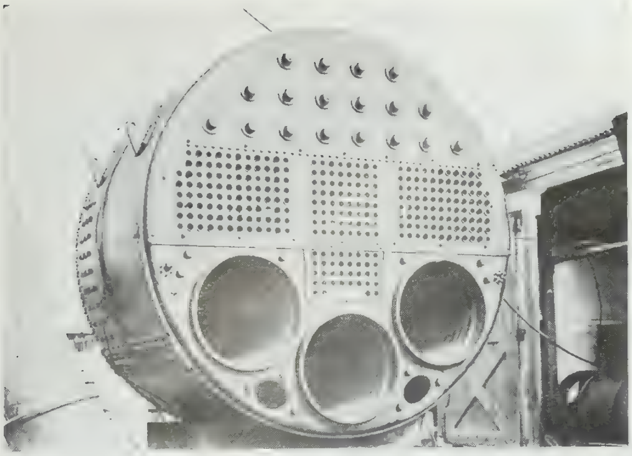
Chinese Carpenters Are Skilled

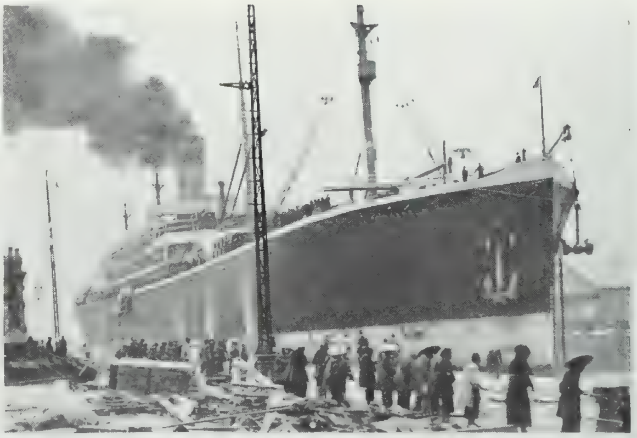
There are also numerous wood shipbuilding yards for building smaller-sized vessels, and it is stated that in Shanghai alone there are over 300 skilled Chinese ship carpenters capable of working from drawings and producing work equal to the best American and European practice. Eighty million feet of lumber is imported annually into Shanghai, and there was almost that amount on storage there in 1917. The ships built by these wood shipyards are small coasting steamers and river boats used in the extensive inland trade which is carried on almost exclusively by Chinese merchants.


Set of triple expansion engines built at Kowloon dock

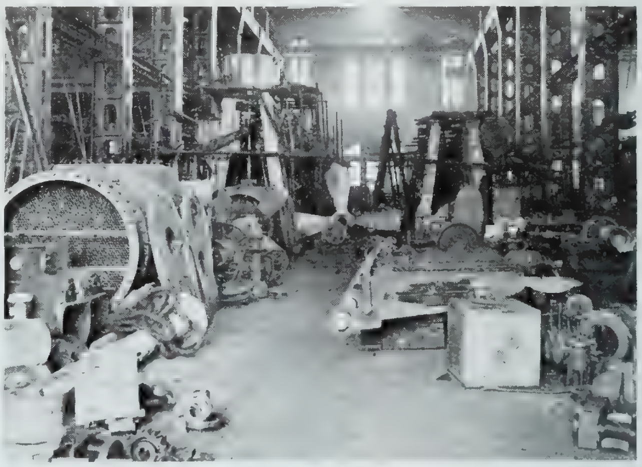
The Aberdeen docks, Hongkong & Whampoa Company

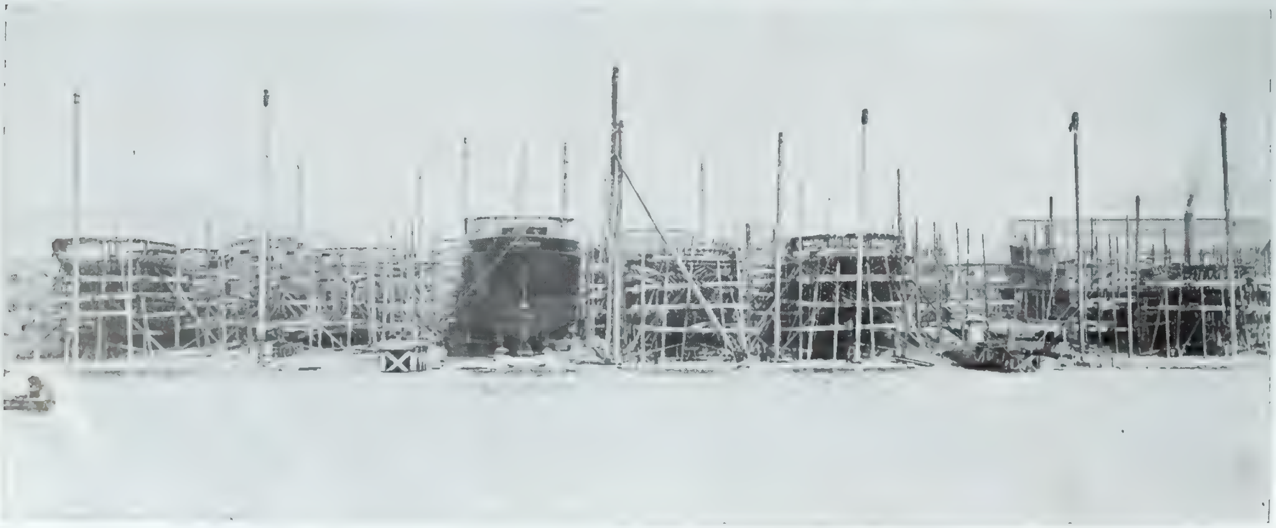
Probably the best known and certainly one of the most successful British-managed and Chinese-manned shipbuilding plants in China is the Hongkong & Whampoa Dock Company of Hongkong, whose activities in marine repairs have brought them into intimate contact with ship masters and owners from all the ports of the world. These works during the past four years have been able not only to take care of an immense amount of repair and alteration work, but also to build and equip tugs, river steamers and cargo carriers for Chinese trade, as well as standard ships for the British Government. They have six very substantial graving docks, three at Kowloon, one at Tai-Kok-Tsul and two at Aberdeen, ranging in length from 260 to 700 feet, and capable of docking any-





Top, left: Specimen of boilers made at Kowloon Works. Middle, left: Steamer Hermelin, built and engined complete at Kowloon, on her trial trip. Below: New ships under construction, Kowloon. Above, right: The steamship Minnesota, 28,000 tons, in No. 1 dock, Kowloon. Upper middle, right: Steamer Valaya, built and engined complete at Kowloon. Lower middle, right: Center bay of engine shops, Hongkong & Whampoa docks. These illustrations prove that the work done in China is high-grade and of a wide range. A great deal has been said and written recently regarding Japanese shipbuilding, but China has not received the public attention that her quality of work deserved.





thing up to the giant freighter "Minnesota." On December 1, 1918, there were eight steamers on the ways of this yard, five of them 5000-ton freighters and three large ocean-going tow boats.

Many Kinds of Work

The machine shops, foundry, plate and shape shops, fabricating parks, mould lofts—in fact, the entire plant—is equipped with the most modern, up-to-date machinery. The oxyacetylene flame is freely used in cutting and welding operations. The activities of this company cover a much wider field than would those of a similar plant in America. They class themselves as dock owners, shipbuilders, marine and land engineers, boilermakers, iron and brass founders, forge masters, electricians and undertake all classes of constructional and general engineering work. The illustrations give some idea of the diversity and quality of the marine work undertaken.

Steel for all of this building and engineering program has, up to date, been imported, but China has the raw iron ore in great abundance and undoubtedly will soon be smelting, refining, rolling and shaping her own steel, and we predict a great future for the engineering works and shipbuilding yards of the Orient.

Dimensions of Docks

The dimensions of the Hongkong and Whampoa docks and slips at Kowloon are as follows:

No. 1 dock—Length on keel blocks, 700 feet; entrance breadth, 86 feet top, 70 bottom; depth over sill at ordinary spring tide, 30 feet; rise of tide, spring, 7 feet 6 inches; neap, 3 feet.

No. 2 dock—Length on keel blocks, 371 feet; entrance width, 74 feet; depth over sill at ordinary spring tide, 18 feet 6 inches.

No. 3 dock—Length on keel blocks, 264 feet; entrance breadth, 49 feet 3 inches; depth over sill at ordinary spring tide, 14 feet.

Patent slip, No. 1—Length on keel blocks, 240 feet; entrance breadth, 60 feet; depth over sill at ordinary spring tides, 14 feet.

Patent slip, No. 2—Length on keel blocks, 220 feet; entrance breadth, 60 feet; depth over sill at ordinary spring tides, 12 feet.

The Tai-Kok-Tsui Cosmopolitan dock is 466 feet on keel blocks; entrance breadth, 85 feet 6 inches; depth over sill at ordinary spring tides, 20 feet.

The two Aberdeen docks are:

Hope dock—Length on keel blocks, 430 feet; entrance breadth, 84 feet; depth over sill at ordinary spring tides, 23 feet.

Lamont dock—Length on keel blocks, 333 feet; entrance breadth, 64 feet; depth over sill at ordinary spring tides, 16 feet.

The rise of spring tides at all docks is 7 feet 6 inches.

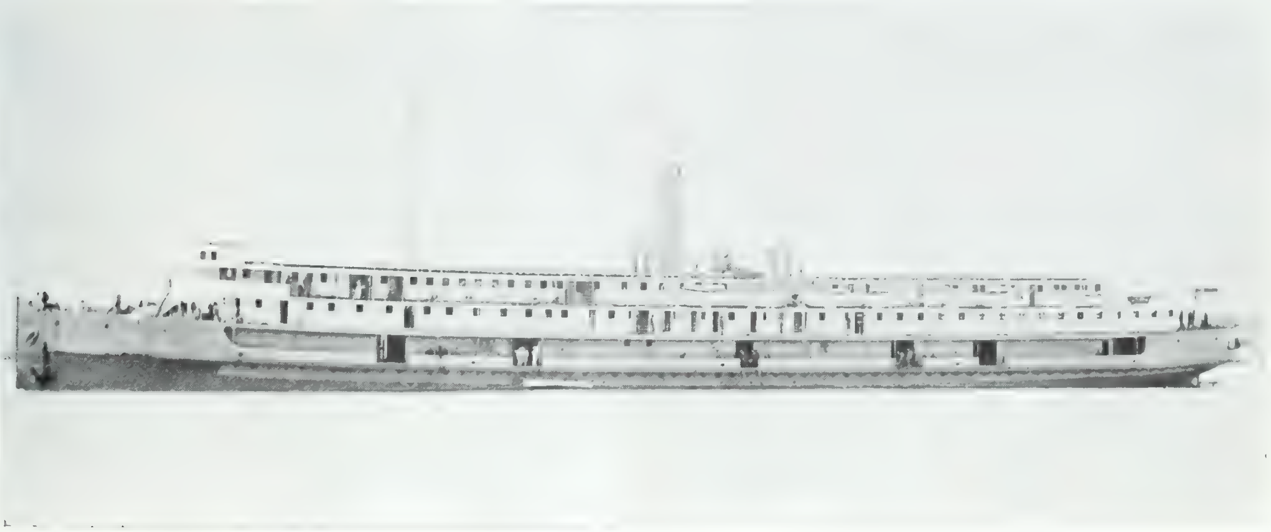
HONOLULU VETERAN DEAD

JAMES W. ROBERTSON, shipping manager of C. Brewer & Co., Honolulu, died at his home in the islands recently. Mr. Robertson was one of the best-known shipping men of Honolulu and probably was the veteran of them all. Most of the masters of vessels calling at the island port knew him, particularly of the Oceanic, Dutch and Nippon Yusen Kaisha steamers, for which C. Brewer & Co. were agents.

Mr. Robertson was born in Honolulu in 1852 of British parentage, and most of his life was spent in the islands, except for two years in St. Johns, New Brunswick, and a few years at sea, which ended when he returned to Honolulu in 1871. After being in business for several years, Mr. Robertson became vice-chamberlain to King Kalakaua of Hawaii in 1888, and was made chamberlain to Queen Liliuokalani when Kalakaua died in San Francisco in 1891.

As chamberlain to the queen Mr. Robertson had a prominent part in the events of the revolution, being an ardent royalist. He acted as emissary between the deposed queen and United States Ministers Blount and Willis during their terms in Honolulu, but when the Republic of Hawaii finally was recognized, and the fact of the queen's deposition became positive, he again entered into business life. In 1895 he entered the employ of C. Brewer & Co. There are several relatives—brothers, sisters and children—surviving.

There were few persons in the islands who had at their finger tips, as Mr. Robertson had, the history of the revolution in Hawaii, of the days of the republic and the final annexation to the United States, which filled the newspapers of the States at the time and in which the whole country was intensely interested.



River steamer Loongwo, built and engined complete at Kowloon Works

Hull Insurance (Part Four): "Sue and Labor" and General Average

By Benjamin Rush

NOW follows what is known as the "Sue and Labor" clause, reading as follows:

"And in case of any loss or misfortune it shall be lawful to the assured, their factors, servants and assigns, to sue, labor and travel for, in and about the defense, safeguard, and recovery of the said ship, etc., or any part thereof, without prejudice to this insurance, to the charges whereof, we, the assurers, will contribute, each one according to the rate and quantity of his sum herein assured.

"And it is especially declared and agreed that no acts of the insurer or insured, in recovering, saving or preserving the property insured, shall be considered as a waiver or acceptance of abandonment."

The object and general scope of this clause is to encourage the assured, in case of accident, to make exertion for the preservation of the property insured, by agreeing that such action shall be without prejudice to the insurance, and by a promise on the part of the underwriters to contribute to any expenditure which may be incurred by the assured or his agents in an effort to avert an impending loss.

This clause, of course, only comes into effect on account of the happening of a loss or misfortune covered by the policy, for it is manifest that if a ship is subjected to a danger not assumed by underwriters the latter have no interest in any efforts which may be made in its protection, as, for instance, if a ship be insured free from claim for capture, and was in danger of being taken by the enemy, the underwriter would have no interest in any expenses which the assured might incur in her defense.

The terms of the clause, although permissive in form, are considered mandatory in effect, and obligate the assured to make every reasonable exertion to save the ship insured from loss or damage, and if he fails to do so the resulting loss will not be recovered under the policy.

Salvors Not Included

You will note that the persons who are especially authorized by this clause to render services to the ship insured are the assured, his factors, servants and assigns, which means the assured himself and his agents, be they direct or voluntary, but not salvors unless contracted for by the assured. Salvage charges, as well as general average charges, are normally not covered by the clause because they are recoverable under the general maritime law.

Under this clause the assured may recover from the insurer any expenses properly incurred pursuant to the clause, notwithstanding that the insurer may have paid for a total loss or that the subject matter may have been warranted free from particular average either wholly or under a certain percentage.

The final words at the end of the clause, "and it is especially declared and agreed that no acts of the insurer or insured in recovering, saving or preserving the property insured shall be considered as a waiver or acceptance of abandonment," simply provide that the rights of either party shall not be prejudiced by any acts, which, in the absence of this clause, might otherwise be held to imply ownership.

You can readily see that in the absence of this clause the insured or the underwriters might either of them rightly decline to take action to preserve the imperiled property for fear that if they did so they would prejudice their legal rights. The clause last-above stated provided that such action shall not be considered as a waiver or acceptance of abandonment.

Losses Paid Proportionately

The method of contributing for these charges, and, indeed, for all losses under the policy, is clearly outlined in the clause:

"Each assurer will contribute according to the rate and quantity of his sum herein insured."

In brief, if one underwriter insures one-tenth of the face of the policy he contributes one-tenth of the losses under it.

Now follow the words:

"And it is agreed by us, the insurers, that this writing or policy of assurance shall be of as much force and effect as the surest writing or policy of insurance heretofore made in Lombard street or in the Royal Exchange, or elsewhere in London to an English court or an English jury."

This is a guarantee that the policy written is and shall be as good as the best.

"And so we, the assurers, are contented and do promise and bind ourselves, each one for his own part, our heirs, executors and goods to the assured, their executors, administrators and assigns, for the true performance of the premises."

This provides, of course, that the death of the insurer shall not void the policy, but holds his estate or his assigns subject to the full performance of the contract assumed by him.

Now follow the words:

"Confessing ourselves paid the consideration due unto us for this assurance by the assured, at and after the rate of........................."

This is a receipt in the policy for the premiums to be paid by the assured to the underwriters for the insurance covered by the policy, and when filled in it constitutes the receipt for the money paid.

It would, of course, be open to the underwriters to prove as a matter of fact the consideration agreed to had not been paid for, if such is actually the case.

The Memorandum Clause

Now follows what is known as the memorandum clause. I omit that portion of the clause applying to cargo and devote my attention to the ship itself. Consequently the clause reads:

"The ship is warranted free of average under 3£ per cent, unless general, or the ship be stranded."

This clause means that the underwriter is free from liability for partial loss, even by the perils insured against unless amounting to 3 per cent of the valuation of the ship unless the ship be stranded, and that he is liable for all general average loss without respect to percentage.

The word "average" here you will note is used to describe both particular average and/or partial loss, and general average.

It is also to be noted that if the required franchise of 3 per cent is reached, the full amount of the loss is paid; it is not a deductible average. The liability for general average, however, does not include particular charges.

It is also to be noted that if the vessel be stranded, in accordance with the terms of this clause, all partial loss by perils insured against occurring on that voyage will be paid for, even though the stranding has nothing whatever to do with the loss. In other words, stranding is considered to open the policy. Thus, if a vessel with a perishable cargo strands at the inception of the voyage or, indeed, any time during its occurrence, and is subsequently floated without any damage whatsoever, and in the course of her voyage sustains a particular average loss of less than the required percentage, the underwriter would be liable for same irrespective of the fact that the particular loss was not due to the stranding.

What Constitutes Stranding

We next have to consider the meaning of the words, "or the ship be stranded," so as to decide what constitutes stranding under the meaning of the clause.

The interpretation of this clause is that the vessel must settle down on the bottom or rest upon the shore in a quiescent state. She must not merely touch and go, for if she but touch and continue to progress until she drags over the obstruction, it does not constitute a stranding within the meaning of the clause.

The amount of damage sustained by the stranding has nothing whatever to do with the legal question as to whether it is or is not a stranding. If it is touch and go there is no stranding. If, per contra, the vessel runs ashore and remains quiescent for any length of time, if only for a few minutes, and is then floated, it is a stranding, even although no damages have been sustained.

Furthermore, it is not a stranding if the vessel takes the ground in the ordinary and expected course of navigation. The stranding must be unusual and not expected. The clause is frequently extended to read as follows: "Free of average under 3£ per cent, unless general, or the ship be stranded, sunk, burnt or in collision."

In this case the word "sunk" explains itself, but the word "burnt" needs some definition. It must not merely be an immaterial fire, which does no substantial injury to the vessel's corpus. Consequently the word is frequently qualified by the insertion of the words "on fire" after burnt.

The words: "In collision" imply the fortuitous impinging together of two or more vessels.

It is also the rule that successive losses happening at different times on the same voyage may be added together to make up the 3 per cent, or other average provided for in the policy, but that general average cannot be added to particular average losses to make up the specified percentage. Nor can the expenses of and incidental to ascertaining and proving the loss be added to the damage to make up the required percentage. The damage per se has to exceed the required amount.

Separate Valuation Provided

As modern vessels are extremely costly, this 3 per cent average clause is frequently subdivided so that a separate valuation is provided for the hull, the machinery, and in some cases the passenger fittings, and the clause is modified so as to provide that if the loss equals 3 per cent on each valuation separately, or on the whole, the underwriter is liable.

During the course of my preceding remarks you have, no doubt, noticed the words "general average," and it is pertinent at this point to explain the meaning of this term.

The law of general average is one of the most ancient in the world, being established long before the Christian era, and its original germ is embodied in the law of the Island of Rhodes, providing that that which was sacrificed for the benefit of all in a sea adventure, should be made good by the contribution of all. It is a law peculiar to the sea—nothing whatever of the kind is known on land. Its foundation may be said to be bedded in equity, rather than in statute.

Three things are requisite and necessary in order to constitute a clear case of general average:

First: An imminent and overwhelming peril common to all interests in the adventure—ship, cargo and freight.

Second: A voluntary sacrifice made of some part of the adventure, whether ship, cargo or freight, or an expense incurred for the purpose of avoiding this imminent and otherwise unavoidable peril.

Third: The sacrifice so made must achieve the desired result of safety, at least in part.

Jettison Is General Average

The simplest, oldest and clearest case of general average is that of jettison of merchandise to lighten a ship in danger of being overcome by the violence of the tempest.

From this foundation the general average act has been extended to include every voluntary act or sacrifice made by the master or other accredited agent of the shipowner for the purpose of saving the adventure in whole or in part from an imminent and deadly peril. Such acts occur when cargo is jettisoned or when masts or spars are cut away in order to relieve the ship from the violence of the tempest. They also occur when a vessel is voluntarily run ashore in order to avoid the peril of sinking in deep water, or when water is poured into the hold to extinguish a fire, or when steam is ejected into the hold for the same purpose.

Furthermore, the consequences of a general average act are considered the same as the act itself; such, for instance, if the hatches are opened for the purpose of jettisoning cargo and water finds its way through the hatch and damages other cargo which was not intended to be jettisoned—the loss on such cargo would also be a general average loss.

The underlying principle of general average is that all who are interested in the adventure should contribute to make good for the loss of one whose property has been sacrificed for the common welfare. Therefore, a general average act having been performed, and a general average loss having been sustained thereby, when the vessel arrives at her port of destination, a general average adjustment is made up which distributes that loss equally among every interest in the adventure, and it is the duty of the underwriter to take upon his shoulders the general average contribution which is legally enforced by the lien in rem on the property itself.

The North Pacific Graveyard—

By Stella Baker

THIRTEEN vessels driven on the beach and about forty lives lost is the toll of the graveyard of the North Pacific Coast, which lies between Point Elizabeth and the beach south of the entrance to Grays Harbor. It is a record of some thirty years, brought to mind by the fate of the five-masted auxiliary schooner "Janet Carruthers," driven on the sandy beach January 22 about four miles north of Grays Harbor. The wreck cost the lives of six members of the crew, the captain and the eight other men reaching shore safely.

Included in the list of ships which have been driven on the beach in this section are schooners, barks and one big steel steamer. Considering the number of vessels, the loss of life has been small. The death toll would have been much greater had it not been for the bravery and efficiency of the live-saving crew at the Westport station. Captain Charles Jacobbsen recently retired after being in command of the station for the last thirty years, and to his "never-give-up" efforts many a seaman owes his life.

Full-Rigged British Ship Lost

One of the first wrecks of which Western Washington pioneers have recollection was that of the full-rigged British ship "Sir Jesse G.," which was coming light to one of the Northwest ports to load lumber about 1888. Six members of the crew were lost and eighteen saved. This vessel was built of teakwood and the wreck remained intact for a long time. About twenty-eight years ago the "Zenita," an English bark enroute from Japan to Portland, went ashore at almost the identical spot where the "Carruthers" lies today.

The "Port Gordon," "Lilly Grace" and "Abercrombie" were lost about twenty-five years ago. Pig iron and fire brick, destined for the Tacoma smelter, then in its infancy, were the cargo of the "Port Gordon," a full-rigged ship from Glasgow. Four or five members of the crew were lost. The Chilian bark "Lilly Grace," lumber-laden from Puget Sound, was the next vessel to go ashore. Part of the cargo of the ship "Abercrombie," from Scotland with railroad iron for the Northern Pacific, aided in construction of the Polson logging railroad, as well as the Grays Harbor branch of the Northern Pacific. After the cargo had been salvaged it was sold for taxes. All except three of the crew of twenty-four men were lost.

The British ship "Ferndale" went ashore about twenty years ago two and one-half miles south of the Copalis River. Mrs. Martha White, wife of a nearby rancher, saved the lives of three of the crew and was awarded a Carnegie medal. The three men she saved came in on the breakers at different times and were unconscious, when she took desperate chances of losing her own life by entering the surf and dragging them beyond the reach of the breakers, where she rendered first aid.

Driven Head-On Into River

The "Ernest Reier," a French ship, was driven head-on directly into the mouth of the Quinault River about 1905. The vessel virtually "plugged" that stream and caused it to seek a new outlet through the sand. All on board were saved by the crew of the Westport station. The "Charles Falk," cast up on the beach about four miles north of the harbor entrance; the "Thayer," driven ashore about where the north jetty now is, and the Norwegian steel steamer "Tellus" were lost in the next two years. The "Tellus" was part of the Wilhelmsen fleet and her home port was Tonsberg, Norway.

The next wreck was that of the four-masted schooner "Balboa," just north of the north jetty, about 1910, her crew also being saved by Captain Jacobbsen and his men. The "Thorsdale" was driven on the bar at the south side of the entrance of the harbor seven years ago. When the storm subsided the vessel rested on her side and for several years her gradually-disappearing frame was a prominent landmark.

The "Janet Carruthers," the most recent wreck, was bound from Tacoma to Portland with 500,000 feet of lumber. She is a British vessel of 2500 deadweight tons owned by S. Griffin & Co. In the darkness and storm of the night of the wreck Captain Carrney believed the vessel was on the rocks and ordered the crew into one of the lifeboats. After six men had got into the first boat it broke away from the ship and disappeared. The next morning it was found high on the beach, about seven miles north of the wreck. The remainder of the ship's crew, nine men in all, including the captain, successfully launched a second boat and reached shore safely.

PACIFIC YARDS IN LEAD

DURING the seven months ending January 31, 1919, the merchant ships built in American yards and officially numbered by the Bureau of Navigation, Department of Commerce, aggregated 1149 of 1,996,859 gross tons, and in addition 48 wooden vessels of 100,288 gross tons were built for foreign flags, mainly French.

Vessels built for American registry, by districts, were as follows:

Atlantic and Gulf—Sail, 42; steam, 209; gas, 154; unrigged, 126; a total of 531 vessels of 767,642 gross tons. Wood vessels were 424, of 307,764 gross tons, and metal vessels, 107, of 459,878 gross tons.

Pacific—Sail, 8; steam, 228; gas, 131; unrigged, 30; a total of 397 vessels of 937,590 gross tons. Wood vessels were 293, of 360,698 gross tons, and metal vessels, 104, of 576,892 gross tons. Although the Atlantic built the larger number of vessels, Pacific yards excelled in total gross tonnage in both wood and metal.

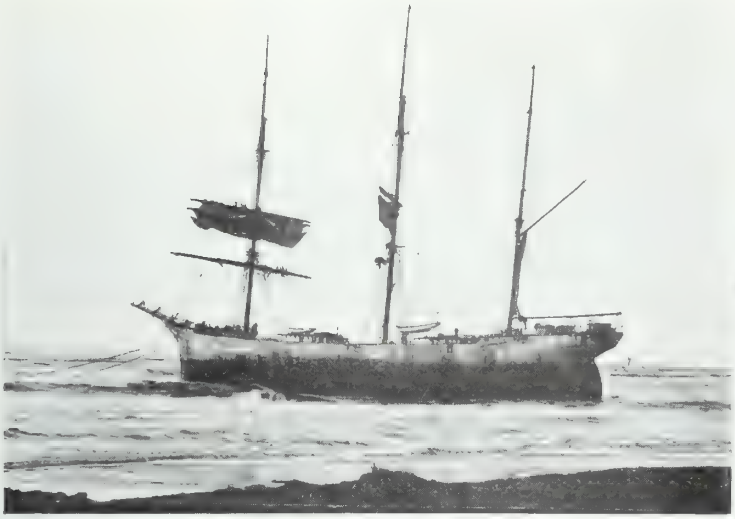
The grand total for the Great Lakes was 171 vessels of 289,879 gross tons. Western rivers built 50 of 1748 tons.

During the seven months ending January 31, 1918, the output of the country was 846 vessels of 563,565 gross tons, and, in addition, 19 vessels of 43,710 gross tons were built for foreign owners.

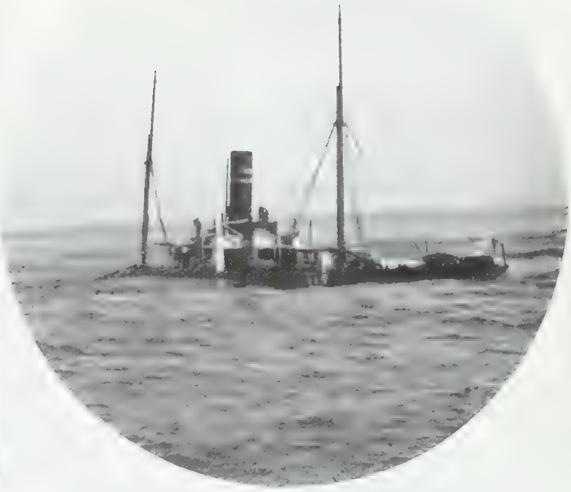
During the twelve months ending January 31, 1919, the total merchant shipping built and officially numbered, including those for foreign owners, aggredated 1957 of 2,920,832 gross tons. Of this number 490 of 1,982,372 gross tons were seagoing steel steamers, 392 of 810,194 gross tons were seagoing wooden steamers, and the remainder were nonseagoing vessels for domestic trade.

During January the output dropped to 132 vessels of 264,346 gross tons, of which 42 of 174,799 gross tons were seagoing steel steamers.

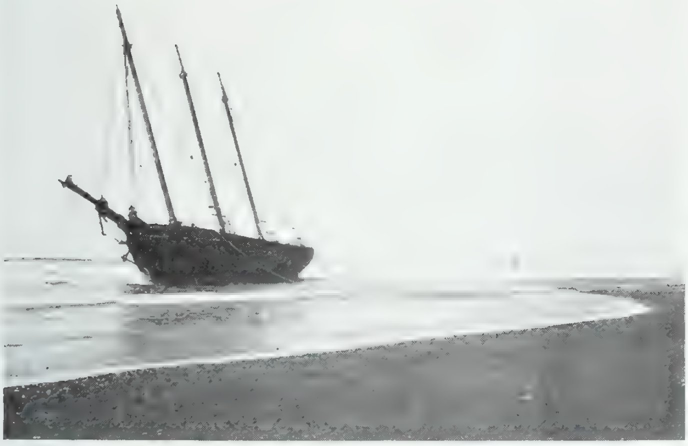
—Wrecks Near Grays Harbor



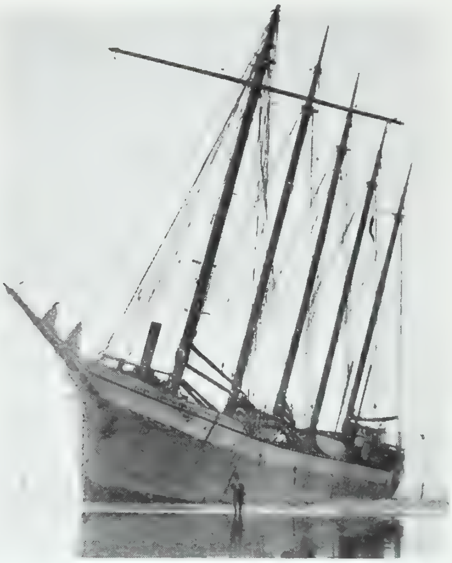
Zenita



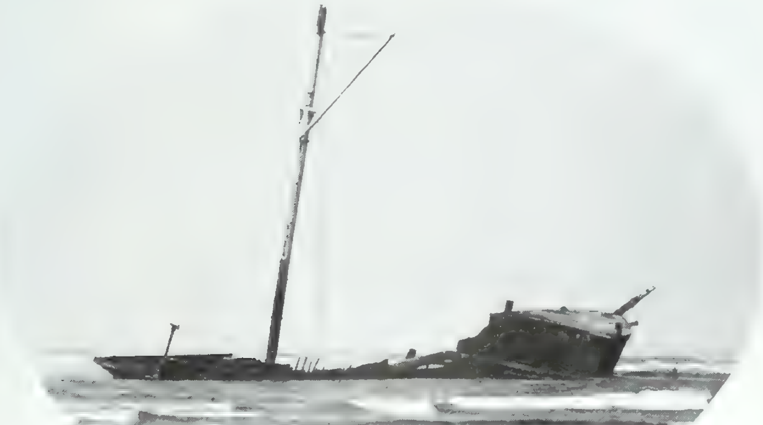
Tellus



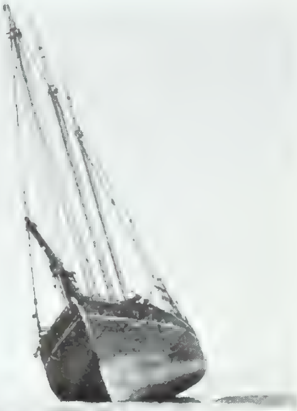
Charles E. Falk



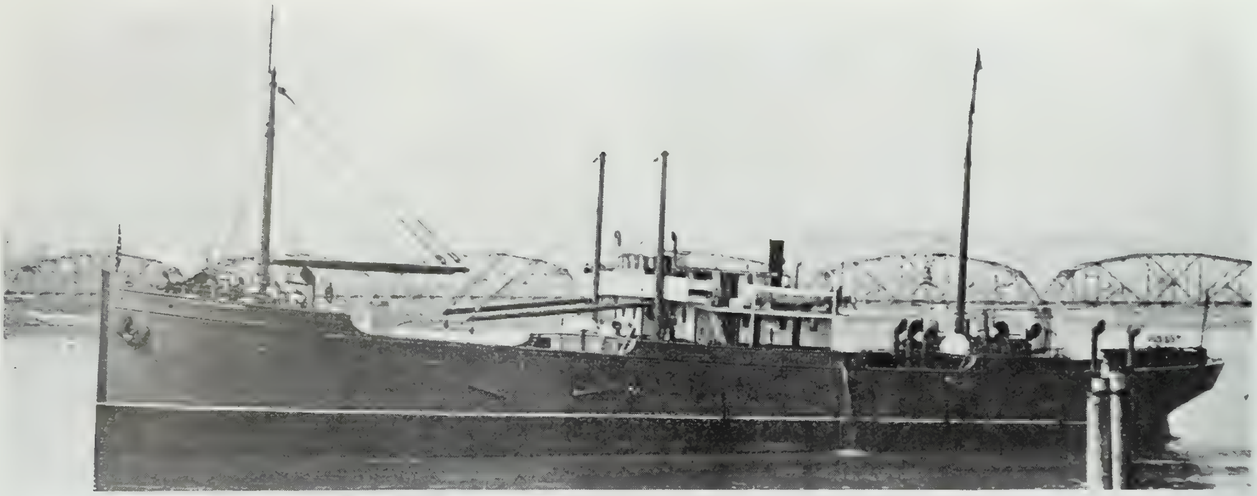
Janet Carruthers



Thorsdale



Thayer



Motorship "James Timpson" leaving berth at Standifer outfitting dock, Vancouver, Washington

Motorship Cuts Fuel Bill in Half

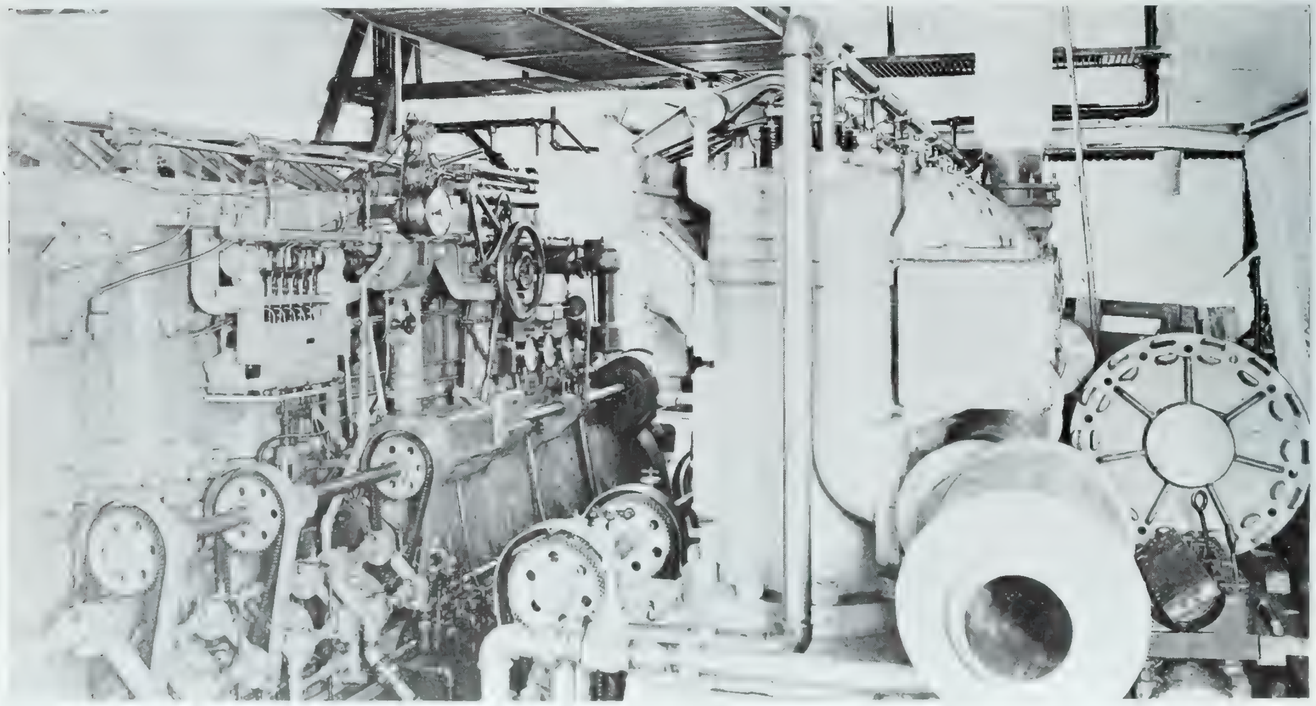
By using only 55 per cent of her estimated consumption of fuel oil, the motorship "James Timpson," owned by I. T. Williams & Sons, New York, in a journey of 14,000 miles, has vindicated the Columbia River type of motorship from the standpoint of economy. The "Timpson" recently came into port at New York after a trip to South America for lumber, in which she cut her low estimate of oil consumption almost in half.

Not only because of economy but because of performance also were her engineer and her owners pleased with the "Timpson's" record. In seven months from the time she was delivered to her owners she had travelled 14,000 miles, and on 17¾ barrels of oil a day instead of the 32-barrel estimate.

On May 7, 1918, the "Timpson" was delivered by the G. M. Standifer Construction Corporation of Vancouver, Wash., and North Portland, Ore., to her owners, and put out for Coos Bay on the first leg of a journey which was to take her to the hardwood exporting centers of South America. From Coos Bay she carried cargo to San Francisco and from the Golden Gate to South America, where she loaded mahogany for the Eastern Coast before going through the Panama Canal to her home port.

She is of approximately 2016 gross tons register, with 1646 net tons and 1767 under deck tonnage. Her loaded draft line is about 14 feet.

The engines of the "Timpson" were built by the Winton Engine Works at Cleveland, Ohio. They are two six-cylinder, 500-horsepower, full Deisel engines, making 300 revolutions per minute, reversible right hand and left hand reduction gear. The propeller shaft makes 100 revolutions per minute. She carries a total fuel oil supply of 2162 barrels, sufficient to last for a journey of 121 days at the rate of consumption established by more than six months of experience.



The engines of the Motorship "James Timpson"

Congress During the Month

THE following resolution was presented to the House by Mr. Gould of New York (H. Res. 562) and referred to the Committee on Merchant Marine and Fisheries:

"That the President of the United States be requested to report to the House of Representatives all facts within the knowledge of the United States Shipping Board, as required by Section 12 of the act creating said board, approved September 7, 1916, including the recommendations made by the United States Shipping Board relating to seamen's wages, equalization of the higher cost, if any, of building ships in American yards, and the method or policy adopted for operating American ships in competition with foreign-owned ships, whether by the Government or private corporations or American citizens; also full information as to plans which have been adopted for providing for furnishing fuel for United States vessels in all parts of the world."

* * *

Under date of February 11 Senator Sherman introduced the following resolution (S. Con. Res. 31):

"Whereas the Government on the declaration of war commandeered the merchant ships of private owners in the United States and thereby canceled all pending contracts with shippers; and

"Whereas the resumption of private business requiring the use of the facilities furnished by such shippers is dependent upon obtaining rates that will permit such business to be conducted without loss, and such resumption will give employment in many lines; and

"Whereas the Shipping Board and Emergency Fleet Corporation having authority in such matters have not returned such private ships so commandeered to their owners so that contracts may be resumed or entered into between the private owner of such ships and various industrial enterprises; therefore be it

"Resolved, That the Shipping Board and the Emergency Fleet Corporation be, and are hereby, directed to report to Congress why such private ships should not now be returned to their respective owners to be used in the various industrial undertakings of the country."

* * *

Government Steamship Line

Under date of February 11 Mr. Edmonds of Pennsylvania introduced the following measure into the House:

"That the Shipping Board as provided in Sec. 11 of the Act known as the Shipping Act of 1916, is authorized and directed to establish and place in service the following passenger and freight lines of steamships, composed of ships of suitable size and equal to or superior in equipment to the ships used by competing lines in similar service.

"Line Numbered One. A monthly service starting at Boston and stopping at New York, to the principal ports on the east coast of South America as far south as Buenos Aires, and a monthly service starting at Philadelphia and stopping at Charleston, S. C., to the same ports in South America, the sailing dates to be so arranged as to make the service every fifteen days from the Atlantic seaboard and stopping both on northern and southern voyages at the Virgin Islands.

"Line Numbered Two. A monthly service from Boston, stopping at New York, through the Panama Canal to Coronel, Chile, stopping at the principal ports on the west coast of South America, and a monthly service starting at Philadelphia, and stopping at Charleston, S. C., to the same ports in South America, sailing dates to be arranged so as to make the service every fifteen days from the Atlantic seaboard.

"Line Numbered Three. A service every fifteen days connecting the Gulf ports of the United States with the Virgin Islands and Colon, Panama.

"Line Numbered Four. A service every fifteen days connecting the principal ports of the United States on the Pacific Coast with Balboa, Panama.

"The Shipping Board and all the interested departments of the Government are directed to prepare at Colon and Balboa, on the Isthmus of Panama, and upon the Virgin Islands, such facilities as will preserve and rapidly transfer the interchange of freight between these lines, whose movements shall be so regulated as to make as little delay as possible. The interchange shall be made at the expense of the Shipping Board and not be directly charged to any of these lines, provided this assumption of charges shall not apply to the passengers.

"Sec. 2.` That the Shipping Board is directed to keep separate and accurate books of account of each of the lines, giving to the branch lines a just proportion of the earnings, and at the termination of each business year shall send to Congress an accurate itemized account of their operations.

"Sec. 3. That during the operation of these lines by the Shipping Board or upon the disposal of these lines to private parties or corporations as hereinafter provided for, the Postmaster General is directed to pay the mail subvention provided for in section 6 of the act of March 3, 1891, entitled 'An Act to provide for ocean mail service between the United States and foreign ports and to promote commerce," from the Treasury of the United States and for the purpose of this act the branch lines numbered three and numbered four shall be considered as a portion of the main trunk lines numbered one and numbered two and shall be entitled to be included in the provisions of section 6 of the act of March 3, 1891, by the Postmaster General.

"The Postmaster General is further authorized and directed to enter into contracts for a term of not less than five years nor more than ten years for the payment of aforesaid mail subvention with any person or corporation to whom the Shipping Board may dispose any or all of these lines by agreement.

"Sec. 4. That the Secretary of War is hereby directed to deliver to the United States Shipping Board all the property afloat or otherwise of the Panama Steamship Company, and to discontinue the service to Panama, and shall enter into contracts with the lines (numbered two, three and four) established by the Shipping Board running to or through the Panama Canal for such supply and transport service as is necessary for the maintenance and and operation of the canal or for other purposes on the Canal Zone at the current rates obtained for passage or shipments of similar character by these lines.

"Sec. 5. That the Shipping Board, in conjunction with the State Department and the Department of Commerce, shall endeavor to obtain from the different countries to which the lines operate a suitable mail subvention covering a term of years, or during the period of the operation of the line, the sum to be paid during government operation to the Shipping Board, and credited to the particular line entering it, or if the lines are transferred to private parties or to corporations, to be paid to them.

"Sec. 6. That the Shipping Board shall at any time entertain proposals from private parties or corporations for the taking over and operating of all or any one of the lines established under this act upon satisfactory proof being furnished that the proposer has complied with section 2 of the Shipping Act of 1916, and that they have the financial ability and knowledge of the business necessary for its successful operation. If the application is approved by the board they shall enter into a contract with the operator requiring him to submit his books and all of his operations and agreements for the inspection of the board. The amount of operating capital necessary shall be agreed to, and shall not be increased without the consent of the Shipping Board. All salaries of operating officers shall be stated and agreed to and shall not be greater than paid commercially for similar services. The board shall thereupon make a valuation of the vessels necessary for the operator to successfully operate the line or lines based upon their market value at the time of contract, which valuation shall be subject to arbitration in case of disagreement in the usual manner, and which valuation shall be subject to revision every three months until ship values return to normal; and shall agree with the operator that in return for the use of the ships, the Shipping Board shall receive out of the operation of the ships five percentum of such valuation, which shall be covered in the Treasury of the United States as a sinking fund. After all payments for expenditures are made, the net profits arising out of the contract shall be divided between the Shipping Board and operator in the following proportion: Ten per centum upon the actual capital invested by operator to the operator; between 10 per centum and 20 per centum, one-half to Shipping Board and one-half to operator; between 20 per centum and 30 per centum, two-thirds to Shipping Board and one-third to operator; all over 30 per centum to board.

"Sec. 7. That in all sections of this act where the term Shipping Board is used it shall be understood to include the board or any agency to whom they are authorized to delegate their powers."

* * *

To Investigate Operation Costs

The Senate, on February 3, adopted a resolution (S. Res. 435) as follows:

"Whereas a United States merchant marine is of prime importance to this country, not only because of the commercial value in itself of the shipping industry, with shipbuilding and other dependent industries and pursuits, but also because of its influence on our foreign trade and the power of foreign shipping to discriminate against the same, if we are dependent on such shipping, and because of the immediate necessity for a merchant marine in time of national emergency, which it may not be possible to supply in time to avert grave disaster; and

"Whereas the government, as a war measure, has greatly enlarged the shipbuilding facilities and embarked on a shipbuilding program at enormous expense, and this expense should be discontinued and measures taken to make such salvage as is reasonably practicable, unless it is possible to establish a merchant marine on a sound basis which can ultimately absorb the same; and

"Whereas, in the final analysis, our ability to maintain a merchant marine in foreign trade upon a sound basis depends on the difference in cost of operation in favor of foreign ships and whether such difference can be obviated or offset; now, therefore, be it

"Resolved, That the committee on commerce be, and hereby is, directed to investigate the difference in cost of operation of vessels of the United States in foreign trade as compared with those of the other principal maritime nations, as now prevailing and as likely to prevail in normal times, with the causes thereof, and to report the results to the Senate."

* * *

Building for Foreign Account

The Senate Commerce Committee, on February 3, reported favorably the bill (S. 5292) introduced by Senator Jones reading as follows:

"That from and after the passage of this act it shall not be necessary to secure a permit from the United States Shipping Board to enter into a contract for the construction of ships for foreign account in American shipyards."

In commenting upon the bill the committee stated the following as the situation:

"Under authority given to the President he ordered that no permit be given by the Shipping Board for the construction of ships for foreign account in our shipyards. The authority in this respect lasts for six months after a final treaty of peace is proclaimed.

"After the signing of the armistice Norwegian interests sought to have a large tonnage of wooden ships constructed in our shipyards, but could not do so because of this restriction. Contracts for building these ships have been let to the shipyards of other countries and we have lost this business. The restriction as to the building of wooden ships for foreign account was removed early in December, 1918, but too late to secure for them a large amount of business.

"The restriction against the construction of steel ships for foreign account in American shipyards still stands. Since the signing of the armistice many contracts for the construction of steel ships of large tonnage have been sought from our shipyards. These contracts could not be accepted because no permit could be secured. Contracts of this kind, we have good reason to believe, would be sought now were it not for this restriction."

An Interesting Letter from the Editor of Syren and Shipping

London.

A. J. Dickie, Esq.,
Pacific Marine Review,
576 Sacramento Street,
San Francisco, Cal., U. S. A.

Dear Sir:

In reply to your letter of December 27 asking my views on the mission of Mr. Hurley to Europe, I must say that it is extremely difficult to express any views on the matter until it is known what Mr. Hurley's mission really was. The chairman of the Shipping Board has indeed displayed a striking resemblance to "Bre'r Rabbit," so far as any statement on his mission is concerned. He has talked at intervals on various subjects, but the question of an international wage standard has never been one of them.

Assuming, however, that one of the objects of his visit to Europe is to obtain an international agreement on seamen's wages, I can say straight away that he is wasting his time, because neither British, French, Norwegian, Dutch, nor any other shipowners on this side would agree to it. The objections to it are obvious, and not the least of them is the fact that Mr. Hurley's object could not be altruistic. The principal obstacle in the recent past to the successful operation of American ships as a commercial proposition has been the question of cost. Even supposing that the first cost of an American ship was the same as that of a British ship, the difference in wages would make the successful operation of the former on a competitive basis with the latter impossible. Presumably, the standard of pay on this side of the Atlantic would have to be the same as that of America, for it is hardly conceivable that your seamen would agree to come down to the European level. The increase, therefore, would all be on our side, where, in spite of the war, the cost of living is considerably less than in America. That increase would have to be compensated by an increase in freight rates, for the owners could not pay it.

Net Return Only Six per Cent

When you consider that the net return on the capital invested in shipping averaged over the last fifteen years is less than 9 per cent, and averaged over the ten years preceding the war less than 6 per cent, you will realize that shipowning is not all that the nationalizers declare it to be.

The increase in freight rates would again mean a general increase in costs throughout the whole of the country, and that after a long and exhausting war, when we must try to get costs down. The only countries which would benefit by the proposal in the end would be the countries which stood out of the agreement. The most obvious of these is Japan, for it is utterly inconceivable that she would ever agree to it. Is it likely that she is going to raise her standard of wages to the American level? The idea is absurd. She would stand out and reap enormous benefits thereby to the discomfort of every other nation.

You will excuse my saying so, but there appears to be, and especially in America, a belief that internationalization is a panacea for everything. But one must be "national" before you can be "international," and is not the first object of the present peace conference primarily to nationalize the world? Before you can have cousins you must have uncles and aunts.

"Savors of Presumption"

Another point I might make is that payment of wages is an internal affair of every country, and there is a very strong feeling over here that such interference as that attributed, I do not know how far correctly, to Mr. Hurley savors of presumption. Supposing one of our great shipbuilders were to sail for America with the announcement that he was going to arrange that every shipyard in the States was to provide free beer for its hands twice a day, what would Mr. Schwab and your other shipbuilders say? Something very pungent, I am quite sure, and might even suggest that our missionary should pay for the beer himself. Yet the proposal attributed to Mr. Hurley is on a par with my hypothetical shipbuilder and I have not noticed any suggestion that the States propose to devote any of the credit of £1,700,000,000 they have made in Europe on the war to paying the suggested increase in wages!

I have lived in America and am very fond of America and the Americans and have many excellent friends over there. We on this side are full of gratitude for what America has done. But the feeling is very strong on this side that the debt of gratitude we owe you is not one that can be liquidated by submitting ourselves to a series of sociological experiments, of very doubtful utility.

After all, if the American system is so successful, why is not the American marine a commercial success? I have heard the alleged Hurley scheme criticized as follows: "If the thing is so good they ought not to want us to have it. If the thing is so bad that they want us to have it, let them keep it."

Arguments Against Nationalization

That the European shipping industry should be bankrupted to bolster up the American marine is a quite unacceptable position. In the end it would mean that all the countries concerned would go down before the countries which stopped outside.

As regards my views on nationalization, I think the best arguments which can be advanced against it are:

(1) That shipping is a business, primarily, of enterprise and adventure, which for success requires an agility of mind, a quickness of perception and a rapidity of decision (let alone the technical experience) that no government department anywhere has yet developed. Without these it can only be a failure and a vast financial burden on the nation.

(2) The financial abilities of a government are, for some inscrutable reason, judged always and solely by the amount of direct taxation which it imposes. On this side, for example, you constantly read that so-and-so raised or lowered the income tax to 2s 6d, or whatever it may be, and the vast majority of mankind condemn or praise him thereby. The reason for this is because the direct is the only visible taxation, and what the eye does not see the heart does not grieve after. The control of great

monopolies, such as the public services, is a direct incentive to governments to reduce direct, visible taxation and to increase the indirect and invisible levies. Both on your side and over here we have had very bad examples of this during the war, and as far as this country is concerned it has been responsible for much of the labor unrest. There is no doubt in the minds of competent economists that a much higher proportion of the cost of the war could and should have been paid by direct taxation, principally by income tax and super tax. Instead, loans have been contracted and a vast amount of indirect taxation levied, part of which has been due to the really scandalous freights charged as soon as tonnage was completely controlled. These high rates led to proportionate increases in all handling from the ship to the consumer, so that by the time goods appeared in the stores they became prohibitive. That led to wage trouble. Of course, it was an easy way for the officials and created for a time an impression that the war was costing less than it actually was costing. The same danger lies in nationalization. So long as the low level of the income tax is the criterion of financial statesmanship, so long the nationalization of public services is a public danger, an incitement to extravagance and corruption and all the other appurtenances of financial perversion.

By the above I do not suggest that some measure of government control of freights is not desirable and an adequate control of such matters as equipment, accommodation and so forth. But for the present I would limit my criticism to the above two points. It will be sufficient to go further when someone or other of the many nationalizers produces a concrete plan for the nationalization of shipping.

I am, dear sir, with very kind regards,
Yours truly,
Joseph L. Carozzi, Editor.

A. H. BRANT

Wayne Albee, McBride Studios, Seattle

A. H. Brant, owner of the Pacific Ice Machine and Supply Company of Seattle, and Northwestern agent for the Brunswick refrigerating machinery, has furnished refrigerating plants for more than 200 essels. Manufacturing a standard line for vessels, the Brunswick company has experienced a great demand for its product during the recent expansion of shipbuilding in the United States, for all the larger vessels have refrigerating machinery; and its interests in the Northwest have been looked after well by Mr. Brant.

SAM L. KREIDER

Sam L. Kreider is a shipping man of Los Angeles, well known to marine men. He is a foreign trade expert, and is engaged in shipping goods to foreign countries.

Mr. Kreider is of the opinion that the United States Government should co-ordinate its two great arms of transportation, the railroad administration and the shipping board, to help make Los Angeles harbor a definite junction for the regular flow of traffic from interior industrial centers through the port of Los Angeles to all Pacific ocean ports and return.

In the Marine Insurance World

THE "CANADA MARU"

THE recent settlement of the salvage claim against the Japanese steamer "Canada Maru" and her cargo disposes of one of the largest claims for salvage which has ever arisen and the final figures reach a new mark in the history of salvage awards.

The steamer "Canada Maru," valued at that time at about $1,500,000, with a cargo valued at between $4,000,000 and $5,000,000, while on a voyage from Japan to Puget Sound, ran ashore during a dense fog in July, 1918, a short distance south of Cape Flattery on the Washington Coast. A large hole was stove in her forward compartment, which immediately filled, and later the other compartments forward of the engine room bulkhead leaked badly and were partially filled. Assistance was asked for and the British Columbia Salvage Company sent its boat "Salvor" to the scene and anchors were run out to hold the steamer in position and prevent her from being driven broadside on the rocks.

The owners sent tug boats to the stranded vessel with longshoremen, and these with the crew commenced to jettison the cargo from No. 1 hold. As soon as possible lighters were sent to the scene and cargo was discharged from the forward part of the ship. Pumps were placed on board by the "Salvor," by the use of which the water in the two holds aft of No. 1 was kept down and anchors were run out astern. After working for about five days the steamer was floated and proceeded to Esquimalt under her own steam. She was then found to be so badly damaged that it was dangerous to proceed on her regular passage to Vancouver and she was convoyed to Tacoma, where the cargo was discharged.

Total Loss Was Feared

The place where the steamer stranded was admitted to be a very dangerous locality on account of the sharp rocky bottom and also for the reason that the steamer was exposed to the full force of all westerly winds blowing directly from the Pacific Ocean, and it was confidently predicted by those knowing the locality that the steamer and such cargo as could not be lightered would be totally lost. Owing to these dangers tugboat and barge owners hesitated to send their boats to assist in the salvage, and it was necessary to guarantee them against loss before they would consent. With this guarantee, however, they agreed to send out their boats on the basis of a daily hire no greater than the usual charge for ordinary work. During the salvage operations one large barge was driven ashore and became a total loss, and many of the other barges and some of the tugboats touched the hidden rocks and suffered more or less damage. The wrecking steamer "Salvor" also touched the rocks when placing pumps aboard.

By these combined operations of the tugs and barges in taking off cargo, the use of the pumps in keeping the water down, and by the use of the anchors in holding the steamer in position and on which several pulls were taken on the last day the steamer was ashore, she was floated successfully.

Efforts were then made to arrive at a settlement with the salvor, the British Columbia Salvage Company, for its services. The company agreed not to file a libel against the ship or her cargo. But when the claim was in a fair way of settlement to the satisfaction of all concerned, complications arose.

Other Complications Arise

It appears that, prior to sending the "Salvor" to the "Canada Maru," negotiations for her sale practically had been completed, but the sale was not actually consummated, although, while at the wreck, it finally developed, a bill of sale was given subject to actual possession on her return. Big money was to be had apparently merely for the asking. The purchaser of the "Salvor" developed a theory that at the time the salvage services were rendered it was his property that was at risk and his property that had rendered the service, and he filed a libel against the steamer and freight (not including the cargo) for the sum of $2,000,000; later, however, accepting a stipulation from the owners of the "Canada Maru" up to the sum of $100,000.

Later another person who was on board the stranded steamer for a few hours asserted that he had been called into consultation by the master and that it was by following the advice given by him that the steamer was floated, and he filed a suit in the sum of $100,000, although he stated his willingness to accept $10,000. Owing to these complications it was necessary for the British Columbia Salvage Company to intervene in the suit for its own protection. Thus was started a legal fight for salvage services involving larger amounts than in any previous case in the Canadian courts, probably in any court.

Cost of Salvage $225,000

Negotiations for a settlement were still carried on and finally the British Columbia Salvage Company agreed to accept $175,000 in full for all services, in consideration of which it was to assume any awards which the court might make to the other libelants. All parties interested in the "Canada Maru" and her cargo agreed to this settlement. When the case came up for trial all parties had reached an agreement for settlement and the court gave judgment in accordance with the agreement, awarding to the alleged owner of the "Salvor" $10,000, with $1,500 for costs; to the individual claiming salvage by reason of alleged advice followed successfully, $750, the remainder going to the British Columbia Salvage Company.

In addition to this amount the owners have paid for hire of tugs and barges and for damages sustained by them the sum of about $50,000, making the total cost of the salvage services $225,000. This amount appears extremely large, particularly as the salvage occupied but about five days, but it must be borne in mind that the steamer was in an extremely dangerous position where bad weather, which would be fatal, was to be expected at any moment; that prompt and efficient action was necessary and that the values saved amounted to more than $5,000,000. It must also be borne in mind that such great values being involved, the chances were against the acceptance of a decision by the lower court and appeals delay settlements and are very costly.

SALVAGE AWARD ON THE "RAVALLI"

ON October 4, 1917, while the steamer "Ravalli" was on her way from Southeastern Alaska to Seattle, the thrust shaft broke, making her helpless. A southeast wind was setting her toward the shore, and as the water was very deep, something more than forty fathoms, with a hard bottom, making anchoring impracticable, signals of distress were made. These were responded to by the steamer "Portland" and she hurried to the rescue. Inasmuch as the "Ravalli" had drifted rather close inshore when the "Portland" arrived," she was made fast alonngside and towed the disabled steamer into the channel, after which a tow line was taken from the bow and she was towed to safety. In the progress of the trial it developed that the "Portland" had on board a large quantity of dynamite and much stress was laid on the danger to that steamer and the lives on board by proceeding alongside the steamer "Ravalli" with that commodity.

$10,000 to "Portland" Owners

The court awarded $10,000 to the owners of the "Portland," $400 to the master, and one month's pay to the other members of the crew, which included the pilot.

Two unusual features are dealt with in the decision. When the libel was filed against the owners of the "Ravalli" and the cargo, the salvors claimed 10 per cent of the value, asserting that to be $250,000, and later amended the libel, claiming 25 per cent of these values as salvage. To satisfy the lien the owners were compelled to furnish bonds in the sum of $65,000. In the decision the court said: "On account of the large sum demanded by the libelant requiring excessive bond, the amount of the premium for the excessive bond should be paid by the libelant."

"Ravalli" Pilot Assisted

It also appeared that the "Portland" towed the ""Ravalli" to Prince Rupert, a place with which the pilot of the "Portland" was not familiar, and he requested the services of the pilot of the "Ravalli" in making that port. The court held that for his service the pilot of the "Ravalli" should receive $50, that amount to be deducted from the award to the pilot of the "Portland."

Application for a re-hearing on these two points has been made. So far as the award to the pilot is concerned, it is asserted that he was a member of the crew of the "Ravalli" and as such was not entitled to any compensation as a co-salvor, and so far as the excessive bonds are concerned it is stated that precedent does not sanction this also, that the amount claimed for salvage was claimed in good faith under the belief that the salvors were justly entitled to that amount and if they erred it was an honest error. The result of the application has not been learned.

INSTITUTE OF LONDON UNDERWRITERS

THE following are extracts from the report for 1918 of the Institute of London Underwriters:

Hulls of Steamers.—The delay in effecting permanent repairs owing to the requisitioning by the government of shipbuilding and repairing yards, and the rationing of steel and other materials, has during the past year become more acute.

As a rule only temporary repairs were allowed to be effected, and whilst the Ministry of Shipping in the national interests debarred shipowners from carrying out permanent repairs and rationed the amount of material that might be used, they continued to hold the shipowner responsible for the seaworthiness and efficiency of the vessel.

One result is that the greater portion of the mercantile marine is necessarily in a state of more or less bad repair, classification surveys have been postponed, and all repair damage, and especially machinery damage, is greatly increased by delay in repairs to the prejudice of underwriters.

The cost of material and labor, which at the end of 1917 showed an increase of from 100 per cent to 150 per cent over pre-war prices, has further risen and is now estimated at from 150 per cent to 200 per cent over the pre-war cost.

The schedule of dry dock dues has also risen from 25 per cent to 200 per cent, according to the length of time occupied in dock.

Power Vessels.— The following definition has been adopted by the marine insurance companies and Lloyd's:

"The term 'power vessel' shall be deemed to apply exclusively to motor and/or power vessels which are habitually propelled by their own machinery only."

Lying-up Returns.—An agreement has been come to by companies and Lloyd's to discontinue the practice of giving fifteen-day returns or for a less period than thirty consecutive days.

The agreement applies to all steamers registered in the United Kingdom, whether liners or tramp steamers, including river steamers, salvage steamers, tugs, dredges, and any other form of steamers excluding cable steamers and yachts.

The committee are glad to report that the same principle has been adopted in the American and Dutch markets.

BELIEVE "OAKLAND" IS SAFE

J. T. O'Neill and Henry Albers of Portland, owners of the schooner "Oakland," which is reported overdue on the way from Lyttelton, N. Z., for Apia, say they are not concerned about the vessel, because she sailed the latter part of December, during the typhoon season, and, in all probability, was blown off her course and will yet make her way back. Captain Wendt is accompanied by his wife and child, and there are ten in the crew. The "Oakland" was on the beach near the entrance to Nehalem Bay for a year, being floated in January, 1918. She was outfitted at Portland and sent to San Francisco to load case oil and lumber for Sydney. She was damaged during a storm on the way and repairs cost about $28,000. Her owners say she was seaworthy when she started for Apia.

PAY $1,600,000 ON "PIAVE"

New York underwriters will pay the government $1,600,000 on the steamship "Piave," which went ashore near Deal in January and broke in two. She had a cargo of foodstuffs. Her crew was from the United States Navy.

Revised Time Clauses (Hulls)

REVISED clauses which have been agreed upon by the Institute of London Underwirters, the Liverpool Underwriters' Association, and Lloyd's Underwriters' Association, were adopted for all hull insurances written on and after November 1, 1918.

The principal alteration in the institute time clauses consists in the revision of the "sue and labor" clause. This revision was made after consultation with solicitors and counsel, and removes an anomaly which existed in practice as regards underwriters' liability for "sue and labor" charges.

The new clause places underwriters' liability for sue and labor charges on the same basis as their liability for general average contribution.

Institute Time Clauses (Hulls)

1. And it is further agreed that if the Ship hereby Insured shall come into collision with any other Ship or Vessel and the Assured shall in consequence thereof become liable to pay and shall pay by way of damages to any other person or persons any sum or sums in respect of such collision the Undersigned will pay the Assured such proportion of three-fourths of such sum or sums so paid as their respective subscriptions hereto bear to the value of the Ship hereby Insured, provided always that their liability in respect of any one such collision shall not exceed their proportionate part of three-fourths of the value of the Ship hereby Insured, and in cases in which the liability of the Ship has been contested, or proceedings have been taken to limit liability, with the consent in writing of the Undersigned, they will also pay a like proportion of three-fourths of the costs which the Assured shall thereby incur, or be compelled to pay; but when both Vessels are to blame, then unless the liability of the Owners of one or both of such Vessels becomes limited by law, claims under this clause shall be settled on the principle of cross-liabilities as if the Owners of each Vessel had been compelled to pay to the Owners of the other of such Vessels such one-half or other proportion of the latter's damages as may have been properly allowed in ascertaining the balance of sum payable by or to the Assured in consequence of such Collision.

2. Provided always that this Clause shall in no case extend to any sum which the Assured may become liable to pay, or shall pay for removal of obstructions under statutory powers, for injury to harbors, wharves, piers, stages, and similar structures, consequent on such collision, or in respect to the cargo or engagements of the Insured Vessel, or for loss of life or personal injury.

3. Should the Vessel hereby Insured come into collision with or receive salvage services from another Vessel belonging wholly or in part to the same owners, or under the same management, the Assured shall have the same rights under this policy as they would have were the other Vessel entirely the property of owners not interested in the Vessel hereby Insured; but in such cases the liability for the collision, or the amount payable for the services rendered, shall be referred to a sole arbitrator to be agreed upon between the Underwriters and the Assured.

4. In port and at sea, in docks and graving docks, and on ways, gridirons and pontoons, at all times, in all places, and on all occasions, services and trades whatsoever and wheresoever, under steam or sail, with leave to sail with or without pilots, to tow and assist vessels or craft in all situations, and to be towed and to go on trial trips.

5. Should the Vessel at the expiration of this policy be at sea, or in distress, or at a port of refuge or of call, she shall, provided previous notice be given to the Underwriters, be held covered at a **pro rata** monthly premium, to her port of destination.

6. Held covered in case of any breach of warranty as to cargo, trade, locality, or date of sailing provided notice be given, and any additional premium required be agreed immediately after receipt of advices.

7. Should the Vessel be sold or transferred to new management, then, unless the Underwriters agree in writing to such sale or transfer, this Policy shall thereupon become cancelled from date of sale or transfer, unless the Vessel has cargo on board and has already sailed from her loading port, or is at sea in ballast, in either of which cases such cancellation shall be suspended until arrival at final port of discharge, if with cargo, or at port of destination if in ballast. A **pro rata** daily return of premium shall be made.

8. This insurance also specially to cover (subject to the free of average warranty) loss of, or damage to hull or machinery directly caused by accidents in loading, discharging or handling cargo, or caused through the negligence of Master, Mariners, Engineers, or Pilots, or through explosions, bursting of boilers, breakage of shafts, or through any latent defect in the machinery or hull, provided such loss or damage has not resulted from want of due diligence by the owners of the Ship or any of them, or by the Manager. Masters, Mates, Engineers, Pilots, or Crew not to be considered as part owners within the meaning of this clause should they hold shares in the steamer.

9. General Average and Salvage to be adjusted according to the law and practice obtaining at the place where the adventure ends, as if the contract of affreightment contained no special terms upon the subject; or if the contract of affreightment so provides, according to York-Antwerp Rules, or, in the case of Wood cargoes, York-Antwerp Rules omitting the first word of Rule I ("No"), but, in all matters not specifically referred to in York-Antwerp Rules I. to XVII. inclusive, the adjustment shall be in accordance with the law and practice obtaining at the place where the adventure ends and as if the contract of affreightment contained no special terms upon the subject.

10. In the event of expenditure for Salvage, Salvage charges, or under the Sue and Labour Clause, this Policy shall only be liable for its share of such proportion of the amount chargeable to the property hereby insured as the insured value, less loss and/or damage, if any, for which the insurer is liable bears to the value of the salved property.

Provided that where there are no proceeds or there are expenses in excess of the proceeds, the expenses, or the excess of the expenses, as the case may be, shall be apportioned upon the basis of the sound value of the property at the time of the accident and this policy without any deduction for loss and/or damage shall bear its **pro rata** share of such expenses or excess of expenses accordingly.

11. Average payable on each valuation separately or on the whole, without deduction of thirds, new for old, whether the average be particular or general.

12. Donkey boilers, winches, cranes, windlasses, steering gear and electric light apparatus shall be deemed to be part of the hull, and not part of the machinery. Refrigerating machinery and insulation not covered unless expressly included in this Policy.

13. Warranted free from particular average under 3 per cent, but nevertheless, when the Vessel shall have been stranded, sunk, on fire, or in collision with any other Ship or Vessel, Underwriters shall pay the damage occasioned thereby, and the expense of sighting the bottom after stranding shall be paid if reasonably incurred, even if no damage be found.

14. No claim shall in any case be allowed in respect of scraping or painting the Vessel's bottom.

15. Grounding in the Panama Canal, Suez Canal or in the Manchester Ship Canal or its connections, or in the River Mersey above Rock Ferry Slip, or in the River Plate (above Buenos Ayres) or its tributaries, or in the Danube, Demerara, or Bilbao River, or on the Yenikale or Bilbao Bar, shall not be deemed to be a stranding.

16. The warranty and conditions as to average under 3 per cent. to be applicable to each voyage as if separately insured, and a voyage shall be deemed to commence at one of the following periods to be selected by the Assured when making up the claim, viz.: at any time at which the Vessel (1) begins to load cargo or (2) sails in ballast to a loading port. Such voyage shall be deemed to continue during the ensuing period until either she has made one outward and one homeward passage (including an intermediate ballast passage if made) or has carried and discharged two cargoes, whichever may first happen, and further, in either case, until she begins to load a subsequent cargo or sails in ballast for a loading port. When the Vessel sails in ballast to effect damage repair such sailing shall not be deemed to be a sailing for a loading port although she loads at the repairing port. In calculating the 3 per cent. above referred to, particular average occurring outside the period covered by this Policy may be added to particular average occurring within such period, provided it occur upon the same voyage (as above defined), but only that portion of the claim arising within such period shall be recoverable hereon. The commencement of a voyage shall not be so fixed as to overlap another voyage on which a claim is made on this or the preceding Policy.

17. In no case shall Underwriters be liable for unrepaired damage in addition to a subsequent total loss sustained during the term covered by this Policy.

18. In ascertaining whether the Vessel is a constructive total loss the insured value shall be taken as the repaired value, and nothing in respect of the damage or break-up value of the Vessel or wreck shall be taken into account.

19. In the event of total or constructive total loss, no claim to be made by the Underwriters for freight, whether notice of abandonment has been given or not.

20. In the event of accident whereby loss or damage may result in a claim under this Policy, notice shall be given in writing to the Underwriters where practicable, and, if aboard, to the nearest Lloyd's Agent also, prior to survey, so that they may appoint their own Surveyor if they so desire; and whenever the extent of the damage is ascertainable, the Underwriters may take or may require the Assured to take tenders for the repair of such damage. In cases where a tender is accepted by or with the approval of Underwriters, the Underwriters will make an allowance at the rate of £30 per cent. per annum on the insured value for the time actually lost in waiting for tenders. In the event of the Assured failing to comply with the conditions of this Clause, £15 per cent. shall be deducted from the amount of the ascertained claim.

21. Warranted free of capture, seizure, arrest, restraint, or detainment, and the consequences thereof or of any attempt thereat (piracy excepted) and also from all consequences of hostilities or warlike operations whether before or after declaration of war.

22. Warranted that (except as hereinafter mentioned) the amount insured for account of assured and/or their managers on Premiums, Freight, Hire, Profit, Disbursements, Commissions, or other interests policy proof of interests or full interest admitted or on excess or increased value of Hull or Machinery, however described, shall not exceed 15% of the values of the hull and machinery as stated herein but this warranty shall not restrict the assured's right to cover.

(1) **Premiums.**—Any amount not in excess of actual premiums for twelve months on all interests of whatsoever nature insured (including estimated premium on any Club Insurance) but in all cases reducing monthly by a proportionate amount of the whole.

(2) **Freight and/or Chartered Freight and/or Anticipated Freight on Board and not on Board, Insured for 12 Months or other time.**—Any amount not exceeding 25% of the value of hull and machinery as stated herein, but if the insurance be for less than 12 months, the 25% to be proportionately reduced. If at any time the gross freight and/or chartered freight at risk exceeds the amount placed on freight and/or chartered freight for time, the owner to have the liberty to cover the excess amount whilst at risk.

(3) **Freight and/or Chartered Freight for Voyage.**—Any amount not exceeding the actual gross freight and/or chartered freight at risk, all freight covered on time policy under Clause 2 hereof to be taken into account.

(4) **Anticipated freight.**—If the vessel be in ballast and unchartered, an amount reasonably estimated on the basis of current freight at time of insurance for anticipated net freight on the next cargo passage, all freight covered on time policy to be taken into account.

(5) **Time Charter, Hire or Profit on Time Charter, or Charter for Series of Voyages.**—Any amount not exceeding the reasonably estimated net profit, reducing as earned, on a period not exceeding the length of the charter. Any amount insured under Clause 2 to be taken into account, and only the excess of such amount to be insured, reducing **pro rata** as earned.

Provided always that a breach of this warranty shall not afford Underwriters any defence to a claim by Mortgagees or other third parties who may have accepted this policy without notice of such breach of warranty.

23.

To return	per cent. for each uncommenced month if it be mutually agreed to cancel this Policy, as follows for each consecutive 30 days the Vessel may be laid up in port, viz.:— per cent. if in the United Kingdom not under repair. per cent. under repair, or if abroad. Provided always that in no case shall a return be allowed when the within-named vessel is lying in a roadstead or in exposed and unprotected waters.	and arrival

INSURANCE RATES TOO HIGH

CHAIRMAN Hurley of the Shipping Board and United States Senator Duncan U. Fletcher, chairman of the Senate committee on commerce, united last month in advocating means for government insurance of merchant ships and cargoes at what they termed "reasonable rates." They asserted that marine insurance rates oftentimes are so high that commerce is being handicapped. Senator Fletcher said:

"I am strongly in favor of the immediate establishment of an insurance plan similar to that of the War Risk Bureau whereby the government will be enabled to insure its merchant ships and their cargoes. It is essential that this be done in order to protect ourselves against the exorbitant rates exacted by the marine insurance companies, most of whom are dominated by British insurance interests."

There was an immediate reply to these statements. New York underwriters asserted that rates were as low as they well could be; that marine risks, as distinguished from war risks, generally were as low as or lower than pre-war rates; and that there had been little profit on business during the war. Following upon Mr. Hurley's statement, it was announced at Washington that marine insurance underwriters and brokers were working on a plan to submit to the government.

WOULD LIMIT BROKERAGE

The following bill has been introduced in the New York Legislature by Assemblyman Braun:

"An Act to amend the insurance law, in relation to prohibited acts in connection with marine insurance.

"5. No person who is in any way interested in a marine insurance company shall act as broker in procuring insurance from such company.

"Section 2. This act shall take effect immediately."

"ST. JAMES" IS LOSS

Among the losses reported during the month was the barkentine "St. James," owned by Mayor James Rolph of San Francisco, which piled up on Oeong Island, December 16. She had a cargo of lumber from Port Townsend for Cape Town, having sailed October 6. She was a four-masted vessel of 1536 gross tons and was built in 1883 at Bath, Maine. The "St. James" was insured for $167,000.

PACIFIC MACHINERY

Portland Machinery Company Fills the Gap

When the call came to speed up ship production, every plant buckled to and got busy. Industry responded to the call of duty, but it happened often that between the raw and finished product, the machine shop and the completed operating shipyard, there exsisted a great gap. Time was the element, how to conserve it the problem. Into the breach sprang many a corporation filling the gap and making the chain complete.

Eastern manufacturers could not meet the situation. For instance, new motors were ordered, but stocks were depleted and months would be consumed before delivery could be made. Old motors, overtaxed by additional burdens, burned out; others were on hand, but did not answer new requirements. Factories in the East with facilities to rebuild already were overworked. Derricks, cranes, gas engines, compressors, pile drivers, donkey engines, hoists and various articles of machinery sprang into demand overnight—the need imperative, the market short.

What to do and how to help was the question. For filling the gap much credit is due to the Coast Steel & Machinery Company of Portland and its president, John Gallagher, who instituted a rental system in addition to his regular sales policy and maintained an accommodation service for making quick shifts of construction equipment from one company completing work to another just beginning.

During the past year, in addition to selling more than 300 high-power motors, numerous donkey engines, wire cable, rails, scows and general contracting outfits, Mr. Gallagher, with his staff of coworkers, rented out equipment on more than 200 jobs, opened up to a larger extent his motor repair shop, maintained a stock of magnet wire at great cost, and constructed a completely outfitted machine shop. These accommodations were placed at the command of the shipbuilders who made generous use of them.

To place an order for two large rotary converters for crane service, and have the factory reply that shipment could not be made for from six to eight months, was a hard blow. To search the market and find no stock available looked like delay of a most costly nature. This was the experience of the G. M. Standifer Construction Company. So it called in B. E. Davis, manager of the electrical department of the Coast Steel & Machinery Company, for consultation. Mr. Davis said he could "fill the gap." A 500-volt motor was required—a 250-volt motor was located. It was put in the shop, taken down, then completely rebuilt so as to meet specifications, and installed on the date the Standifer company was ready to use it, where it stayed on rental until the arrival of the new plants from the East.

The Northwest Steel Company, pioneers in the Portland district in steel ship construction, needed a 300-horsepower 60-cycle motor. Mr. Bowles, the president, telephoned Mr. Gallagher and asked: "What can you do for us?" Mr. Davis was brought in and they agreed to rebuild a motor to do the job. Mr. Bowles said he had heard it could not be done on the Coast. Mr. Davis said he could "deliver the goods." A 200-horsepower 33-cycle motor was rushed into the shop and in short order was installed on the job, where it runs twenty-four hours a day.

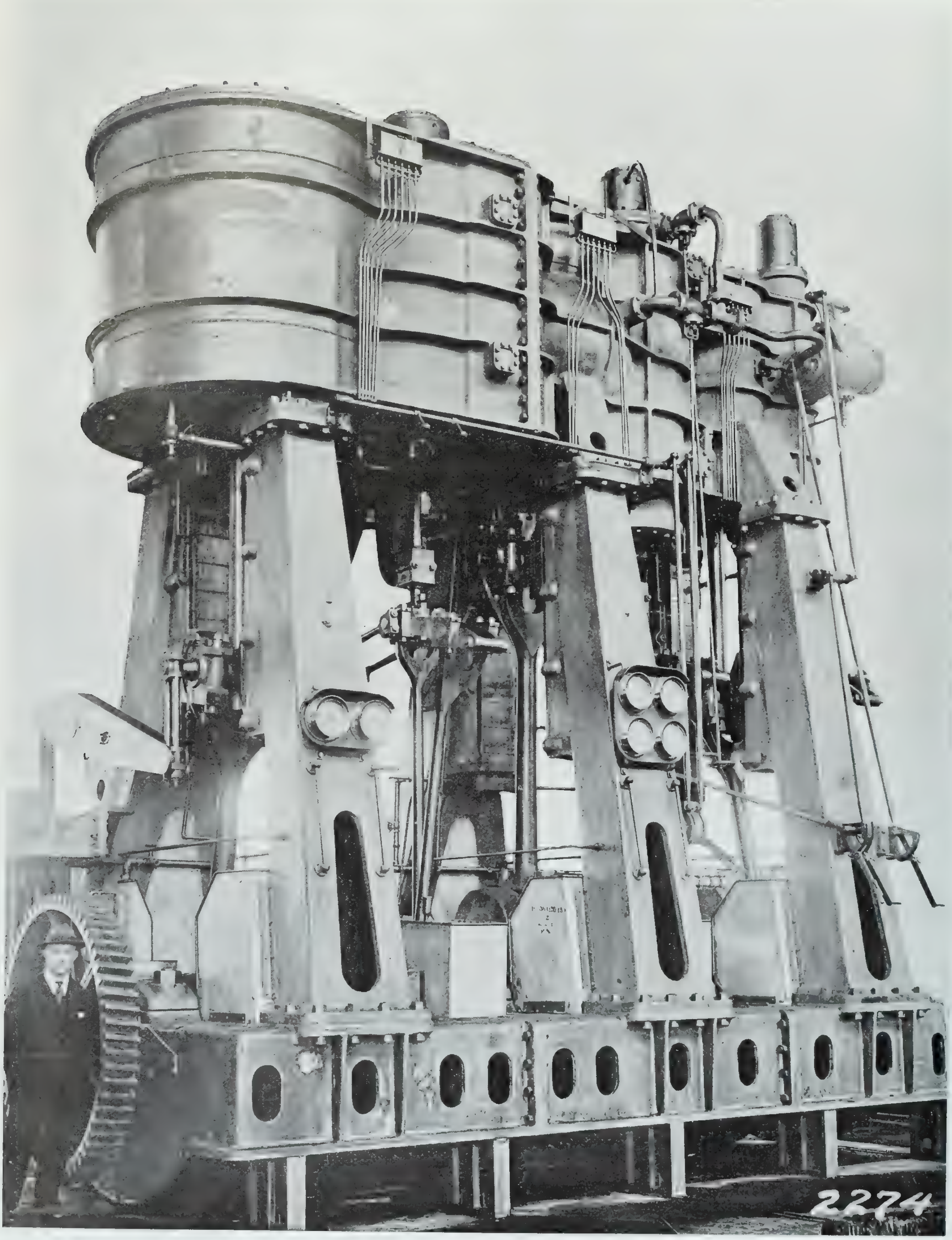
Saw mills and woods were also caught short and were threatened with a shut down. The Grays Harbor Commercial Company operated a big spruce plant at Cosmopolis. A 500-volt alternating current motor was required, but it was an odd voltage not stocked on the Coast, and the factory stated "no delivery" for months. The Coast Steel built up a 440-volt motor to meet the job.

A. P. Coats Lumber Company of Tillamook was out for a 75-horsepower plant. "We can't supply it," said the manufacturer. "We'll fill the gap," said Mr. Gallagher, and a discarded frame was uncovered and remodeled completely and today it is running regularly, doing the work of an entirely new outfit.

Max Houser, grain man, went out for spruce to aid in aeroplane production and built a road near Seaside. Two locomotives were needed, and Mr. Gallagher scoured the country and succeeded in finding "just the article" up in the mountains of Colorado. Mr. Miller made the trip, tested the engines and brought them down to the ocean.

The present plant of the Coast Steel & Machinery Company occupies the three-story building at 50 First street and a large machine shop and yard at Twentieth and Roosevelt streets. The equipment is very complete—a large battery of lathes, punches, drill presses and power hammers strike the eye upon entering the shop. To have built this up out of a mere handful of supplies by dint of hard work, is a rare achievement, for there were no precedents in Portland and few in the country. And peace-time brings plans for further development.

A Feat in Marine Engineering



WE are glad to have the opportunity of publishing this fine picture of one of the triple expansion engines built at Sunnyvale by the Joshua Hendy Iron Works of San Francisco, for the account of the United States Emergency Fleet Corporation's 8800-ton steamers being constructed at the Schaw-Batcher Company's shipyard at South San Francisco. To turn out this 2800 horsepower engine in such splendid shape was a feat requiring preliminary work and added equipment. The Joshua Hendy Iron Works, in large measure, built the needed equipment in their own shop and after their own designs. The first engine was assembled in ninety days and a schedule is set for one every thirty days thereafter.

Truck Conveyors for Unloading Boats

By Robert Ardell, M. E.

FOR handling miscellaneous freight, containing packages of all sizes and shapes, each to be delivered at a different place, there seems to be nothing better than a common, two-wheel truck with a man behind it. On a smooth, level floor, a man with such a truck can move a good-sized load at a comparatively high rate of speed, but when he has to go from one level to another, he needs assistance, if the work is to be at all efficient.

Conveyors of different construction have been devised for boosting trucks up an incline, but, with all individual differences, there are really only two distinctly different types now in use: The one type is a traveling apron conveyor, which carries both the truck and the man—in other words, the man is standing at rest while the load is being moved up the incline. The other type consists of an endless chain with pushers to engage the truck axle. In this case, the man will be walking up the incline holding to the handles as if no conveyor existed, and the truck will be rolling on its own wheels.

Chain-and-Pusher Preferable

It is difficult to decide definitely which one of the two types is the more advantageous, and there may be special conditions in favor of one or the other, but as a general rule, the chain-and-pusher type will be found preferable. It is cheaper to install and less likely to get out of order than an apron conveyor; but the greatest objection to the traveling apron is undoubtedly the man riding upon it instead of walking. It is easy enough to push the truck on the conveyor and to step on for a ride, but it is the getting off at the upper end that is liable to give trouble. The man has to be on his watch to begin pushing the truck at the very point where the moving conveyor intersects the floor, and he has to begin walking when his own feet reach the same point. Experience has shown that the men, talking to each other or listening to orders from the foreman, are very apt to overlook these things, and the natural result is frequent mishaps with more or less congestion and loss of efficiency. If, on the other hand, the man can keep on walking without having to pay any attention whatever to the conveyor, there is no chance of going wrong, even if his mind is not following the work.

Truck conveyors on the Pacific Coast are practically all of the chain and pusher type. The latest installation is on Pier No. 3 in San Francisco, operated by the California Transportation Company and California Navigation and Improvement Company. These conveyors are equipped with several new improvements regarding drive gear, safety and efficiency, and are therefore particularly interesting, especially at this time, both on account of the high wages paid to stevedores and because of the necessity to reduce the time in port to the shortest possible.

Endless Traveling Chain

The conveyor proper consists of an endless traveling chain with pushers at intervals—the chain running in an enclosed guide and the pushers projecting up through a slot. The slot is very narrow, thus eliminating all risk of men getting their feet caught in the conveyor. The lower sprocket wheel is placed far enough out on the end of the apron so that a pusher will always engage the truck axle at the point where the wheels strike the incline. At the upper end the chain is carried over a deflecting wheel and runs horizontally some distance in over the floor, so that the truck will be well up and started on the level before it disengages from the chain. The disengaging is done by running the chain down a reverse incline so that the pusher gradually recedes into the slot without changing its angle with the floor line. In this way the truck will keep its speed constant until it is entirely released from the chain, and it will not receive the quick impulse ahead which it does if the chain is released from the truck by turning it down over a wheel.

The speed of the chain is calculated to be exactly the same as a man walking rapidly, as he should do when handling a truck, and the interval between the pushers is so short (only a fraction of a second) that the truck will not stop when reaching the foot of the incline before being picked up by the conveyor. This continuous motion absolutely eliminates all chance for congestion at the lower end, and it also saves shock on the machinery.

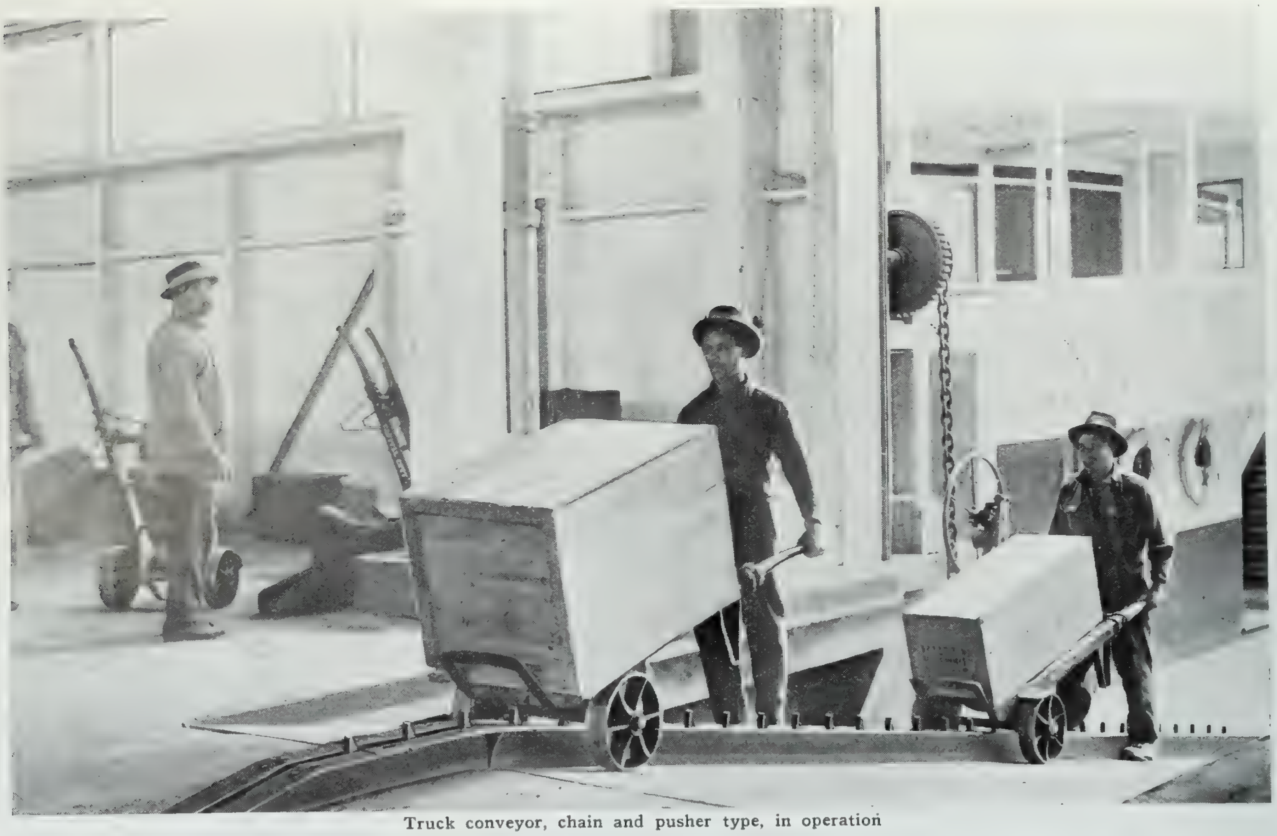
Each conveyor is driven by an individual electric motor, connected to the head shaft by means of a double set of reduction gears. Motor and drive gear are placed in a pit below the floor line, as is also all the machinery of the conveyor proper. Suitable arrangements, however, are made so that all lubrication can be done from above, which makes it easy, even for an unskilled man, to run the machinery without danger of getting in contact with any moving parts.

Provides for Wear

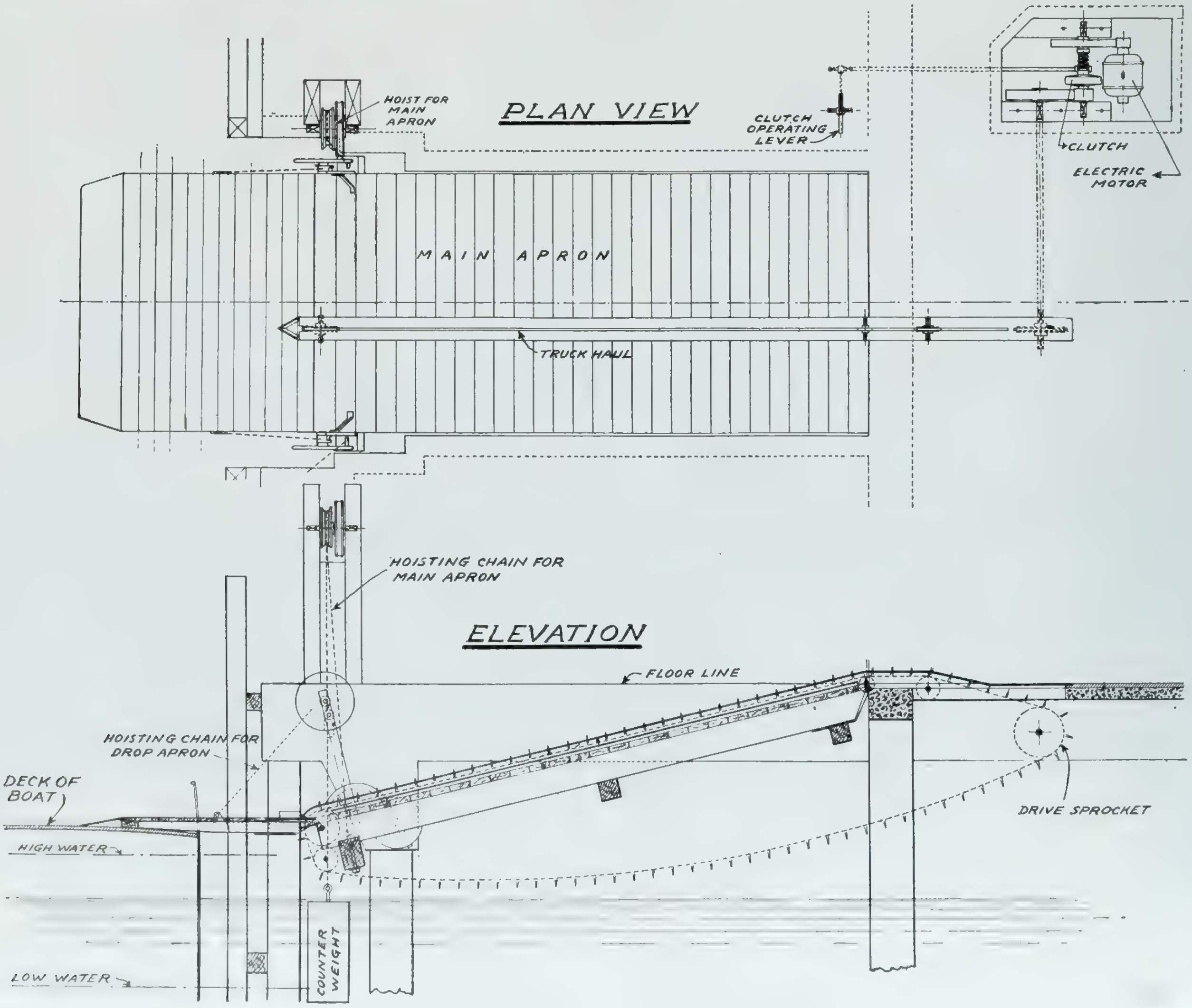
The drive gear is provided with a cone friction-clutch of ample size, held into engagement by a coil spring. The spring is adjusted so it will hold any ordinary load on the conveyor, but it will allow the clutch to slip and instantly stop the conveyor without breaking chain or other parts of the machinery, if there should be any obstructions in the way. The action of the spring will also automatically take care of any wear of the clutch that may occur through slipping, and no further adjustment will be necessary after it has once been set correctly.

In addition to the coil spring, the friction clutch also is provided with a hand-operated lever, which, through a series of rock shafts and connecting links, is brought over and placed directly opposite the head of the incline, where it projects up through a slot in the floor. By the use of this lever, the conveyor can be stopped instantly at any time without stopping the motor.

The conveyors on Pier No. 3 have the full approval of the harbor commissioners. They were designed and built by Meese & Gottfried Company, San Francisco, and all special points, safety devices and other improvements were very carefully discussed by the designer and J. Burns, superintending engineer of the California Transportation Company.

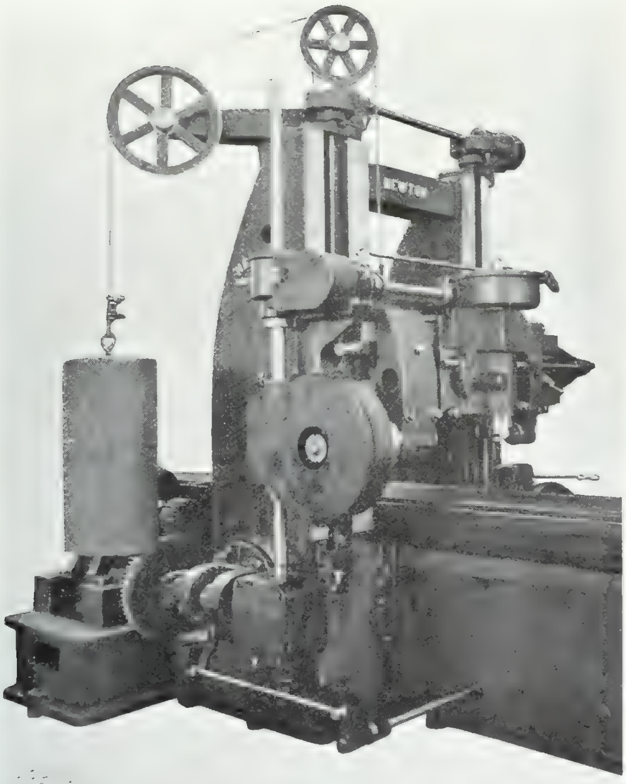


Truck conveyor, chain and pusher type, in operation



Plan view and elevation of the truck conveyor

A New Milling Machine



Back view, Keyseat milling machine, showing drive and counterweights

THE illustrations show a new type heavy-duty, horizontal Keyseat milling machine, manufactured for Keyseating shafts for large rotors.

The general dimensions of this machine are:

Diameter of horizontal spindle in bearing	4⅜″
Diameter of horizontal spindle through driving gear	4″
Side adjustment of horizontal spindle by hand	4″
Distance center of horizontal spindle to under side of cross rail	2½″
Maximum cutter swing on horizontal spindle, where vertical spindle saddle does not interfere	10″
Maximum cutter swing under vertical spindle saddle	6″
Width of work table over working surface	20″
Length of table to mill	10′
Width between uprights	26″
Maximum height center of horizontal spindle to top of work table	33″
Maximum height end of vertical spindle to top of work table	35″
Diameter of vertical spindle	2″
Independent hand vertical elevation to vertical spindle sleeve	6″
Vertical spindle is located so that it can be adjusted to a maximum height above center of the horizontal spindle of	2″

The weight of the machine, complete, is 22,000 lbs. when length of table to mill is 10′.

The special features of this machine are as follows:

Vertical spindle saddle, mounted on the flat cross rail, has a hand cross adjustment on the rail by means of a rack and pinion.

The independent hand vertical adjustment of the vertical spindle sleeve is controlled by a worm and worm wheel connected to the spindle rack pinion, and the control is actuated by a spline shaft carried to the right-hand end of the cross rail, as shown in illustration.

The horizontal spindle head is also adjustable by hand within its range across the rail by screw controlled from the right-hand side of the cross rail.

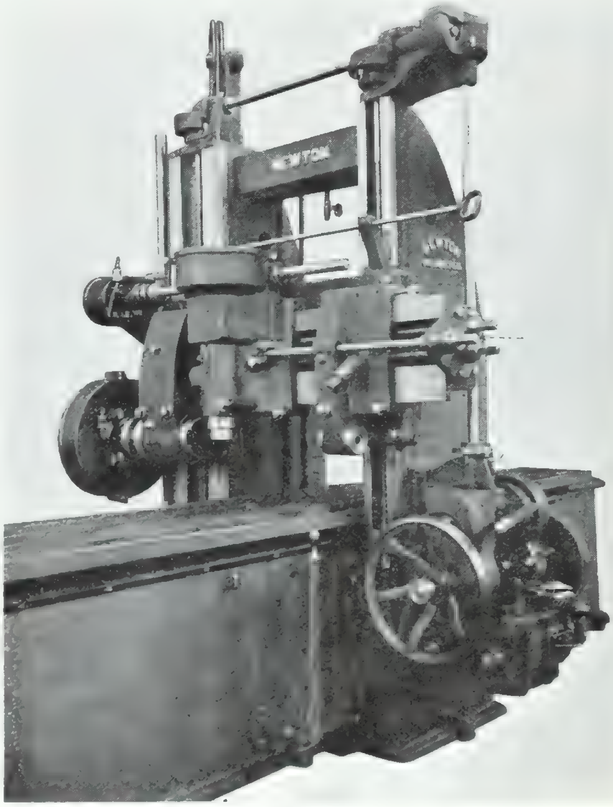
The table of the machine has nine changes of gear feed from a box in which are mounted adjustable sleeves giving changes without removal of gears. The table also has reversing fast power traverse.

The cross rail is counterweighted, and has reversing vertical fast power traverse in addition to hand adjustment.

The shaft transmitting motion for the vertical adjustment of the cross rail is fitted with a micrometer collar for adjusting the cutter on the horizontal spindle to the required depth.

The horizontal spindle is driven by a bronze worm wheel and hardened steel worm, fitted with roller thrust bearings. Vertical spindle is driven by a worm wheel and spiral bronze gear, and the drive for both spindles is encased to permit of continuous lubrication.

Horizontal spindle is fitted with a Morse taper, holder, face keyway, and through retaining bolt, as is also the vertical spindle.



Front view, Keyseat milling machine, showing control

Vertical spindle is fitted with a No. 4 Morse taper.

The outer support on the cross rail is adjustable on the rail by means of a rack and pinion.

The cross rail elevating screws have a top and bottom bearing to insure their operation in tension.

The work table has three finished Tee slots, drilled stop-pin holes, at each end, and is surrounded by a pan for draining off the lubricant to a tank in the base. It is operated by a spiral pinion and angular rack.

Practically every bearing, except those for the lifting screws, is bushed.

All gears in the driving train and in the feed train, except the large substantial spur gear, are steel or bronze.

It will be noted that all hand adjustments are conveniently grouped at the right side of this machine, within easy reach of the operator. The large hand wheel shown adjusts to two positions and controls the hand adjustment of the table and the hand vertical adjustment of the cross rail. The two small latch levers just back of the wheel control the feed gear combination. Immediately above, there is a lever which controls the engagement of the power feed and the fast power traverse of the table. Above this again is another lever which controls the vertical power movement of the cross rail. On the left of the hand wheel is located the long lever which engages the primary clutch that controls all movements in the mechanism and the direction of their rotation.

An Unusual Carbonizing Problem

By L. A. Danse

THE extensive use to which internal combustion power units are being put and the wide variety of fields being worked has caused some unusual heat-treating problems. To surmount these called for the perfection of methods and equipment not generally found in plants devoted to work requiring only commercial practice.

One of the most extreme instances of the difficulties encountered was the piston pins of a large Diesel oil engine. As is well known, the compression in this type of engine is high and the pressure of the expanding gases is such as to put a severe stress on the reciprocating parts, which must be generously proportioned and well fitted to distribute and withstand the shock.

Stud Left Oversize

The piston pin in question, from a machine with a cylinder bore of over twenty inches, was eight inches in diameter at the large end, seven inches in the body, while the small end tapered down slightly from this. The length was eighteen inches. On the small end was a stud, turned and threaded, for the retaining nut, which held the pin home in its seat in the piston. This stud was like the proverbial "sore thumb."

So it was decided to leave the stud oversize for two purposes—one, to allow turning off the case, as the pin was to be carbonized, and the other to afford a quick, easy way of handling so heavy a slug of metal. Accordingly the stud was left one-half inch oversize most of its length, but the outer end was left one and one-quarter inch oversize for one-half inch, forming a head or shoulder. A toggle grab hook was then made that would easily slip over the head and automatically close and clasp the neck under the shoulder. This hook was fitted to the end of the rope of a quick-acting air hoist.

The problem of carbonizing this pin was a severe one. The stock was .30 carbon, .50 manganese, open hearth. The pin had to be carbonized so as to read seventy Shore on the bearing, after hardening and grinding, and have a case over one-sixteenth inch deep after grinding. The ends had to be left soft to machine and fit up.

Develop Carbonizing Box

After considerable experiment, a carbonizing box was developed especially for the job. It was of twelve-inch iron pipe, with the bottom welded in. The lid was made with a special tongue and groove seal and was held solidly in place by mechanical means to prevent loosening or breaking of the seal in handling. The box, with the lid in place, was five inches longer than the pin.

To handle the box with pin packed in it a crane, with a toggle grab hook, was used.

In packing, the box was placed upright and two inches of carbonizing compound placed on the bottom. The pin was lowered into the box by means of the shouldered stud and grab hook. Then the compound was tamped tightly around the pin. In the mouth of the box a test piece one by two by eight inches was placed against the end of the pin, in close contact. This was covered with compound, the lid luted in and fastened and the box was ready to be charged into the furnace, a semi-muffle, oil-fired one, with hearth thirty-six inches wide by forty-eight inches deep.

In order to ascertain the rate of heating and base an estimate of time required, a scrap-pin was bored along its axis with a one and one-half inch hole. A box was fitted with a lid having a similar hole in the center; the pin was packed in this box with a thermo-couple in these holes, the hot end of the couple being in the center of the pin. Simultaneous readings were taken of the furnace couple and this center couple, which showed that it required sixteen hours to heat through. After this it was easy to figure out the heat and time.

When the box was packed, luted and ready, it was hoisted to a charging table in front of the furnace and rolled into place on the hearth. The heat was then started.

Up to 1600 Degrees

Every three hours the furnace operator rolled the box one-half-inch turn so it would heat evenly. Besides this, the box was held up two and one-half inches from the hearth on a double row of firebrick. Before this method was evolved, considerable trouble was experienced from uneven carbonization.

When the box was charged into the furnace the heat was at about 1000 degrees. The cold box caused a drop to about 600 degrees. The heat was forced until 1000 degrees was again reached, and from there to 1600 degrees it was brought up evenly, taking eight hours to bring the furnace up. The furnace was then held steadily at 1600 degrees during the rest of the heat. As before stated, the pin itself lagged behind the furnace several hours.

The thermo-couple used was inserted through the furnace top and the hot end was about two or three inches from the top of the box.

Timing the heat was started when the box was charged, all operating conditions being standardized. The total time was forty hours.

Opened After Twenty-four Hours

When the box was pulled out it was rolled on to the charging shelf and picked up with grab hooks and crane and carried outdoors to cool. It was allowed to set twenty-four hours before opening, when it was stood upright, the lid removed and the small grab hook attached to the shouldered stud and the pin hoisted out. The test piece was immediately hardened and broken under the hammer. If satisfactory, the pin was sent to the machine shop to be finish machined.

After machining, the pin was returned for hardening. The shoulder was left on the stud, but the whole stud was turned down to remove the carbonized case.

For hardening, the pin was packed in crushed charcoal, in an old box, with a loosely-fitted lid, not luted. The box was charged into the furnace and handled the same as for the carbonizing heat, except that it was heated to 1460 degrees instead of 1600 degrees, and the total time was sixteen hours.

Rotating Motion Too Fast

When soaked through for this time the box was rolled out on the shelf and dropped on a pile of sand on the floor, the box landing in an upright position. While one man steadied the box with a large pair of tongs, another removed the lid, a third brushed off the charcoal from the top around the shouldered stud and hooked the grab hook over the stud and a fourth manipulated the hoist controls. The pin was pulled up out of the box; the hoist run over the quenching tank and the pin lowered into the bath.

The tank was round and five feet deep. In it were equally spaced, four one-inch pipes with rows of one-eighth-inch holes drilled in them in such a way that the streams of water were directed toward the pin, but slightly tangential. This was just sufficient to cause the water to move around the pin.

When first installed, the rotative motion was so fast as to form a vortex, in which the pin formed steam pockets and came out with soft spots. With the pipes turned so that the streams only tended to move the water slightly, there was no more trouble.

Prevent Steam Cushion

The overflow from the tank was a four-inch pipe. The water inflow pressure was sixty pounds, which was sufficient to keep the overflow pipe running full. The temperature of the incoming water was 55 degrees Fahrenheit. The pin was soused up and down in the bath by the hoist to assist in preventing the formation of steam cushion on the surface of the hot steel.

Occasionally the pin was raised near the top of the bath, after it had cooled down considerably. The hardener would feel the water near the pin and when the pin had cooled so the hardener could just touch it, it was hoisted out of the bath.

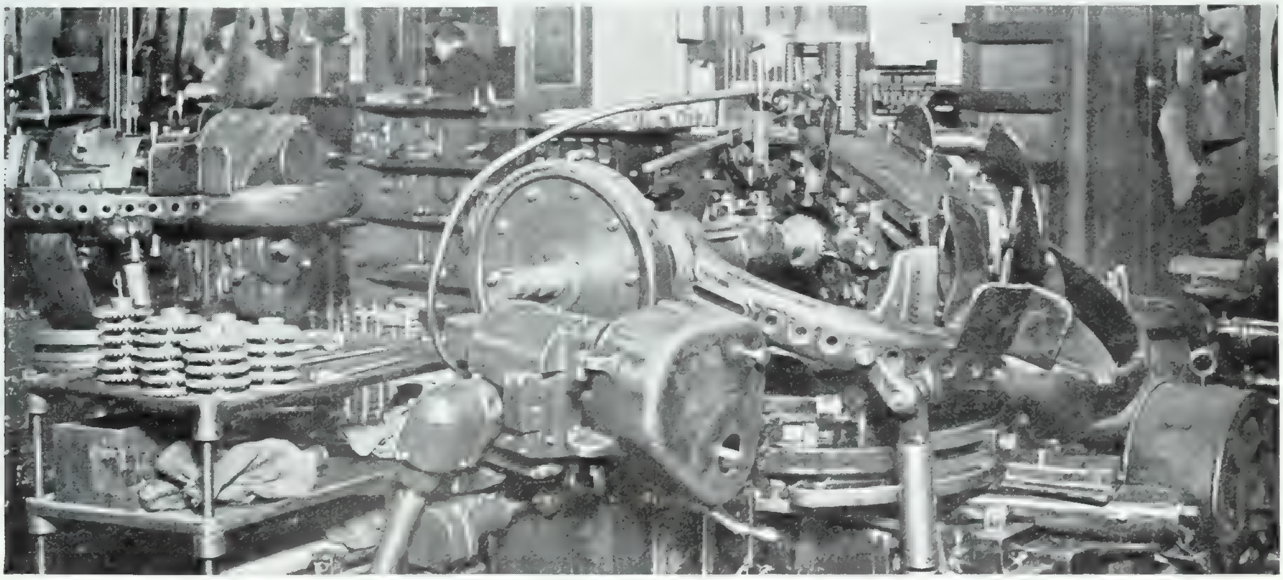
The heat inside the pin radiated out and the hardener splashed a few drops of water on the pin and it steamed, so the pin was again soused in the bath and raised out. This was repeated at intervals until the pin had cooled so that water would not steam when splashed on the surface of the pin, but would only dry off slowly.

The pin was then removed to a tank of boiling water and immersed in the water. This was kept just at the boiling point and the pin left in the water for about twelve hours.

Before placing the pin in the boiling water a file test was made on the case for hardness and it was scleroscoped in a dozen places. The readings averaged 85—90 Shore.

The reason for removing the pin from the bath while warm and boiling it was that some trouble was at first had from the pin splitting after cooling down entirely. When handled as above, the trouble was obviated.

After removing the grinding allowance of about .050 to .065 inch, the pins read 70—75 Shore and stood up well.



View of working head of Gleason gear generator, Johnson Gear Company, San Francisco. Note the blanks for beveled gears at table on left. These have been nicked by a milling machine and will be finished automatically on the gear generator

Characteristics of Fuel Oil

THE power-house manager from time immemorial has been interested in all systems of heating and in fuel that would increase the percentage of efficiency in his plant and reduce costs of operating. The present high prices and the difficulty in procuring coal have naturally turned his attention to the possibilities offered by fuel oil. Many large manufacturing plants have changed their steam-generating systems from coal to oil, while new plants are, to a greater extent than ever before, being equipped to use oil; all of which has very materially increased the demand for all grades of fuel oil, and there are many localities in which oil has been found to be a desirable and economical fuel.

It is not the purpose of this article to describe in detail the use of oil in marine engines and locomotives, or to enter into the merits of the various accessories, such as heater pumps and the installation of oil burners and cleaning devices, because these subjects are so extensive that it would require individual consideration to do them justice.

Boilers More Efficient

There are certain incidental economies peculiar to the use of fuel oil which must be considered in substituting oil for coal, as the problem is one of relative expense, modern equipment having very largely eliminated all engineering difficulties. It is not easy to compare costs for the reason that equal cost per thousand British thermal units from coal and oil does not mean equal operating costs.

Among the advantages which must be considered in using oil are higher efficiency of boiler and furnace, which includes more perfect control; elimination of expense connected with ash removal; reduction of boiler-room expenses; less smoke, and lower cost of handling and storing. In the matter of storage alone oil has a great advantage over coal, as it possesses approximately 35 per cent more heating value than an equal weight of coal and requires about three-fifths of the space required for a ton of coal.

Fuel oil, or liquid fuel, may be crude petroleum or the product of crude petroleum fractional distillation. This crude is produced in three regions of the United States, the first district comprising Pennsylvania, West Virginia and Ohio; the second district, Oklahoma, Texas and Louisiana; the third district, California. The physical characteristics of the petroleum vary as to color, density and odor according to the region from which the crude is obtained. Notwithstanding this difference in characteristics of petroleum or hydrocarbons, the elements of which they are composed, are practically the same as those in coal—namely, carbon, hydrogen, oxygen and nitrogen—making them valuable as fuel.

Vary According to Oils

The relative percentages of these constituents vary according to the location in which the oil is produced.

Fuel oil should be a natural homogeneous oil or the homogeneous product of a natural oil, and should be sufficiently liquid to flow readily at ordinary atmospheric temperatures. It should be free from water, foreign matter and sulphur, and contain not less than 19,000 British thermal units per pound. It should not be a mixture of light and heavy oils in such proportions as to give the desired specific gravity. To be quite safe, a fuel oil should have a flash point of not less than 140 degrees Fahrenheit. It is important that this point be determined by means of a closed tester, as an open-cup tester, while forming a simple means of finding the flash point, is not to be relied upon, as the results are subject to too great a variation in the conditions under which the tests are conducted.

British Thermal Unit Standard

The theoretical heating value is the heat which fuel develops when consumed under theoretically perfect conditions (which conditions are only obtainable in the laboratory), and it is expressed in heat units or thermal units. In England and the United States the British thermal unit is adopted. This is the amount of heat required to raise by one degree Fahrenheit the temperature of one pound of water at or about 39.1 degrees Fahrenheit, the temperature of water at its maximum density.

On the continent of Europe the calorie is used, and the standard is the heat required to raise by one degree Centigrade the temperature of one kilogram of water at or about 4 degrees Centigrade, which is equivalent to 39.1 degrees Fahrenheit.

To convert British thermal units per pound of coal into calories per kilogram of coal, multiply by 5 and divide by 9.

Coal Variation Greater

The theoretical heat value per pound of ordinary coal varies broadly between 7000 and 14,500 British thermal units, and the theoretical value of fuel oil will average between 19,000 and 20,500 British thermal units per pound. The elements in the coal from which we derive heat are carbon, hydrogen and sometimes a little sulphur; but coal contains hygroscopic water, which, requiring heat for its evaporation, detracts proportionately from the heating value. For practical purposes carbon and hydrogen are the only elements which are reqiured to be taken into consideration in determining the heating value of fuel from its chemical analysis.

The elements derived from fuel oil are entirely free from both hygroscopic water and sulphur, containing 35 per cent carbon and 65 per cent hydrogen.

The high value, expressed in British thermal units, of one pound of pure carbon and hydrogen and sulphur under calorimetric conditions of combustion being known, the usual expected figures are:

One pound carbon	14,544 British Thermal Units
One pound hydrogen	63,032 British Thermal Units
One pound sulphur	4,032 British Thermal Units

Analysis of the very best coal is as follows:

Carbon	22.26%
Hydrogen	4.66%
Nitrogen	1.45%
Sulphur	1.77%
Oxygen	0.60%
Ash	3.26%
Total	100 %

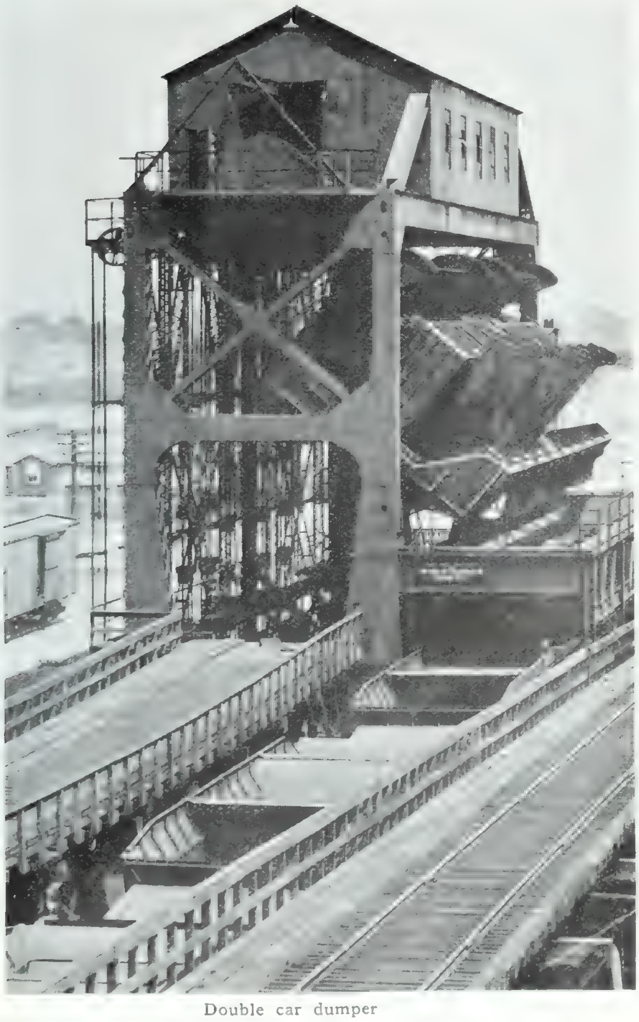
The theoretical heat value of any fuel can be approximately calculated from a chemical analysis, due allowance being made for the hygroscopic water which is contained in the fuel.

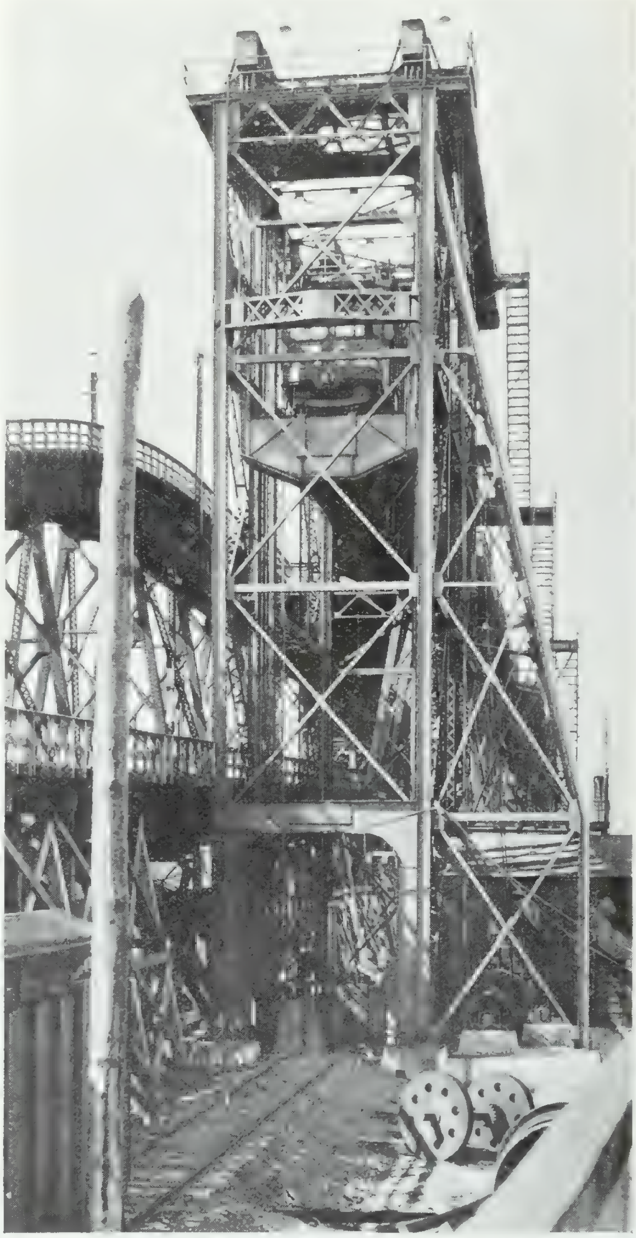
Dulong's approximate formula, 145 (C + 0/8 H 28.8), is the one that is generally used.

Virginian Railway Coal-Handling Equipment

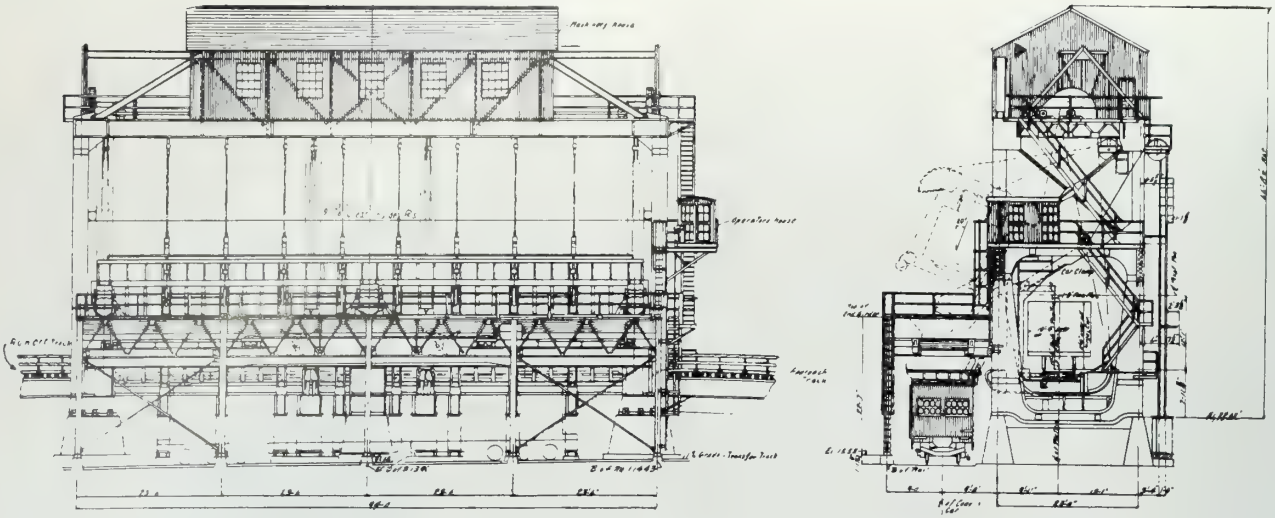
ADDITIONS to the coal-handling equipment of the Virginian Railway Company at Sewell's Point, Virginia, recently completed, include a double car dumper, six 120-ton transfer cars and a transfer car elevator. The contents of road cars, brought loaded from the mines, are dumped into the transfer cars. These are taken by the car elevator to the loading pocket on the pier, where their contents are dumped, afterward to be discharged through chutes into ships lying alongside the pier. About 4,000,000 tons of coal are handled each year over this pier.

The double car dumper can overturn two ordinary road cars at once, the first machine of its kind to do so. It can handle two 60-ton cars or one 110-ton car. The main frame supports a rotating cradle, which holds the cars. In the bottom of the cradle are rollers that support a movable platen. This carries the car rails. The roller rotates about pivot pins, which are carried in heavy pivot frames built into the main frame work. Eight automatic clamps hold the cars in place. These clamps are operated independently by counterweights and are so spaced that they engage different lengths of cars.


Double car dumper


Transfer car elevator

Dumping two cars at once necessitates wide clearance between the front posts—94 feet center to center and 91 feet 8 inches clear dumping space. Coal dumped from two cars, end to end, is spread over about 88 feet. Inasmuch as the hopper of a transfer car is 51 feet, and in order to discharge all the coal from the two road cars into the transfer cars without a concentrating chute, two steel apron conveyors, 24 feet by 8 feet, supported horizontally in a portal frame, are provided. A clear space of about 36 feet is left between the conveyors, which form a portion of the bottom of a hopper into which the road cars are dumped. All the coal thus is transferred horizontally and discharged, obviating the drop of a concentration chute.



Plan of car dumper of the Virginian Railway Company

The approach to the dumper is up an 11 per cent grade for about 225 feet, up which cars are pulled by a haulage mechanism. The mule pit is about 140 feet from the bottom of the incline. A steel cable passes from the haulage drum around a large sheave at the upper end of the track and thence to the mule car, used for pulling loaded cars up the approach. The mule car runs on a narrow gauge track between the car track rails and can be lowered into a pit to permit the incoming loaded cars to pass over it, since the car must be between the mule car and dumper so that the mule may push it up grade. There are by-pass gates in the mule track, eliminating delay. The mule pushes a loaded car up the approach on an upper track; the motors and gates are reversed at the same time and the mule returns to the pit on a lower track, passing under the loaded cars at the bottom of the incline. The haulage motors thereupon are reversed and the mule rises from the pit and engages the loaded cars.

The mule haulage machinery, located under the approach track, 75 feet from the dumper, consists of a winding drum geared to two 275 horsepower mill rated, compound-wound motors.

Car Rests Against Cradle

As the mule approaches the grade top it pushes the car on the platen, the function of which is to insure a bearing of the car against the side of the cradle while being rotated. The platen is mounted on rollers which move sidewise so that the side of the car rests firmly against the side of the cradle. The platen is divided in the center so that cars of different widths may be handled at the same time.

When the cars have been placed in the cradle the rotating mechanism revolves the cradle and cars to an angle of 20 degrees, during which the automatic clamps engage the car. Each clamp is a rigid steel beam hinged to a sliding casting on the dumping side of the cradle, the opposite end of the beam being suspended in the operating cables to which are attached the clamp counterweights. As the cradle rotates the sliding casting gradually descends until it rests on the top flange of the car. As the rotation continues, the clamp beam swings down and its free end engages the opposite top flange of the car. The car thus is held firmly at top, bottom and sides. The machinery for rotating the cradle is four drums, spaced lengthwise of the cradle, geared to two 275-horsepower motors, designed to operate on a direct 550-volt current. Dynamic braking and safety devices are used.

Cycle Requires Two Minutes

Four 1¼-inch steel cables lead from each of four drums around deflectors on the back of the cradle, around the under side of the cradle, and are anchored to the cradle frame on the dumping side. As the cradle revolves it rolls out of these cables and into the clamp cables. The contents of the car are gradually discharged over the edge of the apron plate, the complete cycle requiring two minutes.

The transfer cars are self-propelling; trucks spaced 50 feet center to center; total length over all, 70 feet; height, 16 feet; width, 12 feet. The body of the car is a hopper divided into three compartments, each having a 40-ton capacity. Each compartment has a double system of discharge gates at the bottom. The combined weight of car and contents is about 400,000 pounds. These cars are the largest coal transfer cars ever built.

When the transfer car has been loaded it moves 500 feet to the elevator, is lifted 65 feet to the elevation of the top of the pier and is discharged.

A ninety-foot steel sliver cut from a 9.2 high explosive shell in a machine operation in which Houghton's Solcut was used

SEATTLE

By Special Correspondent

OUT of the throes of the general strike, and with business restored to normal, Seattle is once more in her stride. Commercial activities are moving forward with every prospect of one of the most prosperous years in the history of the city.

Everything points to an immense increase in business with the Orient in 1919. But these prospects are also surrounded with many problems that will tax the ingenuity of the keenest shipping brains of this section in order that the prospective business shall be retained by this Coast as against the active competition of Atlantic and Gulf ports.

Already the United States Shipping Board has taken cognizance of conditions, and a step toward equalizing competition was made early in February, when that body announced a freight rate of $12 a ton on cargoes to the Orient from Pacific ports. This is something of a concession in view of the establishment of a rate of $20 a ton from Atlantic ports, and yet by some shipping men it is still rated as too high in view of the transcontinental freight charges, which are usually charged in excess of the local rate, since most of the commodities shipped out of Pacific ports are first transported by rail across the continent.

The Trans-Pacific Tariff Bureau, an organization comprising representatives of practically all of the shipping firms of the Pacific Coast shipping centers, has been in session in Seattle at intervals since January, endeavoring to arrive at an equitable freight rate that will afford ready opportunity of competing with the Atlantic rate, since the shipping board's rate of $20 to the Orient is likely to be the standard charge from East Coast ports.

Before this body had arrived at a fixed charge from Pacific ports, the shipping board came out with its announcement of the $12 rate. Whether this will be recognized as the standard rate from this Coast is not yet known. Members of the tariff board decline to comment on the proposition. From that it is taken that so far unanimity of agreement on a fixed charge has not been arrived at. In some circles, while entirely unofficial in nature, it is said that an even smaller charge is to be adopted, although still other sources insist that the tariff board is more likely to fix $15 as the rate. In the latter event, such a charge would not absorb the railway differential on shipments from Eastern points by rail for trans-shipment at Pacific ports.

Another, and probably a still more complicated problem, is the policy of the United States Shipping Board regarding the employment of the vessels owned and controlled by that body. With the exception of the Japanese concerns, and possibly the firms operating British-owned vessels, the other shipping concerns would like very much to know just what the board intends to do in chartering or assigning of ships in the Oriental trade. It is well understood that the compensations fixed recently by the Emergency Fleet Corporation for the operation of these vessels is not to be a permanent program.

Chairman Hurley's plea for suggestions from shippers and shipping men has not served to reassure transportation men. Though perfectly willing to lend him their ideas, many of them realize that there is a wide divergence of opinion among shipping men as to what each believes to be the best policy in the matter of operating the government-owned fleet. Therefore the question before the shipping men is, how is the shipping board, once in possession of these suggestions, to reconcile them to the best advantage of all concerned?

In local circles a great deal of confidence is placed in John Rosseter of San Francisco, head of the division of operations. This confidence is due to the fact that Mr. Rosseter is recognized as a practical shipping man, and virtually the only

Battery of boilers ready for shipment from Commercial Boiler Works, Seattle such man in an executive position with the shipping board. Some men frankly assert that Mr. Hurley would do well to leave fleet disposition entirely in Mr. Rosseter's hands.

Definite Policy Necessary

The general concensus of opinion is that some definite policy must be arrived at by the shipping board, and that speedily, in order that the growing business between Pacific as well as Atlantic ports and the Orient may be preserved and fostered.

Although the general strike proved more or less of a fizzle, the aftermath is still fraught with possibilities of further turmoil. This is especially true in waterfront circles, for the longshoremen threaten trouble unless the closed shop is restored.

This organization, in joining the general strike, clearly violated its agreement with the Waterfront Employers' Union, an organization of employing shipping and dock owners. Last November, after years of disputes, the employers finally agreed to closed shop conditions to be in effect on all the Seattle docks and warehouses. It was a big victory for the longshoremen's union as well as the allied trades unions of the waterfront. In this agreement it was expressly stipulated that there should be no termination of its terms or cessation of work without one side or the other giving fifteen days' notice. The longshoremen and kindred unions went on a sympathetic strike on only three days' notice.

Union Men with Non-Union

For three days after the general strike was called the employers waited for the calling off of the walkout. They then held a meeting, and, reciting the terms of their agreement, notified the waterfront unions that they must report for work on a Monday morning if conditions prior to the strike were to continue. The Central Labor Council called the strike off for a Tuesday noon, and the longshoremen elected to remain with the council. The employers reopened their docks, put on non-union crews and declared for open shop on Monday afternoon. Union and non-union longshoremen are now working cargoes in Seattle. How long this condition will last without another waterfront strike will depend entirely upon how well the longshoremen succeed in reorganizing. At present their organization is split by internal strife, due to a dispute over priority of employment by longshoremen and truckers, a serious breach having arisen between the crafts.

Work on the new Port of Seattle pier at Smith's Cove is progressing nicely. The building of the substructure, driving of piles and the preparation of the waterway for the main pier are well under way. Delivery of properly treated piling may delay the progress of the substructure to some extent, but assurances have been received that this delay will not be of any great length.

Since the resignation of Hamilton Higday as port manager, the commission has abolished that office and now employs two men in his place, it having created the office of traffic manager and executive secretary to handle the work formerly coming under Higday's direct control. E. J. Foreman, former assistant to Higday, has been named traffic manager at a salary of $300 a month, and Capt. C. J. France, formerly counsel for the commission, recently discharged from the United States Army at Camp Humphries, has been named executive secretary at the same salary.

To Hold Open Meetings

The port commission has arranged for the holding of open meetings on the first Monday of each month, when representatives of the Chamber of Commerce and Commercial Club, Shipowners' Association, Waterfront Employers' Union, Central Labor Council and International Longshoremen's Association are to attend in an advisory capacity. It is the hope of the commission that these representatives will be able to advise or suggest matters of value to the commission in the administration of port affairs. The first of these meetings will be held March 3, and all of the organizations named have signified their intention of being represented.

W. S. Lincoln, auditor for the Port of Seattle Commission, is ill at the Swedish Hospital here, recovering from a major operation. His progress is reported as being excellent and it is hoped that he will be able to resume his duties about March 1. Mr. Lincoln is one of the most popular members of the port staff.

BALTIMORE DOCKS MAKE QUICK REPAIRS

A RECORD is claimed in the completion of the repairs to the Standard Oil Company's tanker "F. Q. Barstow" in sixty-four calendar days from the time of her delivery to the company in a badly damaged condition as the result of her being burned in the disastrous fire which swept the Standard Oil Company's piers at Canton, November 22, 1918. At the time of the fire this ship was tied up at the Canton pier and, before she could be got out of harm's way, her whole interior was wrecked.

Bids were solicited by the owners from all eastern yards doing repair work, with the result that a New York concern agreed to do the work in 155 days; another local plant in 130 days, and the Baltimore Dry Docks & Shipbuilding Company in sixty-five days. The contract immediately was placed with the latter concern and the vessel was moved over to the south plant of the company. Work was started on the "Barstow" on December 9, 1918, and completed at 4:00 p. m., February 10, 1919. She left the plant of the Baltimore Dry Docks at 11:30 a. m., February 11, 1919, to be provisioned and supplied preparatory to leaving for Tampico and Port Arthur, Tex.

The "Barstow" was at the plant of the Baltimore Dry Docks sixty-four days. During this time there were two holidays intervening, on which no work was done, and eight days were lost due to inclement weather, so that the work actually was done in fifty-four working days.

The repair work on this vessel included the replacing of 102 damaged shell plates and 126 damaged deck plates, as well as the necessary frames, stringers, brackets, longitudinal frames, transverse frames, etc. In addition, it was necessary to provide new fittings in the captain's quarters, the officers' quarters forward, the saloon, wireless quarters, the pilot house and forward quarters. New quarters were also constructed for the crew amidships.

The "F. Q. Barstow" is a tanker having a gross tonnage of 10,290.

Seattle's Fighting Mayor, Ole Hansen

SEATTLE'S little mayor with the big heart, Ole Hansen, has endeared himself to all the right-thinking persons of the Pacific Coast and has gained the respect of his enemies by the manly stand he has taken toward labor troubles in the Puget Sound metropolis. By his firmness in the face of great pressure, a strike which might have lasted several weeks and caused irreparable injury to the business life of Seattle was settled in a few days.

There are no medals, crosses or orders provided for such services, and, if there were, Mayor Hansen would not press an application for such decoration. He is a simple, direct-dealing American citizen, going quietly about his business of managing a great city, and putting into that job all the tremendous energy that he has. The mayors of other cities might study Mr. Hansen's methods and profit by his example.

LOS ANGELES

By Special Correspondent

WITH the construction of vessels for the Emergency Fleet Corporation proceeding rapidly, Los Angeles and the harbor district are turning their attention more and more toward steamship operation. There has arisen in Los Angeles a sentiment which may center the attention of the business interests upon the sea and away from railroad transportation. Municipal authorities, shipbuilding corporations and representatives of steamship companies are watching progress in shipping and are endeavorng to create a sentiment for foreign and sea-borne trade.

Within the month the announcement of the formation of the Los Angeles Pacific Navigation Company was made by the promoters, all of whom are Los Angeles business men. Representatives of this concern have been to Washington and have the assurance of the Shipping Board of the use of two steamers for foreign trade in a line to be operated from Los Angeles harbor. The plans called for the use of six steamers, but under present conditions the company can be assured of only two.

Another Line Projected

The Los Angeles Pacific Company has many stockholders interested also in the Los Angeles Shipbuilding & Drydock Company. Soon after the announcement of the plans of this company an announcement was made by officers of the Southwestern Shipbuilding Company of tentative plans for the formation of a steamship line to operate vessels constructed by the company in its yards. This concern has contracts for a large number of vessels for the Emergency Fleet Corporation and recently several officers and large stockholders in the company made inquiries of the Fleet Corporation as to the terms upon which steel vessels could be procured from the Government. The formation of the proposed steamship line would depend upon the charter rates to be fixed by the United States Shipping Board for its vessels. If these rates proved too high it is the intention of the Southwestern officers to organize a company to operate steamers built in its own yards after the present contracts for the Emergency Fleet Corporation had been completed.

The large Japanese steamship companies may make Los Angeles a permanent port of call. Representatives of the lines have visited the harbor within the last few weeks. The steamship officers made a quiet trip over the harbor with Los Angeles business men and spent the greater portion of a week investigating trade prospects.

Japanese Vessels May Call

Among the steamship companies represented were the Nippon Yusen Kaisha, Toyo Kisen Kaisha, Osaka Shosen Kaisha and the Russian Volunteer Fleet. No announcement of the investigations was made until after the departure of the agents.

Demands for space on steamers to Latin-American ports are increasing. Within the last few weeks several steamers have sailed for the South and all have filled all the space reserved for them for this port.

Reclamation of tide lands in the west basin near the site of the Los Angeles Shipbuilding Company is proceeding rapidly. Harbor engineers have estimated that forty acres of land will be reclaimed with the silt taken from the channels in the west basin. The dike for the retention of the silt from the channels on the west side of the basin has been completed and dredges now are pumping silt into the area. The pocket for the 10,000-ton drydock which is to be constructed by the shipbuilding company has been dredged to the necessary depth and the dredgers will continue the work of completing the channels. Twenty acres of land will be reclaimed on the west side of the basin and twenty acres more will be reclaimed from the east side of the basin and adjoining the right-of-way of the Southern Pacific and Pacific Electric railroads. The reclaimed land will be used for industrial purposes.

Strike Fails of Majority

There was great interest in the possible action of employes of Los Angeles shipyards in their recent vote on the enforcement of their demands for increased pay. The boilermakers and helpers held the key to the situation and their action upon the question was believed to determine the future of shipbuilding at the port. The strike failed to receive the necessary two-thirds majority and coincident with this came the statement that other unions intended to follow the advice of their national organizations and remain at work.

The Municipal Bureau of Power and Light is seeking industries to use power generated from the aqueduct. Burdette Moody, at a recent meeting of harbor business men, announced that no large foundation industries had been located in Los Angeles in the last few years, with the exception of the shipyards. He said that all efforts to induce steamship companies to make this a port of call depended upon cargoes for the steamers, and that one of the ways to get them was to get factories to locate here.

Coal bunkers for the harbor seemed to be assured with the recent announcement of officers of the harbor commission, the Salt Lake railroad and representatives of a Utah coal company of complete agreement upon details for construction of the bunkers on Terminal Island. The harbor commission announced that rates [illegible] that no one company could get co

PORTLAND

By Special Correspondent

WHAT is rated among the most important steps having to do with the future shipping of Portland was taken February 17 by the Shipping Board in assigning the steamer "West Munham" to the Admiral Line to inaugurate an Oriental service from the Columbia River. The Admiral Line directorate has requested that four of the 8800-ton carriers be placed at its disposal so that a monthly service may be maintained, and it is fully expected the vessels will be turned over.

Recently the Admiral Line established an important agency at Portland to handle Shipping Board vessels that are being sent to the Atlantic with cargoes, to prepare for the Far Eastern service and to take care of a coastwise service. The steamers "Aurelia" and "City of Topeka" were placed on the Coast run first and were followed temporarily in February by the "Queen" and "Admiral Schley," but the latter were withdrawn, and consideration is being given a plan to operate other ships. The company has closed with the Commission of Public Docks for the use of the new St. Johns municipal terminal for Oriental and transcontinental business and will continue to use the East Washington street terminal for the Portland - California service.

Cancellation of steel ship contracts by the Emergency Fleet Corporation in the Portland zone is not to assume such proportions as was first indicated through the receipt of suspension orders. Instead of losing ten ships, the Northwest Steel Company has had two reinstated and two were saved by the Columbia River Shipbuilding Corporation, leaving four not to be constructed. The Albina Engine & Machine Works loses two instead of four. The G. M. Standifer Construction Corporation had five 9500-ton hulls involved in the suspension and two or three of them are fully expected to be reinstated.

Mr. Taft Makes Address

William Howard Taft was a special guest of the Grant Smith-Porter Ship Company, February 17, when the hull of the Ferris steamer, "Aculeo," was launched. She was the twenty-ninth hull floated by that company in a year. The "Wasco," the first to be launched and which was the leader of government wood ships in the West, was sent down the ways February 17, 1918, and Mr. Taft congratulated the management and its workers on the record. Miss Winifred Mitchell, niece of Grant Smith, president of the company, was sponsor for the "Aculeo." Thousands witnessed the event and the[illegible] were [illegible] for attending in hearing Mr. Taft [illegible] essive talk on the value of th[illegible] en employers and employes.

[illegible] en the chartering of wood steamers from the Shipping Board during February through the placing of large orders by the Railroad Administration for ties to be delivered on the Atlantic Coast. The last transaction reported in ships was the assignment of five of the Ferris type to the Charles R. McCormick Company. Two others were turned over to Sudden & Christenson to load lumber for Balboa. There was 2,600,000 feet on the two ships. The understanding is that the Railroad Administration is in the market for 100,000,000 feet of ties. The business was not sought actively by Northwest lumbermen until the Shipping Board placed the rate at $16 a thousand feet for ties and $18 for other lumber.

Larger Ships Favored

Fred B. Pape, assistant manager of steel construction, in charge of work in the Portland territory for the Emergency Fleet Corporation, spent the first half of the month at Philadelphia in conference with district managers and assistant managers concerning new plans for ships. The principal question now appears to be whether Congress will make appropriations sufficient to carry on the program for vessels up to 12,500 tons, which are favored instead of so many of 8800 tons and less.

One change during the early part of the month in the plants of the G. M. Standifer Construction Corporation was the retirement of Theodore Knudson as general manager of the Vancouver wood yard and the turning of that plant over to James F. Clarkson, in charge of the corporation's North Portland property. Mr. Clarkson had been manager of both until the last half of 1918, when they were divided. Coincident with the adoption of the new program at the Vancouver yard, most of the men were laid off and a majority of them gradually re-employed under a reorganization plan. The management is building Ballin types at Vancouver and as the steel workers had not been able to keep ahead of the shipcarpenters, the laying-off of men facilitated their work.

The launching of the "W-1," the first of the five concrete vessels the Great Northern Concrete Shipbuilding Company contracted to build for the Quartermaster Department of the Army, took place at Vancouver. The prefix of "W" means "waterboat" and the others will have numbers up to "5." They are 100 feet long and will be driven by twin gasoline engines. The vessels are intended for the transportation of water and fuel oil to transports in large harbors or those where deep-water ships cannot lie alongside berths handily.

To Liquidate Foundation

M. Trichneaux, of the French High Commission, reached Portland from New York the latter part of the month to begin the task of liquidating the interest of the French government in the Portland

and Tacoma plants, which the Foundation Company operated in the construction of forty wood steam auxiliary schooners. It has been hinted that in the final adjustment it is possible arrangements will be made to carry on the Portland property for the construction of steel ships. That was the plan of the French government, but the refusal of the Shipping Board to sanction the construction of steel tonnage for foreign account stopped the project. The Foundation Company launched the last of twenty vessels at Portland the latter part of November and delivered the twentieth completed ship on Christmas eve. Since then the plant has been idle.

Delegates from all Pacific Coast cities attended the annual convention of the Pacific Coast District Metal Trades Council the third week of February. A number of matters were taken up, among them being the question of whether the various organizations would consider a strike in sympathy with shipyard workers at Seattle. The failure of the sympathetic strike at Seattle is believed to have been a safety valve during the convention and it was evident a majority did not favor drastic action. As the agreement with the Federal Labor Adjustment Board expires March 31, the Portland Metal Trades Council decided to continue at work, but meanwhile to have the convention adopt a more satisfactory scale to be proposed to the Federal Board as one to be made operative April 1.

No More Wood Ships?

George C. W. Low, secretary of the Supple-Ballin Shipbuilding Corporation, who went to Philadelphia and New York early in the year on business connected with the future operation of the plant, returned about the middle of the month and reported no change was apparent to him in the determination of the government to suspend wood-ship construction on the completion of the present program. Builders generally are getting in touch with Eastern and foreign interests and all have not lost faith in the prospect for turning out sail and steam schooners. There is talk of the Emergency Fleet Corporation converting some of the ships yet on the ways into sailers, but some men doubt whether many of them can be so altered satisfactorily.

During the session of the Oregon Legislature, which ended the last of the month, an unsuccessful attempt was made to form the Port of the Columbia, the idea being to bring the entire Columbia and Willamette River districts under one commission. The move was combated by both Portland and Astoria shipping and commercial interests. At present both harbors have port commissions and feel they are taking care of their affairs in a manner best suited to local conditions. Another step defeated was that to consolidate the Port of Portland Commission and the Commission of Public Docks, at Portland. The latter body went on record unanimously as opposed to the measure .and the Port of Portland was divided as to sentiment. Members of the legislature advised those backing the plan that there was little chance of passing such a bill unless both boards favored it.

One of numerous illustrations of the adaptability of fir in ship construction was offered two weeks ago, when the gasoline schooner "Nenamosha" was hauled out at the plant of the Marine Repair & Construction Company to be lengthened. When the hull was cut in two it was found her entire construction was sound after twelve years' service.

Suspend Elevator Work

Work has been suspended temporarily on the 1,000,000-bushel grain elevator at the St. Johns municipal terminal, owing to a settling of the structure. The Commission of Public Docks has completed a series of borings there in an effort to locate hardpan and has now referred the matter to the American Society of Engineers with a request that it investigate through a special committee and make recommendations. Members of the commission say they are satisfied the settling has ceased and that the value of the plant will not be impaired.

The first pier and slip at the St. Johns municipal terminal has been finished and accepted by the Commission of Public Docks and is now ready for use. The pier is 1200 feet long and will be extended 300 feet inshore as soon as dredging can be finished. There will be a warehouse for the entire length, although at present only the first unit of 600 feet has been covered. The ship is 280 feet wide and will have a depth of 1500 feet. Tests have been ordered on the site of pier No. 2 and pier No. 3, and they will be carried along during the coming year if possible. The terminal was intended principally for the trans-shipment of cargo and trackage connections have been put in and other facilities added.

Need Ships for Wheat

Late reports from Philadelphia are that the Shipping Board will assign at least five vessels under construction at Portland to transport flour to the Atlantic. At present docks are piled high with grain, there being fully 9,000,000 bushels at Portland, Astoria and on Puget Sound, and much more remains in the interior. Unless tonnage is available for carrying the flour, mills will be unable to grind all wheat offering. Also the presence of the immense stocks of wheat prevent the docks being utilized for general cargo purposes.

Sale of the structural steel business of the Northwest Steel Company to the Northwest Bridge & Iron Company took place early in February. W. H. Cullers, former chief engineer of the Northwest Steel Company, is head of the Northwest Bridge & Iron Company. The Northwest Steel interests announced that the sale of the structural steel department was due to a desire to centralize on ship construction.

That negotiations between the Admiral Line and the San Francisco & Portland Steamship Company for the sale of the latter's liner "Rose City" have been dropped, is information received in Portland. The "Rose City" is being overhauled at San Francisco, and meanwhile the San Francisco & Portland line has no service. There is an impression that, although the sale may not be carried out, there is a probability the "Rose City" may be chartered to the Admiral Line, which is desirous of extending its service to Portland regularly.

MUCH interest has been created in Astoria shipping circles by the recent announcement that the Montana Union, American Society of Equity, directly and indirectly representing more than 120,000 grain growers of Montana, Idaho, South Dakota and Wisconsin, will erect at the mouth of the Columbia River a 2,,000,000-bushel terminal elevator. This plan officially was sanctioned by an interstate meeting of the Society of Equity at Great Falls, Montana, and the plan also has the support of the Equity Co-operative Exchange of St. Paul, Minnesota. The board of directors of the Montana Union, it is announced, already have contracted for the purchase of the site for the elevator, located at Warrenton, just west of the Port of Astoria holdings, the site consisting of a 600-foot frontage on the Lewis and Clark River, and having a depth of 3000 feet. The elevator will be erected in units, the first section to have a capacity of 500,000 bushels. Engineer Bartlett of the Port of Astoria, who attended the meeting in Great Falls, has been asked to prepare preliminary plans for the elevator at once.

Formerly Shipped via Great Lakes

The promoters of the new elevator formerly shipped their grain east via Minneapolis and the Great Lakes, but they report that Eastern shipments of grain have always been more or less unsatisfactory, due to the fact that the Great Lakes are closed to transportation during the winter months, at just the time when elevators are congested and when their grain should be moving. Also, the society figures that there soon should be substantial reductions in Western freight rates, following the water grade of the Columbia River to its mouth.

Preliminary work has been concluded at Astoria, by Assistant Chief Engineer George X. Riddell of the San Francisco office of the Standard Oil Company, toward the construction of elaborate new distributing facilities. The new Astoria station will occupy a full block of well-located waterfront, and it is stated on good authority that this distributing plant will develop into one of the most important on the Pacific Coast. Full details of costs and plans have not yet been given out, but Mr. Riddell has volunteered the following statement: "The Standard Oil Company realizes that a great growth is in store for this fine port, and it will keep full step with the progress of the city. I am not now at liberty to make a statement as to the amount the company will expend here, but you may be certain that it will be adequate and that whatever is done will be done well."

B. F. Stone, as chairman of the Port of Astoria Commission, has signed contracts with the Astoria Flouring Mills Company which insures the immediate erection at Astoria of what will be one of the largest flouring mills on the Pacific Coast. The mill will be located on Port of Astoria property, near the present million-bushel port grain elevator. The port has contracted to erect a suitable concrete building, already under way, and the milling company will provide the equipment, which has already been ordered. It is planned that the machinery for this new plant shall be installed by the end of July, and the mill placed in operation not later than December 1, 1919. As a part of the deal the port commissioners have made leasing arrangements for the use of their million-bushel grain elevator by the milling company. This company is already operating a flouring mill in Astoria with a capacity of 1000 barrels a day. In order to continue the operation of the old mill, and to run the new mill to its full capacity of 3000 barrels of flour a day, it will be necessary for the company to handle 5,000,000 to 6,000,000 bushels of grain annually, refilling the big elevator five or six times during the year. Thus, the new mill will be capable of exporting a cargo of flour every fifteen to twenty days, and Astoria will become one of the most important flour manufacturing and shipping ports on the Pacific Coast. This new export traffic doubtless will aid in attracting additional ocean steamship lines to the mouth of the Columbia, and will establish Astoria as a regular port of call for additional coastwise steamers. The total investment in the interest of this new milling enterprise will exceed three-quarters of a million dollars.

The Wilson Shipyard of Astoria has received a very enviable award for achievement during the height of the late war-speeding-up period, as attested by a letter recently received from James O. Heyworth of the United States Shipping Board Emergency Fleet Corporation. The letter says: "In the execution of the emergency program of wood ship construction, your yard, during the month of October, 1918, ranked among the ten best producing plants. Your standing at that period was that of sixth best yard, based upon the average progress per way. Your assistance, therefore, in meeting one of the country's most pressing needs was material and deserving of special mention."

Oldest in Columbia District

The Wilson yard is the oldest in the Lower Columbia River district. It was established, in a small way, more than thirty-seven years ago, by the late Charles W. Wilson, and his brother, Fritjof Kankkonen, the latter now general manager and superintendent of construction. The yard at this date has five completed Emergency Fleet Corporation vessels to its credit.

The Port of Astoria has issued a coastwise trade report, for the month of January, showing that 47 vessels of 55,969 tons entered the port. Thirty-nine of the vessels entering the port were American steam, four were American sail, three American gas, and one foreign sail. The flour shipments from the port for the month of January totaled about 86,000 barrels. The largest item was 11,428,000 feet of lumber originating at Lower Columbia River points and 1,740,000 feet of lumber from Portland mills.

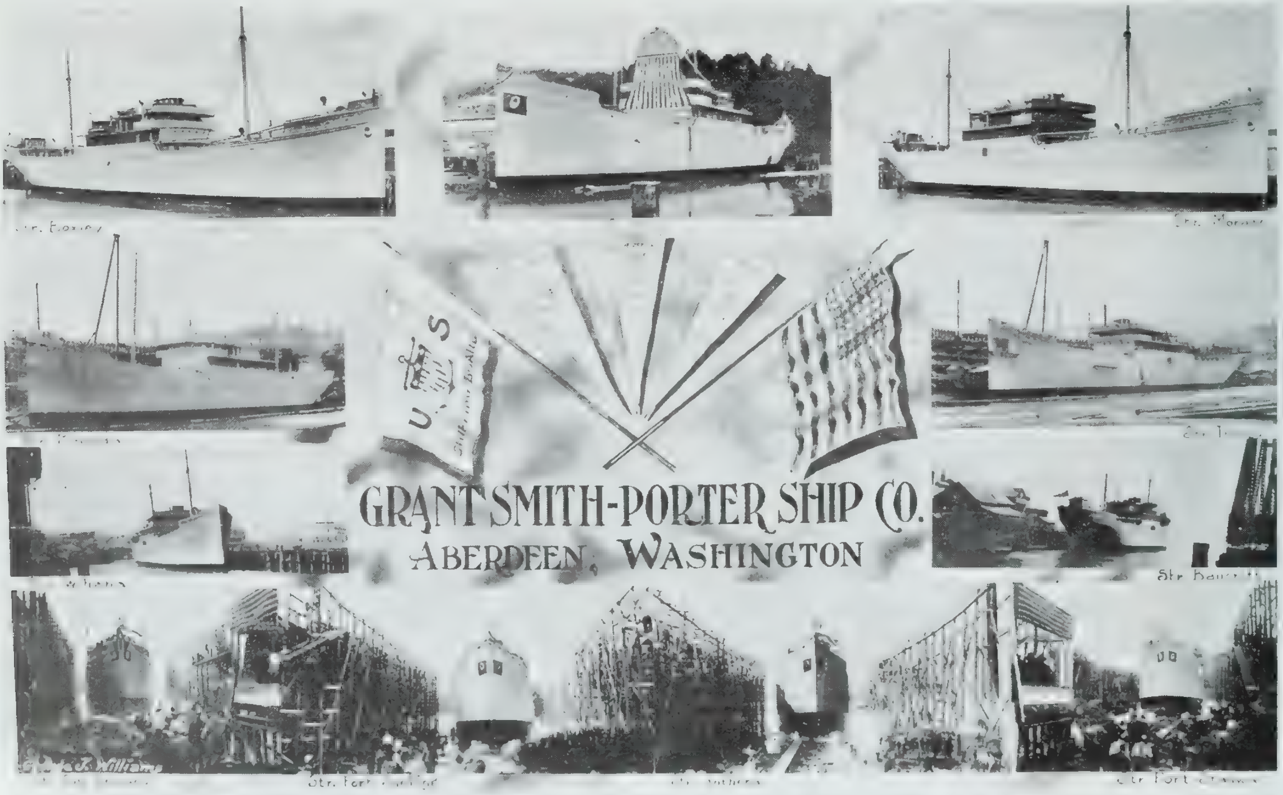
The Oregon State Board of Pilot Commissioners of Portland has authorized the renewal of licenses of Captains H. F. Astrup and R. Swanson as pilots for the mouth of the Columbia River. Captain Swanson has been with the pilots regularly, and Captain Astrup recently was assistant inspector of hulls in the office of Captain E. S. Edwards, United States inspector of hulls. In addition, it is reported that Captain Fritich Hirsch, who resigned from pilot service at the time that America entered the world war, is to return soon. Captain Archie Cann has been given leave of absence from like pilot service at the mouth of the Columbia to accompany the U. S. dredge Chinook to Charleston.

Contracts for Seven Ships

Raft of logs ready for the sea, Astoria

The Astoria Marine Iron Works has been awarded contracts for the installation of machinery in seven additional wood ships of the Emergency Fleet Corporation. This brings the total of government ships which the company will complete up to twenty-seven, and places the Astoria Marine Iron Works third in rank in the United States in point of ship-outfitting contracts. In addition to the present equipment, this plant will soon have at its service the large marine railway recently approved for construction by the United States Shipping Board Emergency Fleet Corporation, and to be operated by the Astoria Marine Iron Works. This marine railway, of the most modern type, already is under construction, and its completion will be rushed as rapidly as possible. As a further step toward enlargements, the Astoria Marine Iron Works has purchased for the permanent location of the plant a tract of land including approximately 12,000 feet of waterfront located just west of Astoria across Young's Bay and near the mouth of the Lewis and Clark River. The plant at present occupies the greater part of pier No. 2 of the Port of Astoria docks.

Grant Smith-Porter Yard Heads Nation



The Aberdeen yard of the Grant Smith-Porter Company, in competition with all wooden yards of the country, won the blue (first place) pennant two of the three months it was offered by the Emergency Fleet Corporation. No other yard equaled this. In May the yard won the red pennant (second place), and the blue in June and July. Eleven Ferris type vessels, shown above, have been launched, the first, the "Manada," March 17, 1918, and the last, the "Fort Stanwix," November 5, 1918. Four hulls are on the ways nearing completion now.

On the Shores of Grays Harbor

By Special Correspondent

COMBINED efforts of the commercial organizations, the lumbermen of Grays Harbor and the port commission to secure a dredge for work on the outer bar of Grays Harbor have been successful, and sufficient water for vessels of large tonnage is assured for this spring. The government dredge will arrive early in April from Coos Bay and spend two or three months in the district; the Grays Harbor port commission has promised to keep up any depth within the inner channel commensurate with the depth attained by the government at the outer bar; and an active campaign is being started to secure a permanent dredge. In other words, the government and the port commission will work together to place Grays Harbor, where it belongs, on the shipping map, as the greatest lumber port on the Pacific Coast.

Announcement that the dredge "Michie" is to spend two or three months on the Grays Harbor bar is regarded as most encouraging. In that length of time it is believed the channel across the bar can be deepened from thirty to thirty-five feet at low tide, sufficient to make navigation safe for the larger vessels. Expenses of work on the outer bar will be paid out of the $95,000 government appropriation already made. The port commission has about $100,000 on hand to meet expenses of inner channel and harbor improvements, and it is thought this amount will be sufficient for the year's work.

Wish Permanent Dredge

The proposal to have a permanent dredge built for Grays Harbor is receiving the support of the entire district. An appropriation of $780,000 was made two years ago for the building of a dredge for Grays Harbor, but with construction costs advancing as they have, it is figured close to $1,000,000 would now be necessary.

Grays Harbor shipyards did not entirely close down on account of the metal trades strike. Throughout the strike the carpenters and joiners continued to work at the two government yards in Aberdeen. The Matthews yard at Hoquiam was at a standstill owing to the strike, as work was at such a stage that the carpenters could not continue.

The strike on the harbor called out and forced out about 1000 men. The members of the Calkers' Union, who violated the orders of their international and district council, went out with the metal trades despite the fact that they are affiliated with the Maritime Council. Under orders from International President William Hutcheson, and on vote of the local, they have returned to work in the Grant Smith-Porter yard.

Conservatives Opposed Strike

The conservative element in the unions generally did not support the strike from the first, and after a time was particularly active in efforts to bring it to an end.

The yard managements took the position from the first they could not treat with the men, so far as taking action on their demands was concerned, because of the agreement with the government and the fact that the matter of wages was placed in the hands of the Macy board. Officers of the Shipwrights' Union were active opponents of the strike, and they used every effort to bring it to an end. The strike situation in the Grays Harbor district was complicated further by the conflicting claims of the Maritime Council and the Metal Trades Council of jurisdiction over the calkers.

The "Gray Eagle," a 4000-ton Ward type steamer, launched January 15 at the Grays Harbor Motorship Corporation yard in Aberdeen, is the only government vessel that has been launched since New Year's on Grays Harbor. The vessel makes a total of 98,500 tons of shipping that has been launched on Grays Harbor for the Emergency Flett Corporation—60,000 tons at the Motorship yard and 38,500 tons at the Grant Smith-Porter yard.

SHIPBUILDING IN 1918

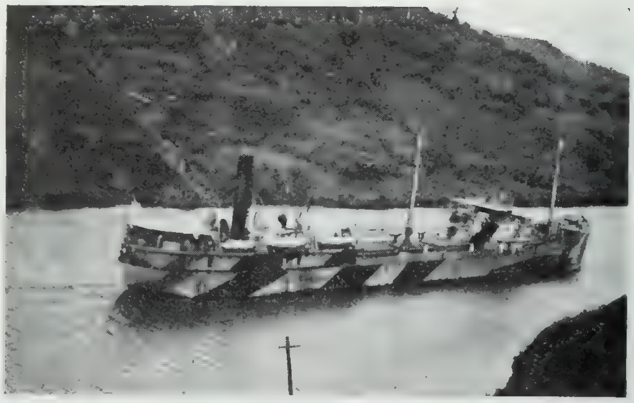
A compilation by the Bureau of Navigation of the Department of Commerce shows that during the calendar year 1918 American shipyards built 1882 merchant vessels of 2,721,281 gross tons. This includes sea-going steel tonnage aggregating 1,861,321 gross tons. All except 124,255 gross tons were sea-going. The tables of figures indicate how great was the shipbuilding effort of this country at the time the armistice was signed. In January, 1917, sixteen sea-going vessels, both steel and wood, with a gross tonnage of 58,754, were constructed. In December, 1917, thirty-three such vessels, with a gross tonnage of 106,528, were constructed. In June, 1918, the number of ships had increased to 58 and the gross tonnage to 190,019. In October, 1918, there were built 110 vessels with a gross tonnage of 345,368, and in November 115 vessels with a gross tonnage of 349,039. Including non-sea-going vessels the total for October, 1918, was 201 ships with a gross tonnage of 357,332, and for November 171 ships with a gross tonnage of 357,660.

From a British source—Lloyds Register of Shipping—come other figures showing the position of the United States as compared with other countries. On September 30, 1918, there were, outside of Great Britain, 1761 vessels of all classes, of an aggregate of 4,624,454 gross tons, under construction. The United States was building 1020 ships of 3,382,709 tons. At the same time Great Britain was building 383 vessels of 1,746,933 tons, all except ten being steamers. In tonnage Japan was third, with ninety-one steel steamers of 231,725 tons and thirty-six wood vessels of 29,150 tons.

The division by sections of the United States was as follows: Pacific Coast: 116 steamers of 656,430 tons; 266 wood steamers of 661,711 tons and six wood sailing vessels of 8400 tons. On the Great Lakes were 121 steel steamers of 289,423 tons, and at Gulf ports eight steel steamers of 27,110 tons, 108 wood ships of 263,610 tons; two steel sailers of 9000 tons and 11 wood sailers of 8960 tons. The showing on the Atlantic Coast was 235 steel steamers of 1,180,393 tons, 120 wood steamers of 244,362 tons; two steel sailers of 4600 tons and 25 wood sailers of 28,710 tons.

Panama Canal Activities

By Special Correspondent



A concrete and steel ship in concrete and steel docks: The "Faith" in Pedro Miguel docks, Panama Canal (left). On the right is the "Faith" in Culebra Cut. Cucuraeha (cockroach) slide in the background

THE latest schedule of prices charged to shipping for coal and fuel oil at the Panama Canal is as follows:

Coal for steamships, $13 a ton at Cristobal-Colon and $14.50 a ton at Balboa. The difference in price at the two canal terminals is due to the fact that the coal at Balboa has to be transported through the canal. When request is made for trimming coal on deck, between decks or special trimming in bunkers for the convenience of the vessel an additional charge of 60 cents a ton is made for the extra handling. For lump coal delivered in sacks the charge is $10 a ton additional, except when the vessel furnishes satisfactory sacks the charge is $3 a ton additional. Not more than five tons of this coal will be furnished a vessel. An additional charge is made for the delivery of coal to vessels on Sundays and holidays of 50 cents a ton.

Fuel oil is delivered to vessels either at Balboa or Cristobal at $3 a barrel of 42 gallons. Diesel oil is not sold by the Panama Canal, but it may be obtained from private concerns in the Canal Zone at approximately $4 a barrel. Arrangements for purchase of Diesel oil should be made by cable in advance of the arrival of the vessel.

"Faith" Visits Canal

The concrete ship "Faith" made her second visit to the Panama Canal the latter part of December when she passed southbound through the canal from Cristobal to Balboa enroute from New York to Valparaiso and way ports carrying general cargo. Tolls of $2590 were collected on a Panama Canal tonnage measurement of 2247 tons. The "Faith" is the first ocean-going concrete ship to be built in the United States and the first concrete vessel to pass through the Panama Canal.

The Chilean transport "Maipo," operating in a commercial capacity under charter to Gonzala Sofia, passed through the canal enroute from Valparaiso to Carinto, thence to New York via Vera Cruz. This vessel carried a cargo of 5800 tons of wheat, beans and wool. The Chilean transport "Rancagua" has also been placed in commercial trade and passed through the canal from Valparaiso enroute to Havana and New York. These vessels will carry cargo from the United States to Chile on their return voyages.

"Marie de Ronde" Ashore

The American auxiliary schooner "Marie de Ronde" of the Donaldson Steamship Company arrived at Balboa in December and was towed to the inner harbor to Dock 16, near the marine shops, for repairs before departing for Honolulu. The schooner grounded off the Peruvian coast near Callao, but got off without serious damage. She left Seattle June 6, 1918, enroute to Caleta Buena, Chile, and had on board 3335 tons of nitrate.

The steamship "Heina," which grounded on Pinas Point near Panama early in December, was successfully pulled into deep water by the Panama Conal tugs "Empire" and "Cocoli." After ascertaining that the damage to the hull was very slight she was towed to Balboa shops for repairs.

For the first time in a year, on December 6, 1918, there were no commercial vessels passed through the canal. The average has been from six to ten vessels a day, and this number undoubtedly will be increased greatly when after the war adjustments of shipping becomes effective.

The Ralph J. Chandler Shipyard, Los Angeles

From the Straits Settlements

By Special Correspondent

Singapore.

IN common with most countries, the Straits Settlements and the Federated Malay States are suffering through shortage of shipping. Anyone engaged in commercial pursuits will tell you with feeling of instances of belated consignments of goods ordered months ago not yet shipped. And he cannot sell forward because he does not know what the landed cost of the goods will be. I have known cases where the freight charges on the same class of goods from the same port, sent more or less by the same route, have shown a difference of 50 per cent in cost. Only the other day I received a quotation from America, along with the shipping cost of the goods. I carefully worked out the cost of the goods and the cost of the freight separately, excluding from the freight marine and war risk insurance charges, and found that the freight cost was three times greater than the cost of the particular class of goods. On the market the same goods are to be found at a price which is nearly 100 per cent cheaper than I could have placed the goods from America. The goods on the market are from Hongkong and Japan, and, of course, freight rates are much lower. From Hongkong to Singapore is only five days' journey, and while the voyage from Kobe is much longer, there is the fact that Japanese goods in most cases are carried at special rates on Japanese steamers.

Freight Rates Too High

So America is handicapped through the absence of adequate shipping facilities. Many of the goods now obtained from Japan would be obtained from America were the freight rates not so high. In most cases the original cost of the goods is higher than the cost of the goods from Japan, but in view of the superior quality I do not think that this would be an insuperable point. But when above the higher original cost there is the extraordinary freight charge, it is impossible to compete against Japanese goods. If freight rates were lower the demand for American goods would be greatly increased.

From this side, too, we are handicapped in connection with the export of goods to America and elsewhere. It is difficult to secure space. In connection with most products one must obtain an export license from the colonial office in London. This may be obtained through the local authorities. Until that license is produced the shipping companies will not allot space. Now, they also insist on receiving proof that an import license has been obtained by the client at the other side when goods are being shipped to America. So right from the start the path is beset with difficulties.

Two Wooden Steamers Launched

In my last article I referred to what was a notable event in Singapore shipping circles—the construction of a couple of wooden steamers, each close to 3000 tons. A local marine structural engineer conceived the idea and approached the authorities. A commission was formed, with the head of the harbor board as chairman. The commission reported unfavorably and the authorities dropped the matter. It was stated that it was impossible to construct such steamers with the facilities here.

But the gentleman who had interested himself in the question eventually came into touch with another gentleman who was willing to secure the money to undertake the work. At this time there was no shipbuilding yard where the steamers could be constructed, and the first thing that had to be done was to secure a yard. It has been described as a stretch of open sand, and truly when taken over it was little else. All the gear and machinery had to be secured before operations could be undertaken seriously. The result has now been shown in the launching of one of the vessels and the near completion of both, without any government assistance.

Concrete Barge Built

Recently the construction of a concrete barge was completed. It is small, but it opens up vast possibilities. Singapore is an island, divided from the Malay Peninsula by the Straits of Johore, at the narrowest point perhaps a mile separating the island from the mainland. The railway runs from Penang, the second most important port in the Straits Settlements, which is situated in the north, to Johore in the south. From the station at Johore (known as Johore Bahru) to the station on the island of Singapore, at the other side (known as Woodlands), passengers are conveyed over on a ferryboat, something after the same style, though smaller, as runs from the Ferry Building at San Francisco to Berkeley and Oakland. For the goods trucks there is a special type of barge on to which the trucks are run, conveyed to the other side, and hauled on to the railway. As difficulty was experienced in obtaining these goods barges, it was decided to experiment with a concrete barge. The necessary material was obtained and the barge constructed. But it is doubtful if we can proceed to the construction of anything larger than concrete barges. We lack the facilities for the construction of concrete ships, and I suppose that probably we lack the experience.

At the most it would only be small vessels that would be built. They would be built for the local trade and not for voyaging across the seas. It is stated that a concrete shipbuilding plant requires only a small outlay of capital. Further, no complicated machinery is required, while I have read somewhere that unskilled labor can do the work. We certainly have plenty of unskilled labor here, fairly cheap, but I fancy that an expert would be required before anything on an ambitious scale could be undertaken. Then there is the point as to whether there is a satisfactory sand here for large monolithic concrete construction.

Local Trade Needs Ships

But whether we can construct fairly large concrete ships or not, I think that we have entered upon a new era as far as the construction of wooden steamers is concerned. There is a great demand for steamers for the local trade, and there would be no difficulty in absorbing all those that could be constructed here. In time it might be possible to build larger ocean-going vessels.

Sabang, a New Coaling Port

THE activity of the German merchant for many years proved something more than a thorn in the side of many a British trader. But in one instance of business enterprise and acumen it is the so-called lethargic Dutchman, who has so much bestirred himself as to threaten, and that not in the far future, the supremacy of Singapore as a great coaling and commercial base of the Far Eastern trade.

The name of Sabang was not known a few years ago. Today it is as familiar to the captain of the tramp steamer, cargo-wallah and liner as that of the port it is intent on cutting out in commercial importance.

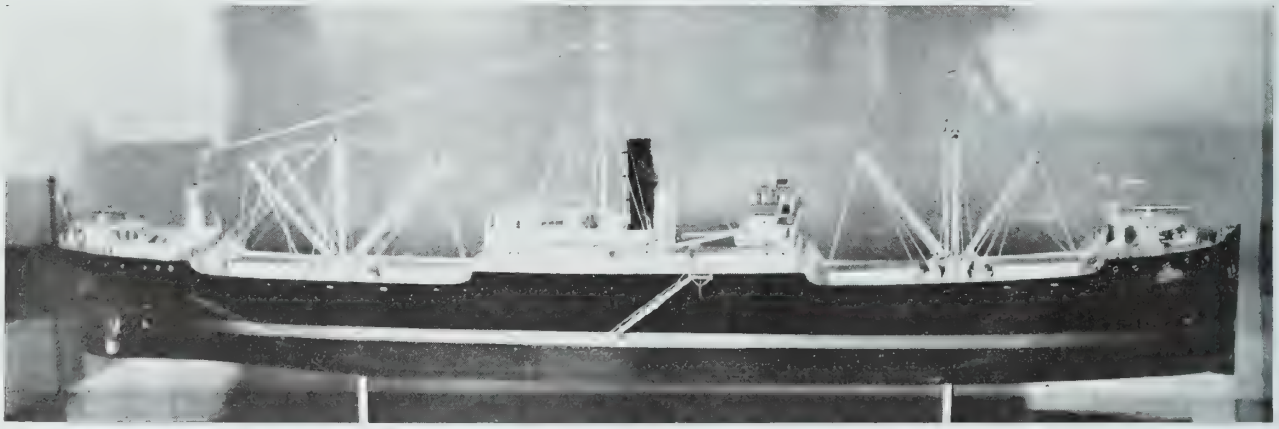
Some fifteen or sixteen years ago an enterprising Dutch trading company of farseeing business eye established a coal depot at Sabang in Pulo Weh, that island lying on the extreme northeastern point of the Dutch Sumatra group. Hidden away in a deep opening between the tropical green-clad headlands, protected from every wind that blows and distant from Singapore by two days' steaming, Sabang stands full and fair in the track of every vessel trading to the Far East. And her invitation has not been rejected. Not a skipper in the Eastern trade but knows Sabang now, no matter what flag he flies.

In itself a completely sheltered harbor, with an entrance which a child could navigate, good holding ground for anchorage, deep-water wharves and eight to twenty-six fathoms outside them, Sabang very quickly has become a favorite port of call for rebunkering. Not only is there entry without dues, but anchorage, pilot service and wharfage also are free. When, in addition, Sabang not only coals her customers at all hours of the twenty-four (and Singapore declines to do so at night), but sells the best steam coal considerably cheaper, it is easily understood how she in certain respects is outrivalling Singapore in the mind of the thrifty sailorman.

In the sheds behind the wharves more than 35,000 tons of coal can be stored, and the company is obliged by contract not to let the storage fall below 10,000 tons. To handle the fuel at least six electric-power transporters are available, each tipping the coal at the rate of 80 to 90 tons an hour. The alert Hollanders have also turned their attention to oil and have provided a huge oil storage for vessels using that fuel. There is a floating dry dock capable of taking a vessel of 3000 tons, and docking facilities are being extended. The repair shops are among the most adequate in the Far East, and there is telegraphic and mail communication with all parts of the world.

The rise of Sabang in the island of Weh is a genuine romance in the history of modern commerce, and though it is but a "settlement" as yet—with a garrison of Dutch infantry—it already has become a menacing rival to Singapore as a coaling station, with every prospect of successfully claiming the position of a leading entreport in the years ahead. Possessing an almost perfect climate, together with an ideal commercial and strategic position, Pulo Weh is among the many points of vantage that England once thoughtlessly gave away in return for—nothing!

A Miniature 8800-Ton Vessel



THIS is a model of the standard 8800-ton vessels built by Skinner & Eddy of Seattle. It is called the "Western Hero" after the first direct contract vessel built for the Emergency Fleet Corporation, launched as the "Seattle."

The model is on a scale of one-eighth of an inch to the foot. Three months were required for its completion, David Rodgers, manager of Skinner & Eddy, having instructed the mechanics to spare no effort to produce a model as representative in its way as the real vessels of the corporation. Mr. Rodgers presented the model to Captain J. F. Blain, district manager of the United States Shipping Board at Seattle.

A line plan was furnished to the model maker, a procedure similar to that of laying down vessels on the mould loft for actual construction. The deck equipment, including cargo winches, windlass, davits, boats, hose reels, hawse pipes, anchors, etc., were specially made from actual working drawings, and are miniatures of the actual fittings and equipment supplied to these vessels. All fittings are made of brass, polished and finished.

A novel feature of the model is a complete electric lighting system so arranged that by pressing a button the forecastle, captain's quarters, pilot house, and crew's quarters are lighted, giving the model the appearance of a ship at night. Wireless antennae are similar to those furnished the standard ships when ready for sea. Gun foundations fore and aft, with guns mounted, are also fitted on the model similar to the equipment furnished by the Navy Department when entering the war zone. The base of the model is made of mahogany and beautifully finished and polished.

What Europe is Thinking and Doing

By Special Correspondent

London.

BRITISH shipbuilding was a strictly controlled industry throughout last year, or at least until the end of November, when government control was so far relaxed that the building of standard ships was stopped and the yards were permitted to book up contracts from private firms. But, with the exception of December, the year had been devoted almost entirely to carrying out the demands of the Controller of Merchant Shipbuilding, which, needless to say, meant concentration of effort on turning out the various types of standard ships ordered by the government. The demand for these ships to fill the ever-increasing gap caused by Germany's submarine campaign has been insistent, but it is greatly to be feared that, under control conditions, the output has failed to come up to expectations. Thanks to a well-planned co-ordination, there was toward the end of the war period an adequate supply of materials from the steel mills and of machinery from the engine shops, though the latter have, admittedly, not been quite up to the requirements of the yards. The chief drawback to production has been the scarcity of labor—especially skilled labor—in spite of the strenuous efforts made to divert men to the yards.

When government control of the yards was relaxed in December there followed a rush of private orders, especially for liners, and the leading builders on the northeast coast are said to have already booked enough work to keep them employed throughout 1919, and much of this work is very high-class type, including liners for the Cunard Company, the Ellerman Line, Holt & Company of Liverpool and the Transport Maritime Marseilles, etc.

Development work has been carried out as actively as the supply of labor permitted, and the New Year started with a building capacity on the northeast coast far in excess of pre-war times. The large new yard of the Furness Shipbuilding Company at Haverton Hill on the Tees, and that of the Egis Shipbuilding Company at Sunderland have been completed and got to work, having already several launches to their credit, while the old yard at Whitby has been restarted and quite a number of establishments have added to their building berths. Concrete shipbuilding has made rapid strides. New yards have been established at Sunderland, at Stockton, on the Tyne and at Amble, and are all turning out barges, coasters and tugboats. If the industry can be kept free from labor troubles the pretty general opinion is that the shipbuilding outlook was never brighter and that four or five years of intense activity are in prospect.

British Shipowners Holding Back

Whilst many British shipbuilders look forward to a burst of prosperity during 1919, and in this case prosperity based upon active peace industry, it must be recorded here that at the present time owners are by no means falling over each other in their haste to order new vessels. Stories in circulation stating this are exaggerations, to say the least. It is true, of course, that both liner and cargo boat yards have sufficient mercantile work in progress or on their books to keep them fully employed for several months to come, but there is a marked hesitancy in shipping circles to place contracts for deferred deliveries at current prices. Shipping men with whom I have discussed the matter say that as compared with the position in the early months of 1915 prices are now well over 200 per cent higher. The materials for both hulls and engines are much dearer, while the prices asked by subcontractors for their specialties have soared to an alarming extent. The shipping outlook is improving, but in the eyes of the expert it does not justify the current prices for new tonnage. Accordingly, a great many people here are inclined to hold their hands a little longer.

Easing the Tonnage Situation

Sir Joseph Maclay, who has been retained as Minister for Shipping in Lloyd George's new administration, is one of those who takes a fairly optimistic view of the shipping outlook. Summing up the present situation, he starts by pointing out that it is quite true that the termnation of hostilities cased enormously the shipping position. The shipments of munitions have now ceased. Great Britain's merchant cruisers have been released for the merchant service fleet and the colliers have been demobilized. Numerous craft of all kinds previously engaged in naval and military work have been made available for bringing supplies to this country and the removal of naval restrictions has meant a great speeding up of merchant shipping. The immediate effect of all these things is to increase the tonnage available for the bringing of imports to these islands by something equivalent to 10,000,000 tons of goods a year. The shipping losses having ceased and the output of tonnage continuing to increase, the position grows easier day by day.

We are returning liners to their pre-war routes to bring the accumulations of cargo which are badly needed in this country (and which during the war, though in many cases already bought and paid for, had been left behind in order to concentrate shipment on the nearer, but much dearer, market of North America), and to take up the trade connections which were necessarily sacrificed in the interests of the effective prosecution of the war. The time is not far distant when it will be possible to release tonnage from requisition on a substantial scale and so create a free market in tonnage and freight. Already at the time of writing the amount of space available for commercial cargo in the North Atlantic has been doubled, and instead of cargo competing for space, space is now competing for cargo.

Speaking on the future of British shipping, Sir Joseph Maclay said: "In spite of our very heavy losses we have no reason to think that British shipping will not be fully equal to the demand likely to be made upon it. The great need of the moment is coal for export. On our coal exports the whole of our shipping and financial position depends. We hope that with the release of miners from the army it will not be long before the ships which now have perforce to go out in ballast can take outward cargoes, thereby at once relieving our financial situation and reducing the cost of our imported supplies. Our shipping is not by any means normal in its extent, but we are aiming at restoring the old conditions and getting rid of vexatious restrictions."

British Merchant Tonnage

The optimists, however, do not have things all their own way. Boiling down a whole lot of authoritative figures that have recently been produced regarding British merchant tonnage, it looks as though the proportion of the world's steamer tonnage owned by Britain has fallen from 47 per cent before the war to 43 per cent, and may fall to 40 per cent by the end of the current year. Thus Great Britain's share of the world's ocean traffic is likely to be considerably less than it was immediately before the war, more especially as her loss of tonnage has been almost entirely in large ocean-going ships.

It seems to be practically certain that the world's total merchant steamer tonnage (including that in enemy countries) will a year hence be much larger than it ever was in the world's history, and that before long the quantity of tonnage actually employed in trade, apart from that still required for the repatriation of men and munitions, will be as large as it was on the average of the five years before the war. On the other hand, according to Sir James Wilson, the demand for the transport of goods by sea is not likely for a considerable time to be as large as it was on the pre-war average, owing to reduced resources and the time necessary to reorganize industrial life. Altogether, it seems probable that a few months hence the supply of shipping for purposes of trade will be greater than the demand for shipping, as compared with the pre-war relation of supply and demand. The present control over merchant shipping will, no doubt, be continued for some time, but it will be the principal object of both the British Government and British shipowners to see that no ships are left unemployed, so that the rates of freight will in the main be regulated by the relation between the supply of shipping and the demand for shipping. The ships at present being built will be expensive, and shipowners will naturally be anxious to keep up freights, but the general law of supply and demand will prevail, and they will soon be forced to accept whatever rates of freight are established by competition, and so long as these rates of freight are sufficient to give some margin, however small, they are not likely to lay up any shipping. Altogether, then, it seems probable that freights will in a few months fall to a level not much more than double the rates which were current before the war.

First Ferro-Concrete Ship

On January 7 the first ocean-going ferro-concrete cargo steamer to be built in this country was launched from the yard at Barrow-in-Furness of the Ferro-Concrete Ship Construction Company. The launching ceremony was performed by Miss Phyllis Owens-Thurston, and the ship was named the "Armistice." Several ferro-concrete barges have already been put into the water from this and other yards in the United Kingdom, as mentioned by your correspondent in the previous article, but the "Armistice" is the largest of this kind of vessel building in this country. She is to be the first of a series and was constructed for private owners. The vessel, which has a poop and forecastle, is 205 feet in length with a breadth of 32 feet and a depth of 19 feet 6 inches. Her displacement is 2415 tons, with a loaded draught of 16 feet. The deadweight will be about 1150 tons and the speed 7.5 knots. The "Armistice," which was built to Lloyd's classification and Board of Trade requirements, has a capacity in No. 1 hold of about 42,000 cubic feet and in No. 2 hold 21,000 cubic feet. The machinery has been fitted in the after part of the ship.

This vessel formed the basis of a paper read by T. G. Owens-Thurston at the spring meeting of the Institution of Naval Architects last year. Mr. Thurston referred in his paper to the difficulties in designing such a ship and the manner in which they had been surmounted. He also dealt with the question of launching, an operation which in the case of ferro-concrete ships requires more than ordinary consideration and care, and he explained the arrangements and precautions which had been made to meet the severe launching conditions in the case of the "Armistice." The admiralty was represented at the launching as well as a large number of persons interested in ferro-concrete shipbuilding.

The National Shipyards

Major-General Collard, whose resignation of the post of Director-General of Administration under the Controller-General of Merchant Shipbuilding is announced, was latterly almost exclusively employed in connection with the national yards on the Bristol Channel. Remembering that, the general public are now not unnaturally asking whether his resignation means the end of these establishments, whose performances to date have been a grievous disappointment to them. Few people would, of course, be sorry if the ill-starred enterprise really came to an end. There is, however, a widespread feeling that before they are finally closed down as state establishments a public inquiry should be held into the whole of the circumstances attending their inception and development. Certainly if we are to judge from the few facts disclosed by the Select Committee on National Expenditures such an inquiry is much needed.

AMERICAN WAR LOSSES

AN unofficial compilation of the war losses of the United States merchant marine during the war shows total losses of 147 vessels, of which 74 were steamers and 73 sailers. The list is headed by the ship "William P. Frye," sunk January 28, 1915, and ends with the steamer "Saetia," lost November 9, 1918. The steamer losses are classified as follows: 56 freight steamers, 216,696 gross tons; 12 tankers, 60,700 tons; 5 freight and passenger boats, 51,304 tons, and one fishing steamer of 353 tons; total 329,053 tons. The sailing vessels were classified as follows: 3 ships, 8282 gross tons; 59 schooners, 43,110 tons; 7 barks, 7278 tons, and 4 barges, 2459 tons; total, 61,129 tons.

The heaviest losses were during the third quarter of 1918, during which 39 vessels of 91,606 gross tons were lost. The second quarter of 1918 and of 1917 were next in tonnage lost.

SAN FRANCISCO

SAN FRANCISCO ship-operators and exporters, in common with those of other Pacific Coast ports, are considerably exercised over the recent Shipping Board schedule of rates to the Far East. They find in this schedule, taken in conjunction with transcontinental rail rates, a serious menace to the business of the port. A telegram sent to the railroad administration and California representatives in Congress by different foreign trade and local associations of San Francisco, states the Coast attitude in part as follows:

"Since establishment by the United States Shipping Board of the $20 rate, long ton, from Atlantic seaboard to the Far East and Australia, twelve rate per short ton on deadweight, fourteen dollars on measurement cargo, from Pacific Coast ports, and approximately same differential to Australia and New Zealand ports, it has been impossible for the Pacific Coast ports to compete with the steamship lines direct from New York through the canal to the Far East on account of the high transcontinental rail rates, with the result that one hundred thousand tons of export business per month which has formerly passed through San Francisco is totally lost and the commerce of this port is in jeopardy unless immediate remedy is applied. Present transcontinental rail rates on low-grade export commodities are based on a minimum of seventeen dollars per ton, or over one thousand dollars per car of sixty tons, up to thirty-five dollars per ton on other commodities, or fourteen hundred dollars per car of forty tons. Commercial and financial life of the Pacific Coast is involved unless rail export rates are immediately re-established on pre-war basis."

The San Francisco Chamber of Commerce has petitioned the railroad administration to restore the import and export rates in effect prior to June 24, 1918. The petition, of several hundred words, cited this instance:

"The old rate from Pacific Coast to Cincinnati, for instance, was 55 cents per 100 pounds. The distance from San Francisco to Cincinnati is 2572 miles. By increasing the rate from 55 cents to $1.12½ it has the same effect as if Cincinnati was moved 2993 miles further from tidewater, making it in theory 5565 miles from the coast and adding nearly six mills per pound to the raw material, which the manufacturer must pay and which his European competitors are not obliged to do."

LABOR IN THE BAY YARDS

LABOR unrest has passed through a number of crises in San Francisco Bay shipyards during the past month. Apparently at the present writing the leadership of labor councils is in the hands of the conservative, commonsense element, and danger of a break has passed over for the time. The yards are all resuming work on the Macy award basis and the men are apparently willing to await the further action of that board in adjusting their claims. This is a wise action on the part of labor, for they never would have been able to enlist public sympathy—a strike at this time being clearly in violation of their agreement with the United States Shipping Board.

A comparison of wages paid in Pacific Coast shipyards with those paid in Great Britain shows that, without taking into account the shorter hours per week here, the local wages are on an average 110 per cent higher. Of course, such a comparison is misleading, in view of the fact that living conditions and costs are also so much higher here than there, but if labor leaders will carefully study the statistics of shipping and shipbuilding, as officially issued by various governments, they will find that when the ships now under construction are finished, the tonnage of the world will be practically on a pre-war normal basis. When this has been accomplished, orders for ships will go to the yards able to turn them out for the least money. There has been much talk of the super-efficiency of American labor overcoming the wage handicap, and it is high time that the labor unions, who are the only responsible agents for this work, should begin an effort to bring their rank and file to a greater production per man per hour. For unless some program of the sort is put over by labor, we will infallibly lose much, if not all, of our shipbuilding industry. The yards will be able to keep running for there will be much repair and reconstruction work, but there will not be anything like so many men employed.

SHIPS MOVE ONE WAY

SAN FRANCISCO shipping men find no change in the tendency of Shipping Board vessels to gravitate to the Atlantic and to remain there. Once in the Atlantic, apparently, vessels are lost to the Pacific. The report of movements of ocean vessels through the Panama Canal for one week might be taken as showing this tendency: Two Shipping Board vessels passed through from the Atlantic to the Pacific, and one was bound to Pearl Harbor, Hawaii, with coal for the United States Navy, whereas five Shipping Board vessels passed through from the Pacific to the Atlantic. Four were from United States ports with cargo. The fifth was from Antofagasta for Norfolk in ballast.

During another week six Shipping Board vessels passed through the Panama Canal from the Pacific to the Atlantic, all except one having cargo, and only three passed from the Atlantic to the Pacific, one of which was in ballast.

T. K. K. OPENS NEW YORK OFFICE

ANTICIPATING the trend of traffic to Japan and planning to increase the efficiency of his organization, K. Doi, manager for America of the Toyo Kisen Kaisha, has been in New York for the past month supervising the opening of the company's new offices at 165 Broadway. Mr. Doi, a progressive shipping man, realized long ago that the business originating in the Eastern States could be served best by offices there in charge of one of his assistants, and as soon as the armistice was signed began planning to install them. K. Tamaki, who has been in an important position in the head office in Tokyo, has been appointed assistant manager in charge of the New York branch, with D. Kamiya as passenger agent. Since coming to this country these gentlemen, following the custom established long ago by the Toyo Kisen Kaisha officials, have made extended tours in American in an exhaustive survey of travel conditions and prospects.

K. Doi, United States manager Toyo Kisen Kaisha

In addition to opening the New York offices, Mr. Doi has just announced a new reciprocal arrangement whereby the Cunard Steamship Company will represent the Japanese line in all its American and European offices, except San Francisco and New York, and the Toyo Kisen Kaisha will act in a similar capacity for the British company throughout the Orient.

The cities in which the Cunard-Anchor offices will represent the T. K. K. are Boston, Philadelphia, Pittsburgh, Chicago, Minneapolis, St. Louis, Seattle, Baltimore, Washington, Winnipeg and Vancouver. The Cunard recently took over the passenger representation of the Toyo Kisen Kaisha in Great Britain.

WOODEN SHIPS

IN a trip through the shipbuilding yards of the Southern States, comprising Emergency Fleet Corporation Districts Nos. 5 and 6, Frank Stone, noted shipbuilder of Oakland, had an opportunity, as a special representative of the United States Shipping Board, to observe the work of the Southern builders. As a Pacific Coast builder of wooden ships, Mr. Stone would naturally be critical in his examination of the work of his southern rivals, especially as he was sent out with the expectation of finding many faults and suggesting cures for the same. We are gratified to find, however, that the reports of Mr. Stone indicate that with very few exceptions, and those in details where the fault lay with the specifications rather than with the contractor, those wooden vessels which came under his observation were pronounced to be very fine products of the shipbuilder's art.

The material in use is well seasoned long leaf pine, a timber famous for its enduring qualities, and Mr. Stone predicts that many of these ships will be afloat and in use long after their steel sisters have joined the rusty accumulations which for many years have been gathering around Davy Jones' locker.

The defects indicated by the report are insufficient calking, the use of oak for wooden rudder stocks, absence of sleeves in rudder ports, and detail defects in methods of attaching tillers to rudder stocks of hanging rudders. These are faults that might be expected in any effort to force production of ships with practically no skilled carpenters. Frank Stone is outspoken in his praise of the remarkable results obtained in some of these wooden ships, stating that the finest workmanship he has ever seen was in one of the hulls examined at Beaumont, Texas.

The report condemns the use of oak for rudder stocks, that material being very untrustworthy under twisting strains. Iron bark is the only commercially available suitable timber for this purpose and steel should be used wherever practical. Much of the rudder trouble that occurred so frequently in the operation of the new wooden steamers of the Shipping Board was due in large measure to the use of oak stocks and the rigid connection of the tiller and steering mechanism. Over twenty years ago the builders of wooden ships discarded wooden rudder stocks on vessels of 2000 tons or over.

BENICIA YARD LAUNCHES "CERRITOR"

THE second 3500-ton Ferris type wooden vessel launched by the Benicia Shipbuilding Corporation for the United States Shipping Board was the "Cerritor," sent down the ways January 31. The first was the "Kimta." Both vessels were the source of considerable pride on the part of the company's officials. They were made of thoroughly seasoned timber by expert workmen.

The Benicia yard was purchased by the corporation in 1917, although it was established by Captain Mathew Turner in 1875. Contracts were held by the company for five 3500-ton Ferris vessels for the Emergency Fleet Corporation, but two were suspended, so that one slip and many of the crew of 400 men are available for private work.

One famous vessel built by the Benicia yard, the "Dora," recently was sold by the Alaska Steamship Company, which had operated her as a passenger and freight carrier to the North, and she will become a fishing vessel. The "Dora" was built in 1880, nearly forty years ago. In 1905 she disappeared for eighty-four days, being blown offshore, but she made her way back to Puget Sound. The traditions of this famous old yard are behind the present Benicia company.

Launching of the "Cerritor"

HAWAIIAN STEAMERS NOT RETURNED

DESPITE an expectation in the East that some at least of the American-Hawaiian steamers would be returned to the company in accordance with the announced intention of the Shipping Board to release steamers no longer needed, the San Francisco offices of Williams, Dimond & Company have no advices as to vessels being turned back. When the American-Hawaiian will resume its old Hawaiian sugar trade therefore remains uncertain, although it is expected that it will return to it when possible. At least three of the big A-H steamers have been refitted as transports, to carry troops home from Europe. These are the "Mexican," 8673 gross tons; the "Ohioan," 6650 gross tons, and the "Iowan," 6650 gross tons. The changes involve installation of bunks, building of kitchens, which must be very large for several hundred men, and hospital bays. The American-Hawaiian, whose fleet was one of the finest and largest under the American flag before the war broke out, is somewhat unfortunate in that its vessels are of a size and kind admirably adapted to the needs of the government.

However, one vessel being operated by the American-Hawaiian will take sugar from Honolulu to the East Coast via Panama, a trade in which the fleet was engaged prior to the serious blockade of the Panama Canal three years ago. At this time, after taking a few cargoes around the Horn, the company diverted most of its steamers to the Atlantic, leaving two to carry sugar to San Francisco for overland rail shipment. The vessel in question, after discharging coal at Honolulu from San Francisco, will load sugar.

HENRY LUND IS DEAD

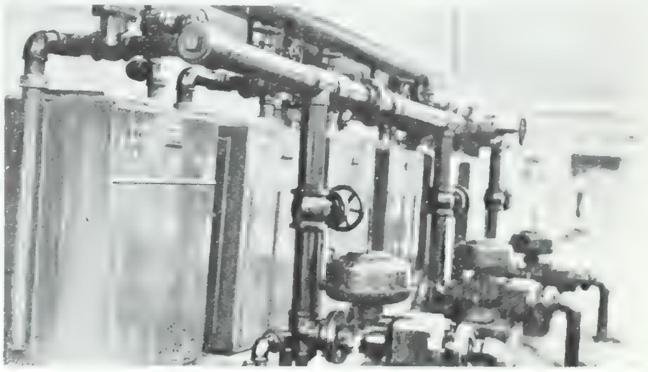
Henry Lund, senior member of the firm of Henry Lund & Company, San Francisco, died February 15. Mr. Lund was 87 years old. He is survived by his son, to whom the management of the business falls, and by his widow. Henry Lund & Company are exporters and importers, but probably are best known in marine circles as agents for the Bolinder engines.

NEW SELAS PLANT IN OPERATION

THE new Selas plant is now in operation at the Schaw-Batcher shipyard, South San Francisco. This plant was installed to receive Pacific Gas & Electric Company high-pressure gas from the city mains and to produce therefrom an economical mixture to be used as fuel in the rivet-heating forges.

The gas is delivered to the station through several regulators, each having a capacity of 10,000 cubic feet an hour. These regulators lower the pressure of the gas, which is then passed through low-pressure meters to the Selas machine, where it is thoroughly mixed in the proportion of one and one-half parts of gas to one part of air. This mixture is conveyed through main lines and distributed to the various parts of the ships and shops through laterals and hose lines. At the rivet forge the gas burners, when properly manipulated by the operator, admit just sufficient proportion of compressed air to bring the gas to the most efficient flame for heating purposes.

This plant was installed under the direction of R. D. Jones, one of O. B. Kibele's efficient assistants.


Meters for the Selas gas reducing plant, Schaw-Batcher Shipyard

TACOMA

By Special Correspondent

FOLLOWING the ultimatum of representatives of the Emergency Fleet Corporation that there would be no conferences on the wage question in Tacoma yards until the men returned to work and carried out negotiations on wage questions through the proper channels, the outlook for the opening of the ship yards looks rather dark. It is possible, however, that, considering the positive stand taken by the Federal authorities, the conservative element will win out and the men go back to work. The order that no further consideration would be given the Tacoma workers, which includes Seattle, was received February 19. It was signed by Captain John F. Blain, head of the district; Henry McBride, Federal mediator, and Dr. L. C. Marshall, representing Director General Charles Piez of the Emergency Fleet Corporation.

Public Sympathy Against Strikers

The walkout at Tacoma ship yards presented one of the most curious situations with which the citizens of Tacoma ever had to contend. Public sympathy was against the employes, and apparently very few of the men themselves were in favor of the walkout. At Tacoma the preponderance of strength naturally was with the boilermakers and allied steel workers. The younger element, led by a few older and radical men, carried every meeting. It is asserted by the conservatives that all working agreements made with the Government were broken and without just cause by the shipyard men. They point out that the young men whom the agreement saved from going into the army are those now loudest in their demands for increased pay.

Rather startling figures of wages have been obtained through some of the yards. Last summer, during the height of overtime, some of the men, including boss blacksmiths, were receiving from $100 to $140 a week. Men listed as "1918" mechanics received from $50 to $90 a week. In a plant employing 8200 men the minimum wage, or about $4.50, was being paid to only about 300 men. Most of these last probably were physically unfit to earn more, and the able-bodied within a short time might have increased their earnings if they applied themselves.

Radicals Seize Opportunity

The radical element took advantage of the situation. A better organization for the work of the radicals could not have been found. Under the stress of war, men were hired through the Federal Employment Office and then directed to union headquarters for their billet before they went to the ship yards at all. Leaders were thus given a golden opportunity. W. T. Morris, a radical connected with the Lumber Handlers' Union in the strike of two years ago which wrecked the longshoremen, went to work at the Seaborn yards and in two weeks had the Shipyard Laborers, Riggers and Fasteners organizing. In a month he was at the head as business agent and held other offices. He proved all that had been expected of him in the present trouble.

The Todd yards have lost contracts for twelve 7500-ton vessels for the Government, while the loss in wages to the men will run well over $1,000,000.

The plant of the Tacoma Shipbuilding company is the only wood yard being operated. This plant is run on an open-shop basis, and although during the war it had some difficulty in securing help, this situation is changed so that now it has all the men needed. This yard is at work on Government vessels of the Ferris type.

The former passenger steamer "Magnolia," which operated between Tacoma, Seattle and Olympia for some time, is being rebuilt and will come out as a tug boat. Captain O. G. Olson, formerly of the Tacoma Tug Boat Company, and Arthur M. Hunt, the original owner of the "Magnolia," are making the alterations. The "Magnolia" is 101 feet in length and powered with a triple-expansion engine.

Harbor Chart Being Prepared

A new chart of the Tacoma harbor is being prepared by officers of the Coast and Geodetic Survey for issue next spring. On account of the many changes in the harbor here within the past year this work has become necessary. The Tacoma work will be completed in about two months.

The John B. Stevens dock has been taken over by representatives of the Pacific Box Company, who will use it for box shook storage and for Hawaiian Islands shipping. This dock was formerly used for hay and feed, a considerable part of which went for Government use.

Shippers declare that because of the strike it is probable that the "West Elcajon" will be the last vessel to load flour for some weeks, unless some of the wooden ships are pressed into service to take flour to New York for trans-shipment to a European port. Tacoma millers had been shipping flour for several months.

Vice-President and Manager J. A. Eves of the Todd Drydock & Construction Corporation plant was confined to the hospital for several days recently by pneumonia.

O. S. K. Clearing Out Freight

The Osaka Shosen Kaisha sent eight steamers to Tacoma in February in an attempt to clear up 1400 cars of freight that had been held for some time. No announcements have been made regarding freight reductions to the Orient. All vessels have been clearing with full cargoes.

The resumption of service by the Harrison Line is received with great favor by Tacoma shipping men, who are pleased to be in a position again to make shipments to Europe. The last of the Harrison Line ships at Tacoma was the "Merchant," in January, 1918. It is presumed that these vessels will take much flour and wheat.

Lumber shipments from Tacoma offshore have shown a little increase the past month, though the business is nothing to what it should be. Exporters look for some business as soon as freight rates reach a point where the business is profitable.

Reports received by Tacoma shipbuilders show that wood vessels have made good. The "Cheron" and "Mazama" from the Seaborn yards arrived in New York with their flour cargoes in good condition and the "Beloit" from the Tacoma yards also arrived in good order.

No reports have been received by Tacoma representatives of the Foundation shipyards. It is doubtful, because of the strikes, whether the yard will make any effort to get new work. Plans call for this to be made into an eight-way steel yard.

"LIBBY MAINE" MAKES GOOD PASSAGE

The chief engineer of the motorship "Libby Maine" has cabled from Manila to the Dow Pump & Diesel Engine Company, builders of the Diesel engines of the vessel: "Arrived here February 13; 4956 miles in 28 days 17 hours; everything perfect." This is an unusually good record for a motorship and speaks volumes for the Diesel as built on the Pacific Coast.

"CARMANIA" IN PEACE PAINT

The Cunard line has been advised that the "Carmania," one of the large liners of the company, lately in service as a transport, sailed from Liverpool for New York in peace paint, having resumed the red funnels, distinctive of Cunard vessels. During the war she was painted gray.

Australian Freight Report

Sydney.

WE are pleased to announce that the removal of restrictions on certain lines of cargo, such as pelts, skins, tallow, leather, hides, has had the effect of merchants again opening up cable communication with American merchants with a view to effecting sales of various commodities which are awaiting shipment here in large quantities, but up to time of writing, so far as we are aware, no sales of any magnitude have been effected. The temporarily unsettled conditions brought about by the armistice and the holiday season have rendered it difficult for sales to be concluded in time for shipment by several of the sailing vessels which are now awaiting cargoes.

The influenza epidemic in the Pacific islands has also seriously interfered with the output of copra to such an extent as to render it difficult for charterers of sailing vessels to fulfill their existing commitments until conditions improve, more especially as the hurricane season in the islands is approaching, which will have the effect of making it more difficult to obtain the quantities of copra required by vessels already chartered.

Large Stocks of Tallow

There are large stocks of tallow, skins, fur skins of all descriptions, hides, pelts and leather awaiting shipment, and if the prices offered on your side approximate the United Kingdom prices, sales of large quantities should be effected, which will lead to the resumption of trade in these commodities with your country. We are daily urging shippers to look to your country as an outlet for the large stocks held by them, and are keeping them posted of the tonnage available and likely to be available during the next few months.

There is a large amount of tonnage at present being headed from the United Kingdom to Australia which will load during the months of January to May, inclusive. The cargo will chiefly consist of dairy products, meat, metals, wool, tallow, flour and wheat in that order, but even if the tonnage which will load here during the above months is averaged for twelve months, it will not nearly be sufficient to lift the cargo at present available, not taking into account the large additional stocks which will become available from next season's harvest, wool clip, and operations at the meat works throughout Australia.

The prospects for this year's wheat harvest are not good, owing to the dry weather experienced; consequently, the harvest will be light, but when we state that there are about 4,378,258 tons of surplus wheat available for export you will realize that the light harvest this season will not appreciably affect the export of wheat for some considerable time.

Wool Clip Average

The wool clip will be an average one, although the wool will be somewhat light owing to the dry weather.

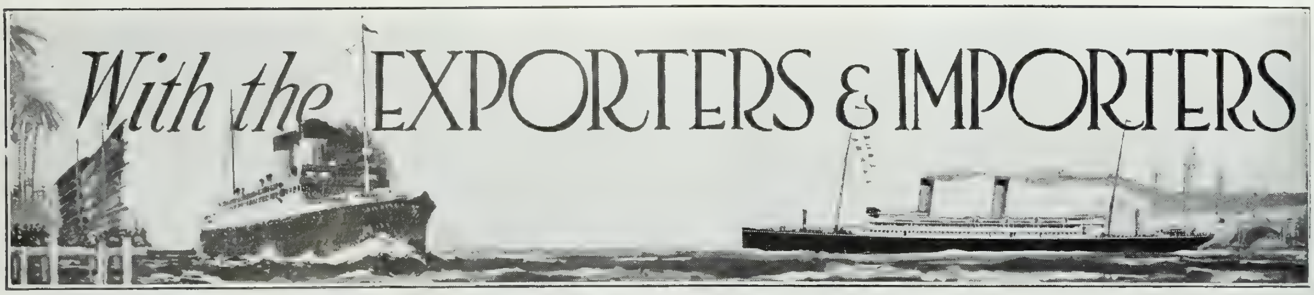
Meat, Tallow and By-Products.—The various meat works in Queensland should commence operations early in the new year and their output is expected to be a fair average one, both as regards meat, tallow and by-products.

Skins.—There will be a large quantity of skins available for shipment this year, including fur skins of all descriptions.

Wine.—Australia is a large wine-producing country, and prior to and since the war large quantities have been exported to the United Kingdom and the continent. The quality of Australian wine has been proved and there is always a great demand for it in the United Kingdom and on the continent, and should anyone in your country be interested in this trade we shall be pleased to put them into communication with the largest wine growers in this state.

Metals.—We are in touch with the large metal purchasers, and prior to and since the war have arranged large quantities of lead and zinc concentrates to the United States via Baltimore. A large manganese ore deposit has recently been opened up in South Australia and the proprietors thereof are now negotiating with certain American interests with a view to finding an outlet for this metal.

BIRT & CO., LIMITED.



With the EXPORTERS & IMPORTERS

FREIGHT REDUCTIONS HURT TRADE.

THE recent reductions in freight rates announced by the Shipping Board have not stimulated foreign trade as might have been expected. On the contrary, they have caused merchants in this and other countries to hold off in the expectation that the freight rates will go still lower.

The situation is a peculiar one and is due to the misapprehension prevailing among importers and exporters that the end of the war has released enough tonnage to take care of the ocean carrying of the world's trade routes. This is a false impression. Tonnage is still scarce and the reductions in freight rates were not made because of increased available tonnage.

Great Britain, still unable to take up its foreign trade where it was broken off at the beginning of the war, started the publication of reduced ocean freight rates, probably for the purpose of unsettling the freight and merchandise markets of the world so that buyers would hold off—as they have held off—in anticipation of still further reductions. American exporters have "fallen for" this clever move and the foreign buyers have further aggravated this condition by cancelling orders already placed in the expectation that they would be able to buy at a better figure when the freight market had further declined, as British interests had intimated it would.

The scarcity of tonnage makes these hopes vain. There are not enough ships afloat now to take care of the world's commerce plus the demands of national activities following the cessation of hostilities on land and sea.

Shipping generally cannot get space, and when space is not available, freight quotations, whether high or low, mean nothing.

If America is to get into the world's trade on the scale befitting her position among the nations, she must take action promptly. Within a short space of time Great Britain and other European nations will have adjusted their affairs so that they can again give their experienced attention to the markets they have controlled for many years. When that time comes the United States will have to meet competition that will be able to put up a much stronger front than it can at the present time.

FREIGHT REPORT

SINCE our report of January, the freight market, though still inactive, has shown more life than formerly. Our government, following the British government, made a still further cut in the rates from San Francisco to the Orient—namely, rates to be charged by steamers under government control to be $12 on deadweight, $14 on measurement.

The steamer "Phyllis" has been chartered from the North Pacific to Honolulu with lumber at $18 a thousand, and the steamer "San Diego" from a nitrate port to Honolulu at $20 a ton.

Frank Waterhouse & Company have chartered the Japanese steamer "Ataka Maru" from Seattle to the Orient. She is now at San Francisco discharging coal for the United States Government from Norfolk, Virginia.

The Mohns Commercial Company has chartered the schooner "Resolute" from the North Pacific to Callao at $37.50 a thousand.

No charters have been reported for Australia, except that J. J. Moore & Company have put the schooner "Geo. E. Billings" on the berth for Sydney. The American steamer "Yamhill" was put on the berth from San Francisco for Porto Rico and Cuba. She has about 2500 tons of rice for Porto Rico, but we understand the Cuban business did not result, and the steamer is now loading the remainder of the cargo for New York.

Captain Whitney, since his purchase of the barkentine "Benicia" and the bark "Albert," bought the schooner "Espada" from Comyn, Mackall & Company at $75,000, but, unfortunately for the sellers, before any money passed, a cable was received announcing her to be a total loss in the South Pacific. However, about ten days later there was another sale made by them to the captain, namely, the schooner "Virginia," for $60,000. Comyn, Mackall & Company, in turn, bought the schooner "Else" from A. O. Anderson & Company at $90,000, thus replacing the old vessels they sold by one practically new.

Mr. Scott, the well-known shipping man of the Gulf of Mexico, bought the large schooner "W. H. Marston" from the former owners at $115,000.

No time charters have been reported, as shippers' views are much lower than those held by the owners.

PAGE BROTHERS.

WILBUR L. HILLER OPENS OFFICE

In order properly to serve its business connections in California, the Wilbur L. Hiller Company, Inc., of Portland, Oregon, has opened headquarters in San Francisco with offices in the Monadnock building. This firm has made a specialty of high-grade shop equipment for shipyards, boiler shops, etc. The Portland office, at 90 First street, is designed to serve the Northwest. D. B. Catton continues as manager in Portland.

SAN FRANCISCO FOREIGN TRADE

THE Foreign Trade Department of the San Francisco Chamber of Commerce has compiled the exports and imports of San Francisco for the twelve months ending December 31, 1917, and 1918. The total increase is $55,779,071, and while this is considerably less than the increase of 1917 over 1916, it must be remembered that, owing to the war, ship tonnage was very scarce, and the many import and export restrictions of the War Trade Board and the manufacturing restrictions of the War Industries Board materially curtailed the foreign commerce of the port. The outlook for 1919 is very encouraging.

Imports

Country	1917	1918	Inc. or Dec.	
EUROPE:				
Austria-Hungary	$	$ 26	$ 26	Inc.
Denmark	56,599	176	56,423	Dec.
France	502,223	343,033	159,250	Dec.
Germany	3,091	39	3,052	Dec.
Greece	278		278	Dec.
Italy	540,355	110,407	429,948	Dec.
Netherlands	84,180	81,939	2,241	Dec.
Norway	16,385	8,560	7,825	Dec.
Portugal	74,767	29,663	45,104	Dec.
Russia		57,949	57,949	Inc.
Spain	84,567	21,562	63,005	Dec.
Sweden	479,293	125,589	353,704	Dec.
Switzerland	3,023	11,138	8,115	Inc.
England	808,459	413,091	395,368	Dec.
Scotland	285,205	52,845	232,360	Dec.
Ireland	106,063	77,255	28,808	Dec.
TOTAL EUROPE	$ 3,044,548	$ 1,333,272	$ 1,711,276	Dec.
NORTH AMERICA:				
Canada	$ 2,481,882	$ 1,445,024	$ 1,036,858	Dec.
Cuba	200,176	114,040	86,136	Dec.
Jamaica	11,345	16,344	4,999	Inc.
Trinidad	36,963	42,259	5,296	Inc.
Other British W. Indies		100	100	Inc.
TOTAL N. AMERICA	$ 2,730,366	$ 1,617,767	$ 1,112,599	Dec.
CENTRAL AMERICA:				
Costa Rica	$ 941,023	$ 797,519	$ 143,504	Dec.
Guatemala	4,983,107	3,100,606	1,882,501	Dec.
Honduras	22,005	37,734	15,729	Inc.
Nicarague	1,028,323	2,656,721	1,628,398	Inc.
Panama	35,739	163,456	127,717	Inc.
Salvador	4,251,691	5,441,766	1,190,075	Inc.
Mexico	2,015,287	2,409,029	393,742	Inc.
TOTAL C. AMERICA	$ 13,277,175	$ 14,606,831	$ 1,329,656	Inc.
SOUTH AMERICA:				
Argentina	$ 436	$ 3,356	$ 2,920	Inc.
Brazil	1,286,005		1,286,005	Dec.
Chile	3,183,506	4,394,956	1,211,450	Inc.
Colombia	4,808	400	4,408	Dec.
Ecuador	943,507	482,636	460,871	Dec.
Peru	190,707	56,927	133,780	Dec.
Venezuela		69,358	69,358	Inc.
TOTAL S. AMERICA	$ 5,608,969	$ 5,007,633	$ 601,336	Dec.
ASIA:				
China	$ 32,780,417	$ 21,872,230	$10,908,187	Dec.
Japanese China	761,907	112,893	649,014	Dec.
Chosen		67	67	Inc.
British India	10,869,568	29,790,557	19,920,989	Inc.
Straits Settlements	25,350,750	34,065,606	8,714,856	Inc.
Other British E. Indies	3,374,052	1,841,541	1,532,511	Dec.
Dutch East Indies	42,370,527	30,674,778	11,695,749	Dec.
Japan	44,455,431	17,406,822	27,048,609	Dec.
Russia	106,636	22,800	83,836	Dec.
Siam	20,673	25,705	5,032	Inc.
Persia		3,952	3,952	Inc.
TOTAL ASIA	$160,089,961	$135,816,951	$24,273,010	Dec.
OCEANIA:				
Australia	$ 11,136,969	$ 20,178,556	$ 9,041,587	Inc.
New Zealand	2,776,428	9,929,117	7,152,689	Inc.
Other British Oceania	1,859,006	3,763,359	1,904,353	Inc.
French Oceania	1,675,211	2,346,428	671,217	Inc.
German Oceania	660,142	918,259	258,117	Inc.
Philippines	29,119,320	49,995,963	20,876,643	Inc.
TOTAL OCEANIA	$ 47,227,076	$ 87,131,682	$39,904,606	Inc.
AFRICA:				
Egypt	$ 808	$ 1,557	$ 749	Inc.
Canary Islands	203		203	Dec.
British East Africa		8,516	8,516	Inc.
TOTAL AFRICA	$ 1,011	$ 10,073	$ 9,062	Inc.
GRAND TOTAL	$231,979,106	$245,524,209	$13,545,103	Inc.

Exports

Country	1917	1918	Inc. or Dec.	
EUROPE:				
Belgium	$	$ 501,450	$ 501,450	Inc.
Denmark	244,844		244,844	Dec.
France	205,927	1,592,472	1,386,545	Inc.
Norway	513,120		513,120	Dec.
Russia	1,297,289	63,174	1,234,115	Dec.
Sweden.	440,841		440,841	Dec.
England	6,234,594	929,803	5,304,791	Dec.
Scotland		297,083	297,083	Inc.
Ireland	157,812		157,812	Dec.
TOTAL EUROPE	$ 9,094,427	$ 3,383,982	$ 5,710,445	Dec.
NORTH AMERICA:				
Canada	$ 6,095,542	$ 8,182,592	$ 2,087,050	Inc.
Newfoundland	235		235	Dec.
Cuba	806,765	4,187	802,578	Dec.
Dutch West Indies		2,932	2,932	Inc.
Jamaica	2,552		2,552	Dec.
Other British Possessions		101,500	101,500	Inc.
Santa Domingo	5,400		5,400	Dec.
Trinidad and Tobago	10,764		10,764	Dec.
Hayti	3,750		3,750	Dec.
TOTAL N. AMERICA	$ 6,925,008	$ 8,291,211	$ 1,366,203	Inc.
CENTRAL AMERICA:				
Costa Rica	$ 236,669	$ 217,609	$ 19,060	Dec.
Guatemala	945,514	748,304	197,210	Dec.
Honduras	310,429	225,060	85,369	Dec.
Nicaragua	653,561	747,933	94,372	Inc.
Panama	1,033,133	1,223,944	190,811	Inc.
Salvador	1,254,077	754,168	499,909	Dec.
Mexico	5,532,359	4,440,535	1,091,824	Dec.
TOTAL C. AMERICA	$ 9,965,742	$ 8,359,553	$ 1,608,189	Dec.
SOUTH AMERICA:				
Argentina	$ 230	$ 101,861	$ 101,631	Inc.
Bolivia	570,875	678,632	107,757	Inc.
Brazil		275	275	Inc.
Chile	3,017,153	4,226,079	1,208,926	Inc.
Colombia	110,688	95,269	15,419	Dec.
Ecuador	297,392	206,046	91,346	Dec.
Guinias	19,481	68	19,413	Dec.
Paraguay		1,954	1,954	Inc.
Peru	1,071,950	1,331,308	259,358	Inc.
Uruguay		2,957	2,957	Inc.
Venezuela	74		74	Dec.
TOTAL S. AMERICA	$ 5,087,843	$ 6,644,449	$ 1,556,606	Inc.
ASIA:				
Aden	$ 772	$ 653	$ 119	Dec.
China	10,841,921	13,450,929	2,609,008	Inc.
Japanese China	1,315,671	833,624	482,047	Dec.
Chosen	258,658	368,808	110,150	Inc.
British India	2,394,230	5,051,801	2,657,571	Inc.
Straits Settlements	2,918,464	3,442,153	523,689	Inc.
Other British E. Indies.	350,616	287,641	62,975	Dec.
Dutch East Indies	10,689,647	14,657,206	3,967,559	Inc.
French East Indies	178,820	318,525	139,705	Inc.
Hongkong	4,103,149	5,891,212	1,788,063	Inc.
Japan	70,009,195	59,378,616	10,630,579	Dec.
Russia in Asia	1,312,929	138,044	1,174,885	Dec.
Siam	463,291	665,018	201,727	Inc.
Persia	17,448	7,250	10,198	Dec.
Turkey in Asia	83,900	25,020	58,880	Dec.
Leased China	22,227	2,112	20,115	Dec.
Portuguese East Indies	655	2,782	2,127	Inc.
TOTAL ASIA	$104,961,593	$104,521,394	$ 440,199	Dec.
OCEANIA:				
Australia and Tasmania	$ 10,570,633	$ 32,981,162	$22,410,529	Inc.
New Zealand	4,682,915	13,334,281	8,651,366	Inc.
Other British Possessions	312,784	562,081	249,297	Inc.
French Oceania	955,746	1,355,652	399,806	Inc.
German Oceania	434,126	373,380	60,746	Dec.
Philippines	15,272,741	30,676,149	15,403,408	Inc.
TOTAL OCEANIA	$ 32,228,945	$ 79,282,705	$47,053,760	Inc.
AFRICA:				
British South	$ 51,321	$ 42,510	$ 8,811	Dec.
Egypt	3,074	36,524	33,450	Inc.
British East	189		189	Dec.
Abyssinia		2,000	2,000	Inc.
British West		37	37	Inc.
Portuguese	10,255		10,255	Dec.
TOTAL AFRICA	$ 64,839	$ 81,071	$ 16,232	Inc.
GRAND TOTAL	$168,328,397	$210,562,365	$42,233,968	Inc.

FIREMAN'S FUND
Insures Hulls, Cargoes
HEAD OFFICE: CALIFORNIA AND SANSOM
JOSEPH HADLEY, European Agent
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714-715 BOARD OF TRADE BUILDING
PORTLAND, ORE.
FRANK G. TAYLOR, GENERAL AGENT FOR WASHINGTON, OREGON, ALASK

SEATTLE FOREIGN TRADE

SEATTLE'S foreign trade increased very greatly during 1918 as compared with 1917. The values of imports and exports during 1917 and 1918 were:

	1917	1918
Imports	$196,210,883	$300,990,136
Exports	289,078,275	296,190,778

The increase in foreign trade during the last ten years has been 983 per cent, according to a statement of the Seattle Chamber of Commerce. The cargo tonnage for 1917 was 5,000,000 tons; figures for 1918 are not yet available.

Principal Imports

	Value 1917	 1918
Copper in ore, mats and bars	$ 17,131,866	$ 15,731,757
Tea	5,111,049	8,191,992
Tin in bars, pigs	6,000,199	11,605,261
Decorated chinaware	624,731	965,330
Manila hemp, tons	10,429,324	12,318,981
Bags and burlap	3,234,183	12,903,952
Fish and fish products	640,817	1,533,264
Matting	243,887	156,945
Rice	1,304,351	5,885,795
Silk, raw	77,288,587	79,705,235
Silk, waste	1,127,741	2,277,753
Print paper	1,490,524	2,146,334
Coal	889,844	1,257,055
India rubber	22,291,303	56,448,712
Soya bean oil	10,079,877	30,538,148
Chinese nut oil	....	3,549,393
Cocoanut oil	....	9,600,036
Peanut oil	....	6,182,367
Rapseed oil	....	2,395,236
Shellac	....	5,375,328
Peanuts	....	3,626,722
Beans	....	6,559,093

Principal Exports

	Value 1917	 1918
Live stock	$ 228,281	$ ....
Barley	115	....
Oats	33,764	....
Wheat	3,664,007	1,059,345
Wheat flour	3,704,060	2,915,100
Copper and mfrs.	7,342,943	2,118,288
Cotton, raw	37,901,610	61,928,237
Cotton cloth	3,733,945	4,552,029
Canned salmon	2,976,261	1,874,818
Fruit	485,164	1,007,416
Hay and feed	48,718	....
Iron and steel mfrs.	46,923,530	61,998,370
Leather and mfrs.	4,745,791	....
Paper and mfrs.	1,123,010	....
Meat products	970,922	....
Dairy products and eggs	360,219	....
Malt liquors	....	....
Tobacco and mfrs.	8,498,512	10,687,089
Lumber	2,906,636	3,247,336
Automobiles	3,517,350	3,079,043
Condensed milk	2,993,526	6,238,183
Tin plate	....	13,758,033

OPENS SAN FRANCISCO OFFICE

A. C. Worthington, vice-president and general manager of the Maritime Navigation Company, has opened a San Francisco office at 433 California St.

SAN DIEGO FOREIGN TRADE

SAN DIEGO'S commerce increased as to tonnage in 1918 over 1917, although there was a decrease in value, from almost $25,000,000 to $18,600,000. In 1913 the business of the port was about $60,000,000, but, when shipping was withdrawn from the Pacific because of war requirements, San Diego suffered greatly.

Recapitulation, 1918

	Tons	Value
Total Domestic		
Cargo inbound	449,234.4	$ 12,564,668
Cargo outbound	19,750.6	1,677,186
Total	468,985.0	$ 14,241,854
Total Foreign	Tons	Value
Cargo inbound	7,891.5	$ 644,306
Cargo outbound	7,982.8	503,963
Total	15,874.3	$ 1,148,269
Local	Tons	Value
Cargo inbound	319,287.3	$ 1,611,120
Grand Total	1,123,433.9	$ 18,612,363

Recapitulation, 1917

	Tons	Value
Total Domestic		
Cargo inbound	706,289.5	$ 19,408,584
Cargo outbound	15,025.8	2,339,505
Total	721,315.3	$ 21.748,089
Total Foreign	Tons	Value
Cargo inbound	16,638.4	$ 1,041,320
Cargo outbound	6,742.4	491,745
Total	23,381.8	$ 1,533,065
Local	Tons	Value
Cargo inbound	309,630.0	$ 1,708,076
Grand Total	1,054,327.1	$ 24,989,230

Imports and exports were classified as follows by districts:

Imports

	Tons	Value
From Pacific Coast	449,234.4	$ 12,564,668
From Mexico	4,769.5	376,406
From South America	2,990.0	261,300
From Balboa	132.0	6,600

Exports

	Tons	Value
To Pacific Coast	8,850.6	$ 1,520,586
To Atlantic Coast	10,900.0	156,600
To Mexico	2,237.8	364,463
To South America	5,745.0	139,500

The number and net tonnage of vessels arriving and departing during 1918 was as follows:

Arrivals

	Number	Tonnage
Steam	478	519,272
Motor	255	16.272
Barge	30	53,904

Departures

	Number	Tonnage
Steam	475	518,247
Motor	240	15,215
Barge	30	53,904

Passengers were: Coastwise, in and out 19,794; Mexico, 716.

NSURANCE COMPANY
reights and Disbursements
REETS, SAN FRANCISCO, CALIFORNIA

W. H. WOODRUFF, Special Agent
[illegible]0 BYRNE BUILDING
LOS ANGELES

O. G. ORR & CO., Managers
ATLANTIC MARINE DEPARTMENT
37-43 WALL STREET NEW YORK

D BRITISH COLUMBIA, 264 COLMAN BUILDING, SEATTLE, WASHINGTON

TACOMA FOREIGN TRADE

THE import and export business of Tacoma increased approximately $50,000,000 in 1918 as compared with 1917, according to the report of W. G. Rowland, harbormaster. The report gives the following data:

Imports, all kinds, 1,967,142 tons, valued at $193,589,089. The large items of more than a million dollars were as follows: Antimony, $2,053,200; beans, $2,624,475; braids, straw, hemp, etc., $3,008,166; cotton and cotton goods, $1,472,053; canned salmon, 406,662 cases, valued at $3,951,093; gunnies, $1,500,300; hemp, $9,039,327; hides of all kinds, $4,524,127; fuel oil, $2,335,451; logs, 255,639,746 feet, valued at $4,054,295; oils for commercial uses, $16,735,510; ores, all kinds, $34,668,090; paper and pulp, $2,316,798; peanuts, $2,745,618; rubber and products, $17,878,843; rice, $5,200,057; rammie fibre, $1,107,830; silk and products, $17,632,026; tin slabs, $9,918,487; tea, 348,022 packages, valued at $6,060,348; tobacco, $8,301,720; wool, washed and in grease, $3,785,428.

Exports, all kinds, 895,845 tons, valued at $125,024,855. The large items of more than a million dollars were as follows: 900 automobiles, valued at $1,215,833; cotton, $17,646,770; dry and cotton goods, $4,191,609; explosives, $2,325,837; cigarettes, 4,141,924,000, valued at $6,999,499; electrical goods and machinery, $2,632,888; fish, cured and canned, $1,319,528; hardware, $2,120,540; flour, 2,160,474 barrels, valued at $22,747,555; iron and steel, $16,922,902; copper, $3,019,228; lumber, 93,411,078 feet, valued at $2,519,912; milk, $1,145,395; machinery, $8,055,544; oils for commercial uses, $1,626,310; paper and pulp, $2,809,378; tin plate, $5,965,968; tobacco, $3,283,471.

The total value of the imports and exports for 1918 was $318,613,938. This is an increase of nearly $50,000,000, or 20 per cent, over 1917, when the value of imports and exports was $270,264,460. This represented an increase of 37 per cent over 1916, when the value was $212,389,612. The arrivals during 1918 were 12,414 vessels and the departures 12,551.

VEGETABLE OILS FALL OFF

IMPORTATION of vegetable oils, which, as regards San Francisco, consisted largely of cocoanut oil, dwindled during the month. There is a pronounced glut of vegetable oils in the Eastern States, where the situation has been represented as serious. During the war there was an unprecedented demand for oils from which to manufacture glycerine for high explosives, and, of course, that demand virtually has ceased to exist. Moreover, animal fats, which were rigidly guarded during the war, now may be used, for soap, for example, and the soap manufacturers thus are not in the field for cocoanut oil to the same extent as formerly.

There is no serious alarm regarding the ultimate future of the cocoanut oil industry. It is believed that the situation will adjust itself and that there will be a normal peace time demand of large proportions, especially because cocoanut oil is being used more and more widely as an edible oil.

The Eastern glut has extended to the Pacific Coast to such an extent that some companies no longer have tanks available for storage. How greatly the cocoanut oil production of the Philippines increased from 1916 to 1917 may be seen by a glance at the value for the two years—$3,925,734 to $11,409,147.

CUNARD LINE ANNOUNCEMENT

THE chairman of the Southwestern Railway announced at the shareholders' meeting February 22 that Southampton would be the home port of the Cunard Company's larger vessels. Sir Alfred Booth, chairman of the Cunard Line, authorized the following statement:

"The Cunard Line intends to take the place of the German lines in providing a regular service of passenger steamers of the highest class between Southampton on the South Coast of England and Cherbourg on the North Coast of France and New York. It is inconceivable that the Cunard Line, as the premier British line in the North Atlantic, could allow the important passenger traffic between the United States and the Channel ports to be monopolized by foreign-owned companies. The Cunard Line does not intend to abandon any service which it has carried on in the past. On the contrary, new services will be established in many directions as fast as the necessary tonnage can be secured. Meanwhile, whatever steamers are available will be used in the various services to the best advantage in accordance with demands of traffic.

"As between Liverpool and Southampton, Liverpool requires cargo capacity as well as passenger accommodation, while Southampton requires less cargo space. It may, therefore, be taken that the 'Aquitania' and 'Mauretania,' the large ocean greyhounds of the Cunard Line, will eventually be based on Southampton, while the Liverpool-New York service will be equipped with steamers of greater carrying power."

The Men Who Buy the Material—

Left: Charles L. Froding,
Union Construction Company

Right: A. H. Williams,
Bethlehem Shipbuilding Corporation

Left: J. M. Duke,
Pacific Coast Shipbuilding Co.

Right: L. S. Jones,
Benicia Shipbuilding Corporation

Left: K. I. Dazey,
Schaw-Batcher Company

Right: J. M. Cummins,
San Francisco Shipbuilding Co.

—For the Men Who Build the Ships

"CAVEAT EMPTOR" is not so potent a maxim in the business world as once it was. When businesses are so highly developed and managed so ably, buying is removed from the "sight-unseen" stage and takes its place with other important branches of a great industry. The purchasing agent studies markets in the light of the needs of his own plant. The shipbuilding yards of the San Francisco Bay district are fortunate in having an exceedingly able group of buying experts.

Lester F. Stone
W. F. Stone & Son

Charles L. Froding, purchasing agent of the Union Construction Company, Oakland, was born in Michigan, but resided in Wisconsin, and attended the University of Wisconsin. After leaving Wisconsin he became chief draftsman for the Garden City Engine Works of Chicago. While here he made some important sales and was transferred to the sales department and sent to the Pacific Coast, where he has been since. Soon after arriving in San Francisco he became district manager for the Sterling Consolidated Boiler Company. This company sold out to Babcock & Wilcox Company, under the management of Charles Moore & Company. Leaving the Moore Company, Mr. Froding became district manager for the Power Specialty Company and was responsible for the introduction of waste-heat superheaters in the marine field. Mr. Froding is still deeply interested in the problem of effecting steam economy. As purchasing agent for the Union Construction Company he has charge of sales, stores inspection, salvage and the traffic departments.

A. H. Williams, purchasing agent of the Bethlehem Shipbuilding Corporation, Limited, Union Plant, received his early business training around the steel mills of Pennsylvania, of which state he is a native. His Pacific Coast shipbuilding experience began with his employment by the Risdon Iron & Locomotive Works in January, 1904, where he served in various capacities until July, 1911, when he began with the Union Iron Works Company in capacity of estimator. In December, 1915, he was transferred to the purchasing department and was appointed purchasing agent January 1, 1917. Upon the consolidation of the various Bethlehem interests in November, 1917, his position was designated as assistant to the purchasing agent. He recently was elected vice-president of the Purchasing Agents' Association of Northern California.

J. M. Duke is purchasing agent of the Pacific Coast Shipbuilding Company. The company's yard is at Bay Point, California, but Mr. Duke's office is at the city headquarters, First National Bank building, San Francisco.

He has the distinction of having been the first employe of the company, being on the job more than three months before the construction of the plant was started in January, 1918.

For twenty years he was associated with Charles Webb Howard, late president of the Spring Valley Water Company, in a confidential capacity. After the San Francisco fire he was elected secretary of the Spring Valley Company, a post he filled for two and one-half years. When a young man he became cashier of a private bank, and later, in the middle '80's, was engaged in the cattle business in Modoc county.

L. S. Jones for twenty years has been general purchasing agent for the Northern Commercial Company, with headquarters in San Francisco.

The purchasing department of this company, in addition to buying the supplies for the fifteen general merchandise stores which it operates in Alaska and Yukon territory, also handles the purchases for the Benicia Shipbuilding Corporation, Natomas Company of California, Sacramento Northern Railroad, National Metals & Chemical Company, and Alaska Commercial Company.

The range of buying in this office is very wide, covering, as it does, such a variety of different businesses.

K. I. Dazey is the new purchasing agent of the Schaw-Batcher Company's shipyard at South San Francisco, having been appointed to that position a few weeks ago. Mr. Dazey went to the Schaw-Batcher Company from the Pacific Gas & Electric Company, of which he was assistant purchasing agent. He also was in charge of collections. During his eleven years of service with this company, Mr. Dazey gained a wide business experience and acquaintance with the leading firms of San Francisco.

J. M. Cummins, purchasing agent of the San Francisco Shipbuilding Company since it commenced operations as superintendent for the United States Shipping Board Emergency Fleet Corporation in the construction of a yard and concrete ships at Government Island, Oakland, was born in Erie, Pennsylvania. He came to the Pacific Coast in 1900 and engaged in oil-well supply business at Bakersfield, California.

In 1906 he located in San Francisco, entering the employ of Holbrook, Merrill & Stetson, and remaining with them until August, 1918, when he assumed his present position.

Lester F. Stone, purchasing agent of W. F. Stone & Son, wood shipbuilders of Oakland, was born and reared in San Francisco and was educated in the San Francisco public schools, Polytechnic High School and Stanford University. He has been with his father, W. F. Stone, in the ship and boat-building business for the last ten years. Besides his duties in purchasing material for the plant, he has the drafting and designing to attend to, and has a thorough practical knowledge of wooden shipbuilding in every respect.

Women Are Naval Architects

Performing the inclining experiment on the "Ituna." On the left is the forward plumb line and on the right the after. The "Ituna" is below. The young men and young women are members of the University of California class in marine engineering and naval architecture

WOMEN naval architects are newcomers in another field that men formerly held for themselves. Not only are they taking courses in marine engineering and naval architecture, but they are being graduated from the classes of the University of California, often after leading their classes, and are earning good salaries afterward.

Probably for the first time in shipbuilding the inclining experiment was performed by young women—this on the "Ituna," formerly a yacht, the stability of which for fishing purposes it was desired to determine. The work was done by the University of California class, under David W. Dickie, lecturer in marine engineering and naval architecture.

Data for Experiment

Prior to the experiment a set of lines was lifted from the vessel and from them the following data were calculated:

Draft forward at time of the experiment, 7.92 feet.

Draft aft at time of the experiment, 9.90 feet.

Mean draft, 8.91 feet.

Moment of inertia of the water plane, 2/3S y cubed dx=45,590.

Tons per inch immersion, 4.531.

Displacement to mean draft above, 328 tons.

Block co-efficient, .433.

Center of buoyancy above base, 5.42 feet.

Metacenter above buoyancy, $\frac{I}{V}$=4.06 feet.

Metacenter above base, 9.48 feet.

G Z, 1.1433 feet.

Metacentric height, G. M., 1.956 feet.

Correct metacentric height for a vessel of this type, 18 to 24 inches.

Center of gravity above base, 7.61 feet.

The actual experiment was performed by arranging the class of students along the rail, having first weighed them. The total weight was 4000 pounds.

The inclination of the vessel then was marked on a stick by means of a plumb bob swung on a line in a bucket of water, as shown in the photograph. The after plumb bob was swung over the hatch aft of the house with the bucket in the hold.

Shift Weight to Other Rail

When the vessel had come to rest the first mark was made. Then the entire body of students was shifted to the rail on the other side of the vessel, and another mark was made on the stick. Having these data, it was necessary only to substitute in the formula:

$$GM = \frac{w \times d}{\frac{W \times a}{l}}$$

where GM is metacentric height;

w is weight shifted, in this case the weight of the students;

d is distance shifted across the deck;

W is weight of vessel or displacement;

a is distance of mark on the stick;

l is height of pendulum down to stick;

$$GM = \frac{4000 \times 17.5}{\frac{328 \times 7.5}{12.83 \times 12}} = 1.956 \text{ feet.}$$

The first class at the university was started in January, 1918, primarily for officers of the naval reserve. The course now consists of two semesters. Young women led the first and second classes. Two of the women students now are at the Mare Island Navy Yard and one is at the Pacific Coast Shipbuilding Company in the drafting rooms.

Pacific Coast Shipbuilding Returns

Albina Engine and Machine Works, Inc., Portland Ore.

Purchasing Agent, **W. L. Deute.**

Hulls Nos 11 to 19, 300 by 44 by 21.5; engines 22-36-60, 1400-h. p.

Allen Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **G. E. Hunt.**

Two Allen type vessels, 274.6 B. P. by 44.9 by 26.4.

American Concrete Pipe & Shipbuilding Co., Seattle, Wash.

One 7,500-ton concrete steamship.
One 150-foot steam concrete tugboat.
Two concrete scows, 120 feet long.

Ames Shipbuilding and Dry Dock Co., Seattle, Wash.

Purchasing Agent, **Mr. C. A. Barron.**

Twenty-seven vessels under contract, mostly 8800- ton freighters.

Anacortes Shipbuilding Co., Anacortes, Wash.

Purchasing Agent, **Will W. Dunn.**

Six wooden vessels, Ferris type, 281 by 46 by 23.6; engines 19-36-56; 1500- h. p. watertube boilers.

Anderson Shipbuilding Corporation, 602 Alaska Building, Seattle, Wash.

Purchasing Agent, **H. E. Thompkins.**

No. 6, 270 by 43 by 24, 1200-h. p. Scott water-tube boilers, 3-Island type; 3000 ton.

No. 7, 270 by 43 by 24, 1200-h. p. Seabury boilers, 3-Island type, for Oriental Navigation Co.; 3000-ton.

Nos. 8 and 9, 3000-ton dw. motorships. For Christoffer Hannevig, Inc.

Apex Manufacturing Company, Emeryville, Cal.

Purchasing Department, **A Youngholm.**

Three hundred metallic life boats for U. S. Shipping Board.
Thirty metallic life boats for shipyards.
Twelve Catamaran rafts for ship yards.

Astoria Marine Iron Works, Astoria, Ore.

Purchasing Agent, **Mr. J. A. Jackson.**

Completely outfitting 27 Hough and Ferris type wooden vessels.
Contractors for United States and French governments.
Overhauling and repair of ships a specialty.

Babare Bros., Old Town, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. Babare.**

Four wooden freighters, Ferris type.

Ballard Shipbuilding Co., Ballard, Wash.

Purchasing Agent, **Mr. T. W. Smith.**

Three wooden steamers, 215 by 40 by 18.

Ballin Water Tube Boiler Co., Portland, Ore.

Sixteen Ballin type water-tube boilers for eight steamers. For the Supple & Ballin Shipbuilding Co.

Twelve Ballin type water-tube boilers for six steamers building at the G. M. Standifer Construction Corporation.

Barnes & Tibitts, Alameda, Cal.

Purchasing Agent, **Mr. J. J. Barnes.**

Installation of machinery and fitting out nine vessels for Emergency Fleet Corporation.

Benicia Shipbuilding Corporation, Benicia, Cal.

Purchasing Agent, **L. S. Jones,** Alaska Commercial Bldg., San Francisco, Cal.

Hulls Nos. 2735, 2736, Ferris type. Deliveries, March and April, 1919.

Bethlehem Shipbuilding Corporation, Ltd. (Union Works Alameda Plant), San Francisco, Cal.

Purchasing Agent, **Mr. A. H. Williams.**

Four 12,000-ton steel freighters; hulls 169, 170, 215 and 216.
Eighteen 12,000-ton dw. steel tankers.
Contracts for six additional freighters.

Cameron-Genoa Mills Shipbuilders, Ltd., Victoria, B. C.

Purchasing Agent, **Mr. P. D. Bannerman.**

Four Wooden freighters, 250 by 43.6 by 25, 950 h. p., 2800 tons dw.

Ralph J. Chandler Shipbuilding Co., Wilmington, Cal.

Six wooden vessels, 281 feet long.

Chilman's Shipyard, Hoquiam, Wash.

Purchasing Agent, **Mr. Iver Chilman.**

Two 3-mast auxiliary schooners 130 by 33 by 14. One 300-h. p. engine, for Belgian interests.

Coast Shipbuilding Company, Portland, Ore.

Ten wooden freighters, Ferris type, 281.6 and 268 by 46 by 26, 1400 h. p.

Contracts for four additional Ferris type freighters. Deliveries 1919.

Columbia Engineering Works (Linnton), Portland, Ore.

Purchasing Agent, **Mr. C. W. Steele.**

Motor schooner, 188 by 36 by 15.2; two 120-h. p. Skandia engines; name "Mildrel." Delivery February 15th, 1919. For Chris Christenson, Jr.

No. 14, motorship, 173 by 36 by 15.5; single screw Avance 320-h. p. oil engine. Delivery March, 1919. For Chr. Christensen, Jr.
No. 15, topsail schooner, 178 by 36 by 15. Delivery April, 1919.

Columbia River Shipbuilding Corp., Portland, Ore.

Purchasing Agent, **Mr. H. A. Killam.**

Fifteen steel merchant ships, 8800 tons dw., General Electric and De Laval turbines, Scotch marine boilers. Deliveries 1919. Five of above now on ways.

Commercial Boiler Works, Seattle, Wash.

Purchasing Agent, **Mr. J. H. Fox.**

Contracts for:
156 Scotch marine boilers, 14.9 inside dia. by 11 ft. long, H. S. 2695.5 sq. ft., W. P. 210 lbs., for vessels building on Pacific Coast. Delivery, twelve completed boilers per month.

Coos Bay Shipbuilding Company, Marshfield, Ore.

Manager, **Mr. J. H. Polhemus.**

Contracts for four Ferris type vessels. Length over all 281.6, 3500 dw. tons. Deliveries starting November 1st.

J. Coughlan & Sons, Vancouver, B. C.

Purchasing Agent, **J. Joseph.**

Four 8100-ton dw. freighters, 400 by 52 by 31, 3000-h. p., three Scotch marine boilers. For Dominion Government.

Crowley Launch & Tugboat Co., San Francisco, Cal.

..Purchasing Agent, **John L. Crowley.**

Six 28-foot launches with 10-h. p. engines.
Four 45-foot launches with 50-h. p. engines.
Eight covered barges, 125 by 40 by 12.
Derrick barge, 75-ton lifts, 125 by 50 by 12.

J. F. Duthie & Co., Shipbuilders & Engineers, Seattle, Wash.

Purchasing Agent, **E. C. Gaumnitz.**

Fifteen 8800-ton cargo vessels, 2800-h. p., 425 feet by 54 feet x 29.9; Scotch boilers.

Elliott Bay Dry Dock Company, Seattle, Wash.

Local repair work, cleaning, painting and overhauling.

Elliott Bay Shipbuilding Co., Seattle, Wash.

Purchasing Dept., **C. A. Morrow.**

Six vessels, 260 by 46 by 26.
Contracts for five 3500-ton carriers.

Elliott Bay Yacht & Engine Co., Seattle, Wash.

Large amount of repair work.

Feeney-Bremer Company, Tillamook, Ore.

Contract for two wooden ships. Ferris type, 281.6 by 46 by 26.

Foundation Company of British Columbia, Ltd., Victoria, B. C.

Purchasing Agent, **Mr. D. D. Long.**

Twenty 3000-ton dw. twin screw wooden steamers, 293.2 by 47.6 by 23.6, two Scotch marine boilers.

Foundation Co., Portland, Ore.

Local Purchasing Agent, **G. M. Raymond.**

Twenty steam auxiliary schooners, each 280 by 45.6 by 25 feet (moulded); twin engines, triple expansion, 425-h. p. each.

Foundation Co., Tacoma, Wash.

Purchasing Agent, **Mr. Whiteside.**
Seattle Office: Smith Building.

Twenty 5-mast auxiliary schooners 275 by 46 by 24. Twin 350-h. p. steam engines; two watertube boilers. For French government.
Duplicate order now pending.

Fulton Shipbuilding Company, Wilmington, Cal.

Purchasing Agent, **A. H. MacFarland.**

Four Hough design wooden steamers.
Nine Ferris design wooden steamers.

Grant Smith-Porter Ship Company, Aberdeen Shipyard, Aberdeen, Wash.

Purchasing Agent, **Mr. Z. A. Toye.**

Contracts for eleven Ferris type steamers.

The Grant-Smith-Porter Ship Co., Portland, Ore.

Purchasing Agent, **Mr. P. S. Sinnock.**

Contract for fourteen Ferris type ships. Length 286 feet, beam 46 feet, depth 28 feet; two standard E. F. C. boilers.

Grays Harbor Motorship Corporation, Aberdeen, Wash.

Purchasing Agent, Mr. H. L. Rich.

Twelve 4000-ton ships of Ward type. For Emergency Fleet Corporation. Deliveries about two a month.

Great Northern Concrete Shipbuilding Company, Vancouver, Wash.

Purchasing Agent, **Mr. Pacquet.**

No. 3, Concrete hull, 100 by 25 by 12.6. Delivery February, 1919.
Nos. 4, 5 and 6, Same as above.

Hammond Lumber Co., Eureka, Cal.

Purchasing Agent, **W. R. McMillan.**

Seven steamers, Ferris type.

Hanlon Dry Dock & Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **C. J. Foard.**

Twelve cargo vessels, 320.9 by 46 by 26.9; three water-tube boilers. For Emergency Fleet Corporation.

Harrison & Lamond, South Vancouver, B. C.

One auxiliary schooner.

D. W. Hartzell, Inc., Winslow, Wash.

Schr. "Snow and Burgess," Str. "Hyak," barge "Palmyra," Str. "Roosevelt," Schr. "Taurus," Milwaukee Barge No. 4 and Drummond Litherage Barge were docked, repaired and overhauled during the past month.

Helser Machine Works, Inc., Portland, Ore.

Purchasing Agent, **Mr. H. P. Rasmussen.**

20 large size hawser reels for Pacific Coast Shipbuilding Co.

12 same as above for Pensacola Shipbuilding Co.

30 same as above for J. F. Duthie & Co.

44 same as above for The Columbia River Shipbuilding Co.

56 8¼ by 8 single geared winches, single gypsey.

28 8¼ by 8 single geared winches, double gypsey.

56 9 by 9 single geared winches, single gypsey.

All of above winches for Southwestern Shipbuilding Co.

180 cargo winches for Schaw-Batcher Shipbuilding Co.

200 9 by 9 cargo winches.

300 8¼ by 8 cargo winches.

Hesse-Martin Iron Works, Portland, Ore.

Purchasing Agent, **Mr. R. M. Hoffman.**

All auxiliary machinery for ten wooden steamers building by the G. M. Standifer Construction Co.

All auxiliary machinery for twenty-four wooden steamers building by the Grant-Smith-Porter Ship Co., at Aberdeen.

Anchor windlesses, cargo winches, steam capstans and steam steering gears for eight wooden steamers building by Supple & Ballin at Portland.

Forty steam cargo winches for ten steel steamers building by the Northwest Steel Company.

One hundred and thirty anchor windlasses, forty steam steering gears and fifty hand steering gears.

Herzog Electric & Engineering Company, San Francisco

Two 750-h. p. single gear, double reduction De Laval turbines on S. S. "Johanna Smith."

One Herzog double electric steering gear on M. S. "Katherine" at Hanlon Shipyard.

Five De Laval oil separators for Schaw-Batcher Company.

Five De Laval oil separators for the Union Construction Company.

Four De Laval oil separators for Bethlehem Shipbuilding Company.

G. W. Kneass, San Francisco, Cal.

Two tow boats, 60x15, 125-h. p. engine. For Peterson Tow Boat & Lighterage Company.

Twenty lighters for Peterson Tow Boat & Lighterage Company.

Three hundred metal life boats for Bethlehem Shipbuilding Corporation, Union Plant.

One hundred work boats for Emergency Fleet Corporation.

Kiernan & Kern Shipbuilding Co., Portland, Ore.

Purchasing Agent, **Mr. McCall.**

Six composite steamers of Ballin design.

Kruse & Banks, North Bend, Ore.

Purchasing Agent, **Robert Banks.**

Six hulls, Ferris design, 286 by 46 by 28.

Llewellyn Iron Works, Los Angeles, Calif.

Builders of Marine Engines, Boilers, Tanks, etc., for Emergency Fleet Corporation.

Present contracts include 1400-h. p. and 2800-h. p. marine engines with marine boilers for same, for most of the ships being built on the Pacific Coast.

Also reinforced concrete bars for concrete ships being built for the Emergency Fleet Corporation at the San Francisco Shipbuilding Company's yard in Oakland and at the Pacific Marine & Construction Company's yards in San Diego.

Long Beach Shipbuilding Company, Long Beach, Calif.

Purchasing Agent, **Mr. John Craig.**

Ten steel vessels of 9000 tons.

Eight steel steamers, 8,800 deadweight tons each.

Los Angeles Shipbuilding & Dry Dock Co., Los Angeles, Cal.

Thirty-two 8800-ton dw. vessels, 410 by 54 by 29.9, 3500 I. H. P. three Foster water-tube boilers. For Emergency Fleet Corporation. Delivery 1919-1920.

The Wm. Lyall Shipbuilding Co., Ltd., North Vancouver, B. C.

Six auxiliary schooners, 235 W. L. by 44.6 by 20.6 moulded. First three launched.

Two 175-h. p. Atlas Diesel engines for 3 of these.

Two 200-h. p. Fairbanks Morse Semi-Diesel engines for the other three boats.

Eight 1500-ton full powered steamers—compound engines—for French Government.

Marine Pipe and Machine Works, Inc., Seattle, Wash.

Purchasing Agent, **Mr. E. A. Lamb.**

One 6-cylinder Sumner type heavy oil engine, 650-h. p.

One 6-cylinder Sumner type heavy oil engine, 650-h. p. For Chilean Government.

Two 1200-h. p. triple exp. steam engines.

Martinolich Shipbuilding Co., 306 California Bldg., Tacoma Wash.; Yard at Dockton, Wash.

Purchasing Agent, **Mr. Martinolich.**

Three wooden 4-masted auxiliary schooners, 250 by 43 by 21; twin 240-h. p. Skandia engines. For Norwegian interests.

Matthews Shipbuilding Company, Hoquiam, Wash.

Purchasing Agent, **G. F. Matthews.**

Lumber carrier for Hart-Wood Lumber Company, 250 ft. long, capacity 1,500,000 ft.

Two auxiliary 4-masted schooners, 250 by 43 by 21. Twin 240-h. p. Skandia engines. For Mons Isaakson, Norway.

McAteer Shipbuilding Company, Seattle, Wash.

Purchasing Agent. **Mr. Ramm.**

One steel vessel, 160 by 30 by 16.

Two four masted schooners, 250 by 44 by 21; Skandia engines.

McEachern Ship Co., Astoria, Ore.

Purchasing Agent, **Mr. O. E. Draper.**

Ten steamers, 286 by 46 by 28; Hough design.

Meacham & Babcock Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **Mr. W. N. Voegtly, Jr.**

Ten hulls, Ferris type.

Moore Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **M. G. Waites.**

Sixteen 9400-ton dw. steel freighters.

Twelve 10,000-ton dw. steel tankers.

Fitting out:

Monasses (refrigerator). Launched December 20, 1918.

Tuckenuck. Launched January 30, 1919.

Motorship Construction Co., Vancouver, Wash.

Purchasing Agent, **J. W. Dougherty.**

Large number of wooden and metal lifeboats and Columbia River fishing boats.

Also contract for 750 lifeboats for Emergency Fleet Corporation.

National Engineering Corporation, Los Angeles, Calif.

Outfitting ships for Emergency Fleet Corporation.

New Westminster Construction & Engineering Co., New Westminster, B. C.

Purchasing Agent, **Mr. H. M. Fullerton.**

Four 2800 dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

Five 1500-ton dw. wooden freighters, 204 by 40.6 by 17, 550-h. p. twin engines, watertube boilers.

Nilson & Kelez, Seattle, Wash.

Purchasing Agent, **Mr. Kelez.**

Eight wooden hulls, Ferris type.

Northwest Steel Company, Portland, Ore.

Purchasing Agent, **Mr. W. C. Smith.**

Sixteen freighters, 425 o. a. by 54 by 29.9, 8800 tons dw.; geared turbine drive; 3 Scotch boilers fitted for either coal or oil fuel.

Eight freighters, 425 o. a. by 54 by 29.9, 8800 tons dw.; geared turbine drive; 3 Scotch boilers fitted for coal.

Ten freighters, 3000-h. p. turbine engines.

Pacific American Fisheries, South Bellingham, Wash.

Purchasing Agent, **Mr. B. U. Slyster.**

Seven wooden steamers, 281 by 46 by 26, 1500-h. p. water-tube boilers. Deliveries starting October, 1918.

Pacific Boat & Iron Works, Portland, Ore.

Two hundred metal lifeboats and 100 liferafts for steel yard in this district.

Contract for several Corser's one-man simultaneous releasing hooks for lifeboats.

Pacific Coast Shipbuilding Co., 317 First National Bank Bldg., San Francisco, Cal.

Purchasing Agent, **Mr. J. M. Duke.**

Purchasing Agent, Bay Point, **Mr. A. C. Lewis.**

Ten 9500-ton dw. steamers.

Pacific Construction Co., Ltd., Coquitlam, B. C.

Purchasing Agent, **Mr. R. W. Holland.**

Two 2800-ton dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

No. 3, Wooden steamer, 250 by 43.6 by 25, 1000-h. p. water-tube boilers.

No. 4, Same as No. 3.

Nos. 5 and 6, 1500-ton full-power barges, 204.8 by 39.8 by 17, 275 I. H. P. engines, 5 water-tube boilers.

Pacific Marine Iron Works, Portland, Ore.

Purchasing Agent, **Mr. V. L. Hamlin.**

Contracts for twelve 1600-h. p. triple expansion engines.

Contracts for six 1400-h. p. triple expansion engines.

Thirty-two boilers for Standifer Construction Co.

Sixteen boilers for Supple & Ballin Shipbuilding Co.

Patterson-MacDonald Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **W. J. Thomas.**

Ten wooden steamers, 281.6 by 46.10 by 27, twin screw, triple expansion engines, 1550-h. p. 30"-15½-25½-42. Two Heine boilers.

Pacific Shipbuilding Corpn., Seattle, Wash.

Purchasing Agent, **C. H. Jones.**

Yard designed with six building ways.

Peninsula Shipbuilding Co., Portland, Ore.

Purchasing Dept, **Mr. H. H. Fisher.**

Contracts for twelve steamers, 287 by 49.8 by 27.6. To be equipped with Westinghouse turbines.

Puget Sound Boiler Works, Seattle, Wash.

One Scott Patent Water Tube Boiler, 200-h. p. pressure, for Anderson Shipbuilding Co.

Contracts for condensers, water feed tanks, boiler casings and smoke stacks.

Large amount of local marine repair work.

Puget Sound Bridge & Dredging Co., Seattle, Wash.

Purchasing Agent, **Mr. Moore.**

Complete installation of machinery for twenty-four wooden vessels.

Two wooden hulls, Grays Harbor Motorship type.

Six 5,000-ton wooden hulls.

Geo. F. Rodgers & Co., Astoria, Ore.

Purchasing Agent, **W. N. Browning.**

Contracts for two 3500-ton cargo carriers

Six hulls, Ferris type, 3500 tons dw., 281.6 by 46 by 26. For U. S. Shipping Board.

Rolph Shipbuilding Company, Eureka, Cal.

Purchasing Agent, **John D. Stelling.**

Three wooden steamers, to be fitted with 1000-h. p. triple-expansion engines and two Union Iron Works Heine boilers. To builders' account.

Three four-masted barkentines, 1,650,000 feet lumber capacity. To builders' account.

Sanderson & Porter, Raymond, Wash.

Purchasing Agent, **Mr. Wm. Evans.**

Four wooden hulls, Ferris type, standard wood steamships. Delivery 1919.

S. S. Bingamon. Launched January 14, 1919.

San Diego Marine Construction Co., San Diego, Cal.

Purchasing Agent, **C. W. Stose.**

No. 132, "U. S. No. 2," 35 by 7 by 2, 150-h. p.

No. 135, "U. S. No. 3," 40 by 7 by 2, 200 h. p.

San Francisco Shipbuilding Co., 310 California St., San Francisco, Cal.

Purchasing Agent, **Mr. J. M. Cummins.**

Two 7500-ton dw. bulk oil steamers and one 7500-ton dw. freighter, reinforced concrete, at Government Island Plant, Oakland, Cal.

Schaw-Batcher Company, South San Francisco

Purchasing Agent, **Mr. G. B. Merritt.**

Eight single-screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2500-h. p. Curtis turbines, 4 Heinie boilers.

Ten single-screw freighters, 8800-ton dw., 427 by 54 y 29.9; 2800-i. h. p. reciprocating engines; three Sctoch boilers. Deliveries 1919.

Schofield Engineering Company, San Diego, Cal.

Contracts for eight concrete ships of 7500 tons.

Seaborn Shipyards Company, Tacoma, Wash.

Purchasing Agent, **P. J. Anderson.**

Fourteen hulls, Ferris type. Deliveries by April, 1919.

Four-way yard prepared for any kind of wood construction.

Seattle Machine Works, Inc., Seattle, Wash.

Purchasing Agents, **Frank H. Wheelon** and **D. Crause.**

Eight 2700-h. p. triple-expansion engines for Skinner & Eddy Corporation.

Six 750-h. p. triple-expansion engines for Pacific American Fisheries.

One 500-h. p. triple expansion engine for McAteer Shipbuilding Co.

Seattle-North Pacific Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **Lyle C. Bankson.**

Ten freighters, 402.5 by 53 by 34.5. Parson turbine, three Foster boilers. Deliveries 1919.

Skandia Pacific Oil Engine Co., Oakland, Cal.

Purchasing Agent, **Mr. L. M. Bliss.**

Twenty 825 B. H. P. Werkspoor Diesel engines for installation in 5600 tons steel fabricated motorships.

Six 500-h. p. Skandia oil engines; four 240 h. p. and six 120 h. p. engines.

Additional engines of smaller capacity.

Skinner & Eddy Corporation, Seattle, Wash

Purchasing Agent, **Mr. W. H. Borrow.**

Contracts for sixty 9600-ton dw. freighters.

Sloan Shipyards Corporation, Olympia, Wash.

Purchasing Agent, **Mr. L. P. Byrne.**

Sixteen freighters, 281.6 by 46 by 26, 19-32-56 by 36; 1400-h. p.

Smith & Watson Iron Works, Portland, Ore.

Purchasing Agent, **Mr. H. W. Bates.**

Contracts to furnish all castings, fittings, condensers and auxiliary machinery for thirty-two ships building by Columbia River Shipbuilding Corporation.

Somarstrom Shipbuilding Co., Columbia City, Ore.

Four wooden steamers, Hough design, 288 feet long.

Four wooden steamers, Ferris type.

Southwestern Shipbuiding Co., Los Angeles, Calif.

Twenty-three single screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2800 i. h. p. reciprocating engines; three Scotch boilers. For U. S. Shipping Board.

Standard Vault & Metal Works, Portland, Ore.

Purchasing Agent, **Mr. R. G. E. Cornish.**

Life boats, life rafts.

Sheet metal equipment for ships.

G. M. Standifer Construction Corp., North Portland, Ore., and Vancouver, Wash.

Purchasing Agent, **Mr. H. Luckett**, Vancouver, Wash.

Four wooden freighters, 281 by 46 by 26; 1700-h. p., Ferris type.

Five composite steamers, Ballin design, 4500 tons.

Fifteen steel steamers, 9500 tons. Delivery early in 1919.

Stephens Bros., Stockton, Cal.

Two wooden towboats, 50 by 13 by 8, for Island Transportation Co.

One towboat, 40 by 11 by 6, for Bay and River Dredging Co.

Nine 65 by 14 passenger launches, each equipped with two 90-h. p. 6-cylinder Wisconsin motors. For the Delta Transportation Co.

St. Helens Shipbuilding Co., St. Helens, Ore.

Purchasing Agent, **Mr. Barnett.**

No. 42, schooner, 286 o. a. by 48 by 27; to the order of Chas. R. McCormick & Co.

Fort Sheridan, launched February 11, 1919

Fort Shaw, launched February 11, 1919

W. F. Stone Shipbuilding Co., Oakland, Cal.

Purchasing Agent, **Mr. Frank Stone.**

Four 150-foot wooden hulls for seagoing tugs, 30-foot molded beam by 17 ft. depth.

Miscellaneous repair work.

Supple & Ballin Shipbuilding Corporation, Portland, Ore.

Purchasing Agent, **Mr. Charles Burton.**

Eight 4500-ton steamers, Ballin design, 309 feet o. a. by 44 by 26, diagonal planked, steel reinforcing on top sides, single screw; 1500-h. p.

Nos. 9 to 12, Same as above.

Tacoma Shipbuilding Company, Tacoma, Wash.

Purchasing Agent, **Mr. D. D. McKay.**

Contracts for six Ferris type vessels. For U. S. Shipping Board.

T. R. Trahey, Ballard, Wash.

One oil barge, 110 feet long and 32 feet wide, capacity 150,000 gallons. For General Petroleum Company

Tregoning Boat Co., Seattle, Wash.

Purchasing Agent, **Mr. C .Tregoning.**

A large number of lifeboats and ship power launches.

Todd Dry Dock & Shipbuilding Co., Tacoma, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

Eight cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 watertube boilers.

Twenty-four cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 S. E. S. boilers.

All of above for Emergency Fleet Corporation. Deliveries by January, 1920.

"Cascade," cargo vessel, 380 by 53 by 23.9, 2500 h. p. three S. E. S. boilers. For Emergency Fleet Corporation. Delivery March, 1919.

Todd DryDocks, Inc., Harbor Island, Seattle, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

General drydock and repair work.

Union Construction Company, Oakland, Cal.

Purchasing Agent, **Mr. Chas. L. Froding.**

Contracts for 10 steel ships of 9400 tons.

Vancouver Shipyards & Engine Works, Ltd., Vancouver, B. C.

Contracts in hand for two wooden vessels.

Wallace Shipyards, Ltd., North Vancouver, B. C.

Purchasing Agent, **Mr. C. Wallace.**

Three steamers, 300 by 45 by 27, single screw, reciprocating engines.

Contracts for four 8,100 dw. steel vessels.

Western Canada Shipyards, Ltd., Vancouver, B. C.

Five 195 by 39.8 by 17 watertube boilers.

Willamette Iron & Steel Works, Portland, Ore.

Purchasing Agent, **Mr. R. B. Woodbury.**

177 high-pressure, three-furnace, Scotch marine boilers for vessels building in Pacific Coast yards.

Building and installing all machinery on Northwest Steel Company's hull, 15 to 24, inclusive.

Building and installing all machinery on G. M. Standifer Construction Corporation's wooden hulls, 24 to 29, inclusive.

Wright Shipyards, Tacoma, Wash.

Purchasing Agent, **W. G. Wray.**

Five wooden vessels, 281.6 by 46 by 26; Ferris type. For Emergency Fleet Corporation. Delivery March 1 to August 1, 1919.

Wilson Shipyards, Inc., Seattle, Wash.

Three building-ways ready for constructing wooden vessels up to 3500 tons.

Wright Shipyards, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. P. Wright.**

Two wooden steamers, "Elissa" and "Endymion," 3500 tons each, length 282 feet, beam 46, depth 26. For U. S. Shipping Board.

Yarrows, Ltd., Esquimalt, B. C.

Two shipways suitable for building vessels up to 350 feet in length.

Marine repairs a specialty.

OTHER SHIPBUILDING COMPANIES

American Shipbuilding Company, Warrenton, Ore.
Ballard Marine Railway Company, Seattle, Wash.
Chico Shipbuilding Co., 4185 Arcade Building, Seattle, Wash.
Clapp & Reed Shipbuilding Company, Seattle, Wash.
Columbia River Shipbuilding Co., Vancouver, Wash.
Craig-Wilde Ship Company, Los Angeles, Cal.
Wm. Cryer & Son, Oakland, Cal. W. E. Cryer, Purchasing Agent.
Fellows & Stewart, Inc. V. B. Stewart, Purchasing Agent, Wilmington, Cal.
French-American Shipbuilding Corp., 418-420 Marsh-Strong Bldg., Los Angeles.
Halstrom Shipbuilding Co., Inc., Seattle, Wash.
International Shipbuilding Company, Columbia City, Ore.
King & Winge Shipbuilding Co., C. B. Winge, Purchasing Agent, Seattle, Wash.
Marine Iron Works, Seattle, Wash.
Mare Island Navy Yard, Mare Island, Cal.
Muller Shipbuilding Company, 410 I. N. Van Nuys Building, Los Angeles, Cal.
Oceanic Shipbuilding Co., Milwaukee, Ore.
John E. Price & Company, Hoge Building, Seattle, Wash.
Port Blakeley Shipyard, Port Blakeley, Wash.
Puget Sound Navy Yard, Bremerton, Wash.
T. B. Puck & Co., Honolulu, T. H.
Raymond Shipbuilding Co., Raymond, Wash.
Sehrs Shipyard, Port Townsend, Wash.
South Bend Shipbuilding Co., South Bend., Wash.
Southern California Shipbuilding Corporation, 405 Trust & Savings Bldg., Los Angeles, Cal.
H. D. Stewart Shipbuilding Company, American Bank Building, Seattle, Wash.
Union Timber & Products Co., O. L. Craven, Pres., Port Towsend, Wash.
United Shipbuilding Corporation, Hoge Bldg., Seattle, Wash.
U. S. Steel Shipbuilding Corp., Ltd., Los Angeles, Cal.
Varney Shipbuilding Corporation, Seattle, Wash.
Washington Shipbuilding Corp., C. E. McMasters, Pres., Burke Bldg., Seattle, Wash.
West Coast Shipbuilding Co., H. W. Hellman Bldg., Los Angeles. Cal.

Anchor Chains by the Mile

THE smith reaches his climax in the art of making chains. Whether they be dog chains, fetter chains, chain mail, watch chains, logging chains, the idea conveyed is that of security. In no other form of the genus chain is this more manifest than in the anchor chain of a vessel. These in English literature have always been associated with trustworthiness and inherent qualities of strength. To this day the greater part of the work involved in manufacturing anchor chains is hand labor by the skilled blacksmith.

The Seattle Chain Company claims to have the only chain factory west of Chicago and the best equipped chain plant in the United States.

Starting in a small way on chain for saw-mills, logging, railroad construction and mining development, this company in 1913 occupied a small corrugated iron shed about twenty-five feet square, with two small fires. When the war brought to Seattle a revival of the shipbuilding industry, the Seattle Chain Company rose to the occasion, and, surmounting great difficulties, has been able to install a plant which met not only the local needs of the Emergency Fleet Corporation and the French Government, but has been able to fill orders for Eastern shipbuilders.

At present the plant is employing seventy-five men, who are among the best paid mechanics on the Coast. Specially refined iron to the amount of 250 tons is used every month. All sorts of chain are manufactured, but the company is especially proud of its 2⅜-inch stud link anchor chain manufactured for the Emergency Fleet Corporation. These chains have to pass a proof test of 204,120 pounds and a breaking strain of 285,600 pounds before being accepted. The weight of this chain is about fifty pounds to the foot in length, so that, in round numbers, 250 tons of iron would make two miles of chain. The hydraulic machine used in testing these chains has a capacity of 400,000 pounds, and is licensed by American Bureau of Shipping, Lloyd's Register of Shipping, and the United States Government.

The illustrations tell the story much better than words. All large chains are practically hand made. They are forged out of specially refined iron one link at a time, and a perfect weld must be made at the closing of each link.

The Seattle Chain Company is to be congratulated on the showing it has made, and we predict it will form a strong link in the chain of auxiliary industries that will make shipbuilding a permanent institution on the Pacific Coast.

Finding and Stopping Waste in Modern Boiler Rooms. 275 pages; numerous illustrations, diagrams and tables. The Harrison Safety Boiler Works, Philadelphia, Pa. $1 net.

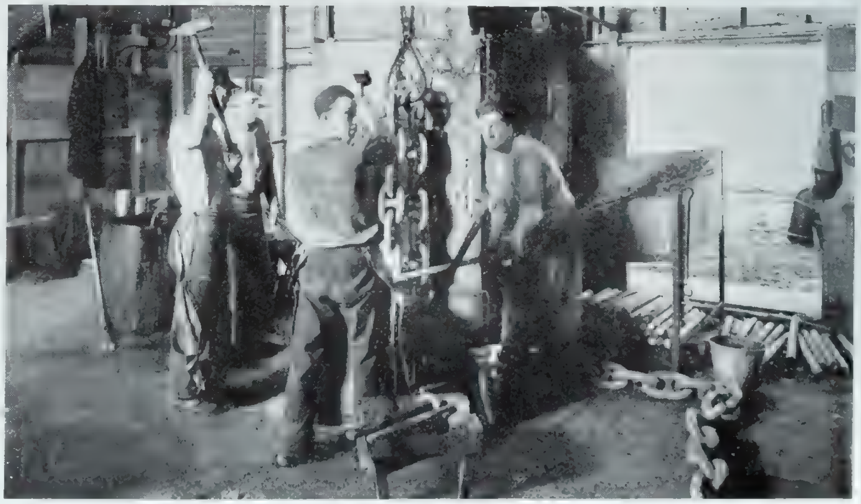
Careful compilation and comprehensive treatment combine to make this a very useful reference manual for the owner, manager, or boiler operator who is endeavorng to secure and maintain plant economy.

(Section continued on Page 163)

Plant of the Seattle Chain Company

Chain-testing machine, capacity 400,000 pounds; licensed by Lloyds, Bureau Veritas and American Bureau of Shipping

A steam hammer making shackles



Making stud link cable chain

THE "CHIEF" CABLES FROM MANILA

"Arrived here February Thirteenth, 4956 Miles in 28 Days, 17 Hours Everything Perfect"

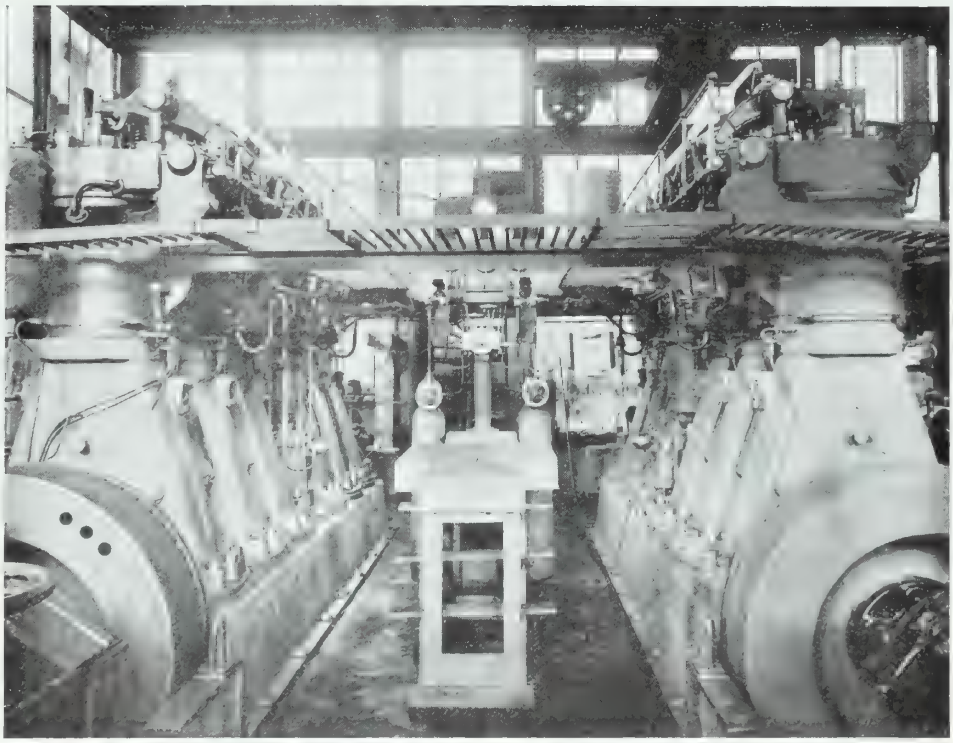
The full-powered motorship "Libby Maine" equipped with Dow Full Diesel Engines

DOW FULL DIESEL TYPE OIL ENGINE

The superiority of the Dow Full Diesel Type Marine Oil Engine is proven on every trip made by the full-powered M/S "Libby Maine."

Fuel economy on this 3000 ton ship of 4.46 gallons per mile, or .403 pound per B.H.P. hour. Lubricating oil—13 gals. per 24 hours.

We are prepared to make prompt delivery of 320 B.H.P. and 500 B.H.P. Engines.



DOW PUMP AND DIESEL ENGINE CO.

GENERAL OFFICES

ALAMEDA CALIFORNIA

Why —Kill the Men, Kill Time

and keep up the high cost of unloading, when an M & G improved inclined truck haul for cargo aprons will save *men, time* and *money?*

Will handle over 1500 trucks an hour at a cost of a few cents for power—better talk it over with M & G engineers.

ENGINEERS **Meese & Gottfried Company** MANUF'RS.

Conveying, Elevating, Screening and Power Mechanical Transmitting Machinery

SAN FRANCISCO SEATTLE PORTLAND LOS ANGELES

PLEASE MENTION THE PACIFIC MARINE REVIEW WHEN YOU WRITE

A Complete Brass Manufacturing Plant

THERE is a wide difference between a brass foundry working on rough, brass jobbing work and a complete brass manufacturing establishment equipped to handle all types of soft metal, from the rough casting to the complete, finished product. The various processes of manufacture must include turning and finishing; oftentimes also plating and burnishing, and afterwards assembling of finished parts for the manufacture of valves, oil burners, machine parts, etc. The Golden Gate Brass Manufacturing Company is justified in laying claim to the fact that it is a complete brass manufacturer. A study of the plant, located at 251 Second street, San Francisco, shows a wise selection in shop equipment. Two Jones' revolving brass furnaces of large capacity are capable of melting metal at a minimum cost in fuel, labor and time. These large furnaces are continually in operation, which is shown by the fact that this shop is pouring on an average over 30,000 pounds of metal a month.

J. E. Ridley and H. Reaside are the proprietors of this busy plant. These men are practical brass foundrymen and brass manufacturers. In the various manufacturing processes throughout the plant, these men are capable of personally handling the work on hand, and this fact is no doubt a big factor in the success of their establishment.

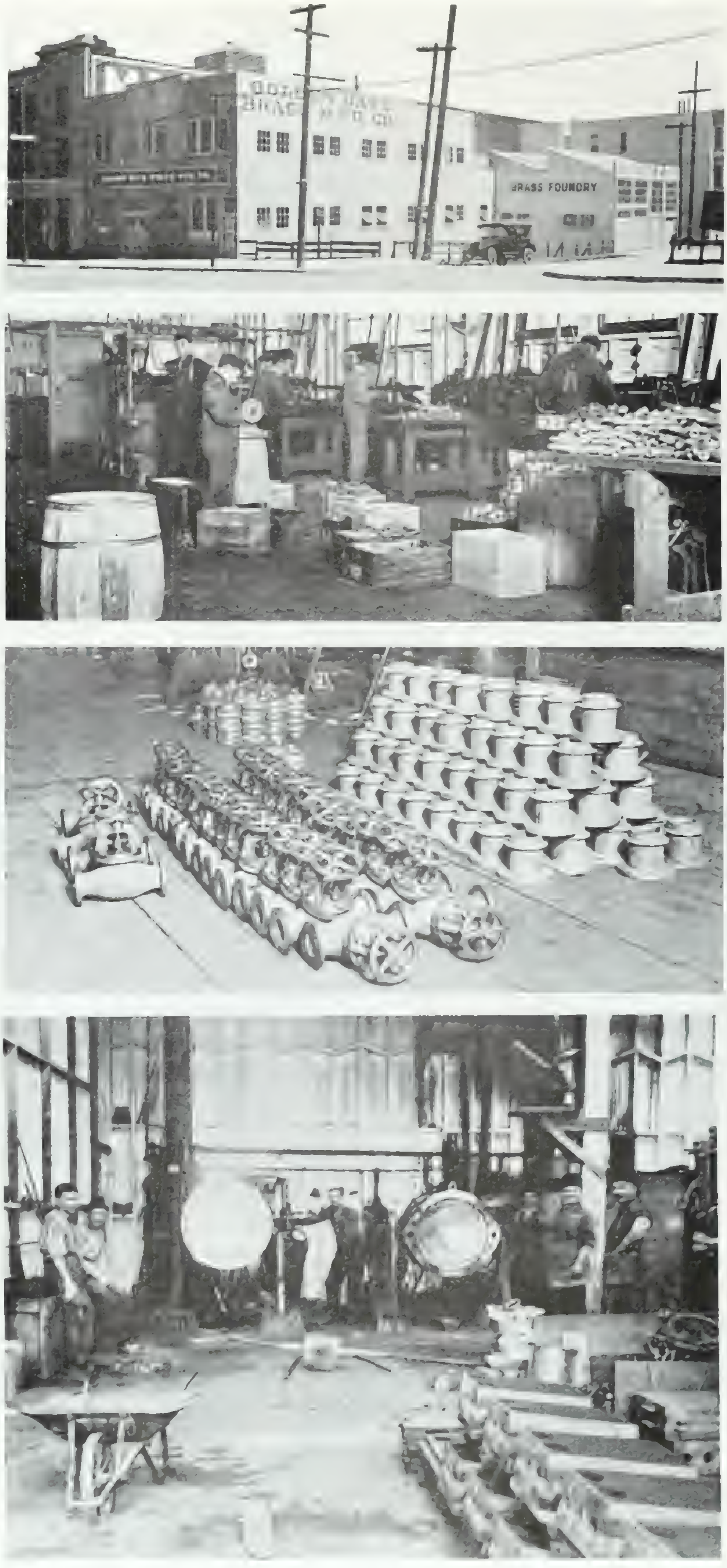
Originally this company's only business was brass finishing. Today the line consists of brass, bronze, copper and aluminum castings, finishing, nickel-plating and polishing, and the plant contains a department for each branch of the work. The chief production is ship equipment, although the company does soft metal work.

ECCLES & SMITH COMPANY OBTAIN NEW LINE

ECCLES & SMITH COMPANY are to be congratulated upon having been appointed exclusive selling agents of the fine shop tools manufactured by the Seneca Falls Manufacturing Company. This line includes high-grade screw-cutting engine lathes, which are manufactured in sizes 9, 11, 13 and 14 inches. Mr. Root, one of the executives of the Seneca Falls Company, on a recent trip to San Francisco, complimented the local organization very highly. Mr. Root was impressed by the complete distributing organization of Eccles & Smith Company, who have stores and warehouse stocks in Portland and Los Angeles as well as at their headquarters in San Francisco.

Of considerable interest to shop tool users is the price guarantee arrangement which has been made by the manufacturers of the Star line of lathes. The Seneca Falls Manufacturing Company will issue through Eccles & Smith Company a guarantee certificate to cover each Star lathe and attachment sold during the year 1919. The guarantee will state: "Should a decline in price of Star Lathes occur during the year 1919, the manufacturers will rebate to the purchaser an amount to cover any decrease in price during the year 1919."

(Section continued on Page 164)



Top: Plant of Golden Gate Brass Manufacturing Company. Second: One end of the finishing department. Third: Valves and brass castings manufactured by the Golden Gate Company. Bottom: Brass furnaces.

Steel Shop Built in Sixty Days

A row of tanks, McDougall-Overmire Company

The McDougall-Overmire plant of Portland, Oregon, was built at a time when it was almost impossible to procure materials, tools or labor.

On September 1, 1918, the incorportors and owners, A. D. McDougall, Nat McDougall and C. C. Overmire, had made no plans for going into business.

On September 2, the company was incorporated and the results obtained will show that no time was lost in getting the plant in shape. Equipment was purchased which is capable of producing structural steel for tanks, boilers, riveted pipe, bridges, buildings, etc. On October 1 the building was completed and the tools installed. On November 1 the first shipment left the plant, and shipments have been made steadily ever since. A derrick was built, and with this derrick and a crew of eight men, the building, 70 by 270 ft., was erected in three days, erection starting on the east end of the building on Monday morning and the derrick moved out of the west end of the building Wednesday night with the roof in place.

While the erection of the building was going on, some of the tools were being set.

All of the tools in the plate shop are capable of handling up to and including three-quarter inch material. The plant has been so designed that the material moves forward from the laying out room to the erection floor, passing first through the large splitting shear; thence to the circle shear, if any irregular cutting is necessary; then to the 36" punch; then to the bevel shear, and then either to the pneumatic flanger or the large rolls. The large rolls will take a 1 ft. 6 in. plate, the top row being 12½ inches in diameter. A small set of rolls is also included in the equipment which will roll up to and including one quarter inch plate up to 4 ft. 6 in. wide.

A 12 ft. 6 in. clamp is used for the turning of the corners and on all flange heads; a 24 inch punch is used for the punching of angles and the miscellaneous small material, and it is also used both for shearing small plates and angles.

It was found impossible to obtain reasonable deliveries on a radial drill, so the drawings were made and a 9 ft. 6 in. arm radial drill was built at the plant. In addition to this, the boiler shop equipment includes two drill presses and a flue drill, together with all miscellaneous small tools, such as air hammers, reamers, caulking tools, etc.

The machine shop side of the plant is served by an 80 h. p. Bucyrus boiler, 1200 pound steam hammer, a 30 inch lathe, a 28 inch planer, shaper and milling machine. The tools in the plant are independently electrically operated so that any tool or any portion of the plant may be operated independent of any other tool or any other portion of the plant.

In addition to the above, the company will install, immediately after arrival, a combination punch and angle shear, a combination saw and milling machine. The milling machane will be used for the milling of column ends and compression members for bridges, also six gap riveters, so that in addition to the boiler and tank work the shop will be able to take care of all classes of structural steel work required for buildings and bridges.

The plant is equipped with one 14 by 16 foot straight line Chicago Upperfort steam compressor, a 12 by 14 Denver Engineering Works electric compressor and a 10 by 14 by 16 Duplex Ingersoll-Rand electric compressor.

It was found impossible to obtain reasonable deliveries for cranes and the company built one twenty-ton electric crane, which serves the entire shop, running the entire length of the shop through the center panel. The plate shop is served by two 3-ton hand-operated cranes, and each bay of the erecting shop is served by two 3-ton hand-operated cranes. In addition to the above, overhead travelling cranes, the 36-inch punch, the 24-inch punch, the bevel shear, the pneumatic flanger, the clamp and the steam hammer are each served with a 2-ton jib crane.

In the shop, McDougall-Overmire Company

At the completing of the erection of the building, the stiff-leg derrick was skidded to its present position, jacked up and mounted on wheels so that it now moves the full length of the yard, and is used for unloading the material from the cars, putting it in the storage yard, and also handles the material from the storage yard onto cars on which material is taken into the plant.

On account of the impossibility of obtaining rods and timber of a desired size it was necessary to build the plant in three bays, the outside bay being twenty-five feet wide and the center bay twenty feet wide.

The lavatory is pronounced by the city health officer as being the most sanitary of any in the city. A drinking fountain is installed at either end of the shop.

The machine and plate shop end of the building is entirely enclosed and the south and west sides of the erecting shop are enclosed.

FOLDER DESCRIBES THOR TOOL

A Thor Drill

A new folder describing the Thor portable electric drills and grinders has been issued by the Independent Pneumatic Tool Company, Chicago. The drills are made in nine sizes, for drilling from ¼ inch to 2 inches; for reaming from 3/16 to ⅞, and for wood boring from ⅜ to 3 inches. Weights vary from six pounds to sixteen. The largest size, No. 6, is a grinder only, and No. 4 is a two-inch driller. The folder is illustrated with ten cuts, illustrating the different drills.

(Section continued on Page 165)

WILLIAM D. SQUIRES

To gain a technical and practical knowledge of packing requires a wide range of experience in power plants, factories and other places where pumps, engines and other mechanical appliances are used, and an exhaustive study of the problems that continually confront the engineer. Steam leaks, water leaks, or leaks of any kind usually are costly, and there is generally some type of packing that will overcome leakage and reduce friction to the minimum.

William D. Squires is widely known as an authority on the subject of packing, and is expert in prescribing the particular type suited to the job. His experience in this connection dates from the time when, at the age of seventeen, he was in command of a passenger steamer on Seneca Lake, New York.

At the age of nineteen Mr. Squires entered the service of a company that manufactured steam packing. One year later he went with the Garlock Packing Company of Palmyra, New York. Four years later he was sent West by the Garlock Packing Company to take charge of the sales department of their San Francisco branch. San Francisco climate put even more energy into his system. At twenty-five he was promoted to be Pacific Coast manager of the firm. Now, at forty-one years of age, he is the executive head of the Pacific Coast Rubber & Supply Company, one of the most progressive houses in their line on the Pacific Coast.

William D. Squires

REPORT OF FIREMAN'S FUND

The annual statement of the Fireman's Fund Insurance Company for 1918 contains the following data relating to marine insurance: Net premiums, $6,736,040; net losses paid, $5,249,999. For 1917 the figures were: Net premiums, $8,686,241; net losses paid, $3,881,009.

ORGANIZE NEW COMPANY

The Merchants' & Shippers' Insurance Company is being organized in New York City. It will be under the general management of Isaac H. Klein and will do a strictly marine business. The capital will be $200,000.

(Section continued on page 167)

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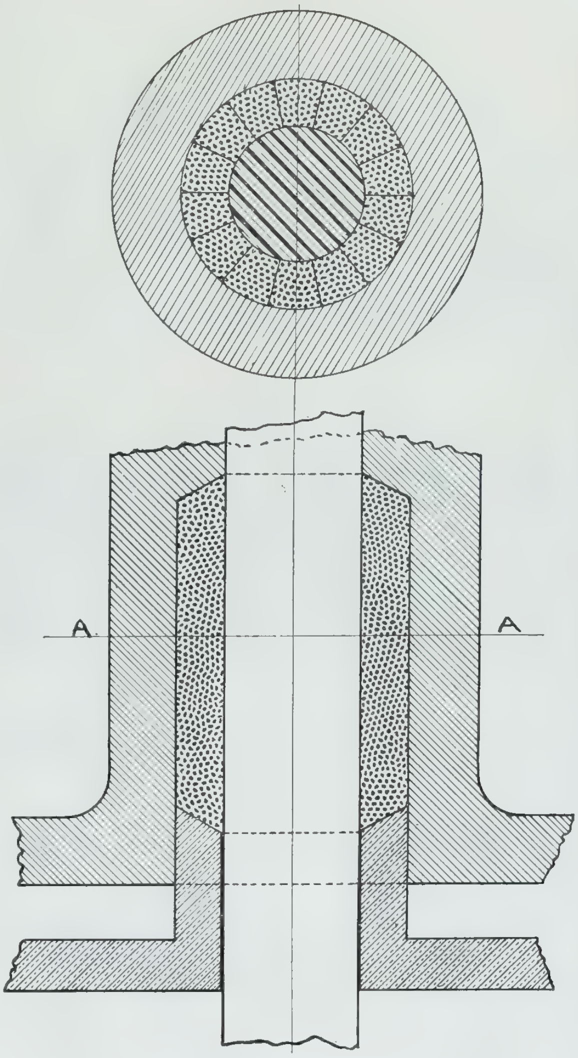

The above illustrates the method of packing with Victor Semi-Metallic Packing. This packing, which is manufactured by master steam-engineers, is supplied in small segment bars which are placed in the stuffing box and after box warms up the packing amalgamates into a flexible metallic bushing. Victor packing is leak-proof and frictionless; will resist the highest temperatures and will not score the valve stem or pump rod as will soft packing.

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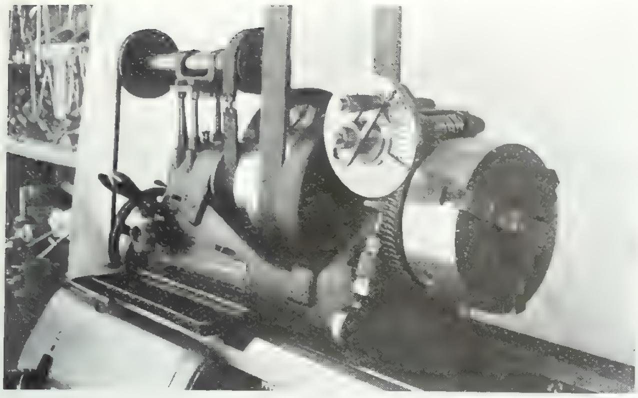


Figure 1

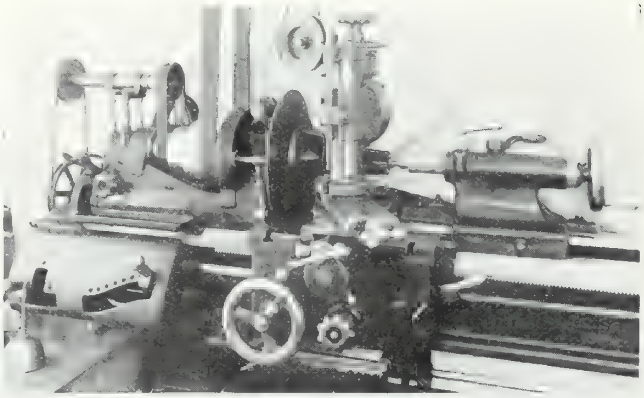
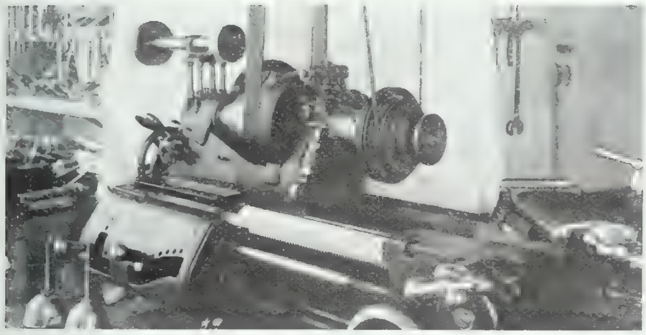
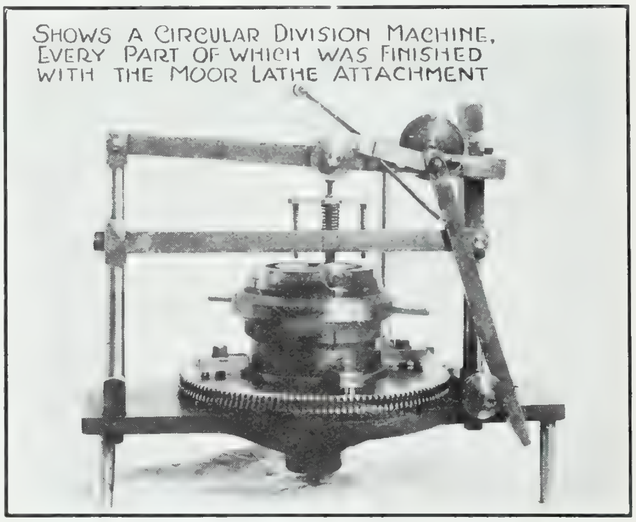


Figure 2



High-speed wood-turning attachment



SHOWS A CIRCULAR DIVISION MACHINE, EVERY PART OF WHICH WAS FINISHED WITH THE MOOR LATHE ATTACHMENT

By Edw. N. Moor

IN the February issue of Pacific Marine Review was published a general description of the Moor lathe attachment for milling and grinding. The present article is intended to show the flexibility of this new machine tool and the wide range of work that can be undertaken through it by the engine lathe.

In order to cut horizontal slots on a cylindrical surface, whether it be double keyways on a shaft or the teeth on a gear wheel, some device for circular feed to accurate divisional spacing is necessary, and for the Moor lathe attachment this is provided in two ways. The first of these is shown in Figure 1. A hand-operated universal division plate actuates the circular feed of the work through a worm and work gear, the latter bolted to the back of the chuck. This worm and division plate are carried on a trunnion so that they may be swung out of gear when not in use.

The method of fastening the worm gear to either chuck or face-plate is very simple, and all chucks and face-plates of any engine lathe can be very easily fitted to take the worm-gear so that the change can be made in a very few moments.

In Figure 2 is shown the second method of getting this circular spacing. An index pin carried on a hinged arm adjustable in length holds the direct circular division plate which governs the circular spacing of the work.

In order to insure perfect alignment and finish of surface cut by the milling tool, it is still necessary to arrange a method of longitudinal power feed for the tool carriage while the spindle remains stationary. This is accomplished by pulling the driving pin on the main gear and belting the small end of cone, as shown in both Figures 1 and 2, through a short counter-shaft and pulleys to the gears driving the feed-screw. The illustrations show very plainly the method of carrying the bearing for this shaft. Now, with the back gears thrown out of mesh, we have a live cone only to drive the feed-screw and a dead spindle used to hold the work. The lateral feed is taken care of by the micrometer feed of the cross slide, so that now the Moor lathe attachment becomes, in connection with the lathe, a universal milling and grinding machine.

A little experience will enable any skilled operator to make the change from lathe to universal milling machine in a very few seconds. Within its capacity the lathe so equipped will do everything that it is possible for a universal milling machine to do with equal accuracy and dispatch.

There is an equally important function possessed by this Moor lathe attachment which no universal milling machine possesses—namely, that of accurate grinding. By substituting the grinding quill for the milling quill the attachment becomes a grinding machine with all the variation in speed necessary to adapt it for any abrasive wheel used in ordinary practice, and with micrometer adjustments of feed permitting the utmost accuracy in work. A holder for diamond dressing-tool can be clamped to the lathe bed and the abrasive wheel faces properly cared for without running to the tool room. This same holder can be used for various purposes, such as holding a spring finger to insure position of work in the lathe.

Another accessory which is available for use with the overhead drive is the high speed lathe attachment for wood turning. This screws into the lathe head, is provided with anti-friction bearings, and will give speeds up to over 6000 r. p. m. By using the power feed on the lathe as described above, we get a combination on which wood can be turned to accurate dimensions with great certainty.

The final illustration shows a sample of the work done with the lathe and attachment. This is a special mechanism built to calibrate the degree's circle of the lathe attachment. The worm-gear is 13½ inches in diameter. The lathe shown has only 14 inches' swing. Yet the gear was hobbed and its surface ground in this lathe with the Moor attachment. The calibrating mechanism automatically cuts the calibration marks on the degree circle with three lengths of cut, and finishes the circle in less than four minutes' time.

The Eccles & Smith Company, 71 First street, San Francisco, with branches in Los Angeles and Portland, are manufacturing this tool. They have the exclusive selling agency. All the features are covered by letters patent and the attachment and accessories are on demonstration at their San Francisco store.

(Section continued on page 169)

W-S-M

Port and Terminal Equipment Will Keep Our Ships on the Seas

This country has production sufficient to take care of export trade. Soon we will have the ships. The limiting feature is our inadequate coast port facilities. Should not our own coast ports be modernized to meet the demands of our export trade and merchant marines?

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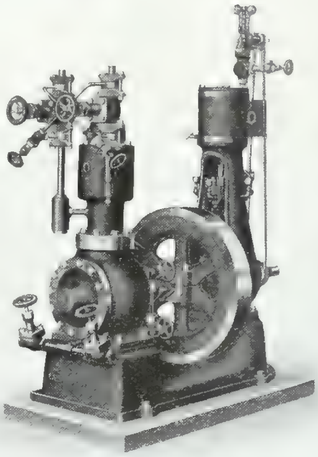

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Handbook of Ship Calculations, Construction and Operation. By Chas. H. Hughes. 740 pages. Second edtion. D. Appleton & Company, New York.

This is the second print of a comprehensive handbook. It includes many new tables. The man in the office, on the wharf and on board ship will find it valuable, a vast amount of information having been compressed. The book is well bound and the type is clear.

A Handbook of Practical Shipbuilding. By J. D. MacBride. 238 pages; 156 illustrations and two plates. D. Van Nostrand Co., 25 Park Place, New York.

Mr. MacBride, superintendent of hull construction, Hog Island Shipyards, deals with his subject in the "popular" manner, for, as he says, the manual is intended for the newcomers in the shipyards, and he has avoided being over-technical.

American Foundry Company, Seattle, exterior and interior views of the plant. The building is 80x180 feet.

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The National Magazine of Shipping
April, 1919

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The American Ship Building Company in the War

By J. S. Dickie,
Estimator, American Ship Building Company

WHEN war was declared by Germany, shipbuilding on the Great Lakes was very dull. There were few ships on the stocks and little prospect for future work. This had been for some time the chronic state of the industry. Fortunately, enough new work had usually been available to keep the staffs intact and this with the repair work had enabled the yards to maintain themselves by stringent economy and careful management. This forced habit of economy and efficiency enabled the American Ship Building Company to carry on during the war the ambitious program of expansion and output, the success of which placed it in the van of American ship producers.

Winter conditions under which the shipyards of the Great Lakes must labor. The illustration shows a vessel in the Buffalo drydock, winter of 1917-1918. When the bottom of a vessel is iced up there is grave danger of the ice blocks jamming on the bilge and keel blocks and crushing in the bottom. The Great Lakes are noted for the severity of their winters. To carry on shipbuilding throughout the year under these conditions is quite different from doing it on the warm coast of the Pacific.

The American Ship Building Company had plants in operation at the following places: Detroit, Michigan; Wyandotte, Michigan; Cleveland, Ohio; Lorain, Ohio; Chicago, Illinois; Superior, Wisconsin; Buffalo, New York; Port Arthur, Canada (subsequently sold); and Milwaukee, Wisconsin. These were all controlled from the home office at Cleveland, where were prepared the designs, working drawings, and other matters pertaining to the general organization of a centralized scheme of construction. The several yards were organized for the purpose of building ships to plans prepared for them and with materials supplied to them by the central organization. Each had its supervising staff, consisting of men highly trained and experienced in ship construction. Each was supplied in order of constructional sequence with the necessary plans and materials. The activities of the local staffs were largely confined to seeing that the plans and instructions supplied them were correctly, expeditiously and economically carried out. This system was very elastic. It was an underlying principle which, while it guided the local staffs, still permitted them a considerable discretion as to methods and local conditions and did not bind them to a hard and fast rule of procedure. Within their own spheres they could and did exercise originality and discovered and effected considerable economies in construction.

The central office was small and its staff consisted of a few well-trained men. Even during the rush of work incidental to the large orders received during the war, the drawing office staffs were kept down to a very few men. This was made possible only by adopting standard types and using those methods of office procedure which established practice in shipbuilding had made standard because they had been proved to be efficient wherever ships had been successfully built. These same conditions prevailed in actual constructive work in all the plants. Those visionary economies which lead many newly-established yards into extravagant innovations and at best secure a fictitious production at the expense of quality were not allowed to interfere with the true objects of the business and necessities of the time, which were to make serviceable and profitable ships.

As stated above, the American Ship Building Company's plant consists of several shipbuilding and general engineering works located at as many different places at the several industrial centers of the Great Lakes region. The organization only is centralized and a common policy guides the local activities of the several yards.

It was in the fall of 1915 that the effect of the war on shipbuilding began to make itself felt in the Great Lakes region. At this time there was no new construction at the Chicago, Superior, Cleveland, Buffalo and Milwaukee plants. At Detroit there was a small lake steamer of about 3000 tons deadweight, and at Lorain there were five large lake freighters aggregating 65,000 deadweight tons.

Ships for Norwegian Interests

Orders at this time began to be taken for 3000 tons deadweight steamers for Norwegian and later other foreign interests. These vessels were for the lumber and small trading routes of Northern European waters and also the Mediterranean Sea—a very sturdy and economical type of vessel of good capacity on a light draft and shallow and beamy enough to permit carrying a high deck load. A number of these with modifications as to accommodations and equipment also were built and sold to American owners. The deliveries for 1916 were two at the Chicago plant, aggregating 6250 tons deadweight; seven at the Detroit plant, aggregating 21,850 tons; and three at the Cleveland plant, aggregating 6400 tons deadweight.

In the spring of 1917 the Cunard Company secured its great option on the shipbuilding output of America by placing orders to fill practically every available berth. These vessels, requisitioned subsequently by the Emergency Fleet Corporation, were America's active contribution to the tonnage of the Allies for overseas trade, as it was the tonnage begun at this time which turned the balance against the destructive activities of the submarines and either was used in transporting troops and supplies or made other tonnage available. This was the first of the orders which included many ships ordered at one time from a single set of plans and specifications; in this particular instance twenty-five were ordered at one time from the American Ship Building Company's plans and specifications. Up to this time the building for ocean service had been "repeat" ships, but the later orders were in groups.

Detroit Led in 1917

The tonnage delivered by the American Ship Ship Building Company in 1917 for ocean service was: Detroit plant, twelve ships aggregating 39,000 tons; Chicago, four ships aggregating 12,400 tons; Cleveland, six ships aggregating 18,600 tons; Superior, five ships aggregating 15,500 tons; Lorain, nothing for salt water but six ships aggregating 73,200 tons for lake trade; at Buffalo, two ocean tugs for the United States Navy.

For 1918 orders were taken for fifty ships of one type for the Emergency Fleet Corporation. The building of these several types was carried on simultaneously. In the same yard at the same time vessels of different types were being built. The several types that were built did not, however, differ from each other except as to depth of hull and amount of power and in a few minor details. To keep the work straight, sets of vessels were given type numbers which to a certain extent were really group numbers, all being of practically the same type — namely, small cargo steamers with poop, bridge and forecastle. During 1918 the following were delivered: Chicago, thirteen vessels, aggregating 46,400 tons; Detroit, twenty-five vessels, aggregating 88,050 tons; Cleveland, thirteen vessels, aggregating 45,700 tons; Superior, ten vessels, aggregating 35,700 tons; Lorain, one vessel of 8200 tons for lake service and twenty-one for ocean service, aggregating 70,250 tons; Buffalo, four vessels, aggregating 14,200 tons.

Large Contract With Cunard

The vessels enumerated in the several paragraphs above include deliveries made of several related types and are part of several distinct contracts. The first large contract with the Cunard Company was for twenty-five of a certain type in addition to others taken over; the next contract with the Emergency Fleet Corporation was for fifty vessels; the next contract was for sixty-six vessels in two lots of six and sixty, respectively; and the last contract was for sixty. About forty-five ships will be ready to go down on the opening of navigation in spring, and, including these, there are about 110 to complete the present contracts with the government. Practically all ships have been finished well ahead of contract dates.

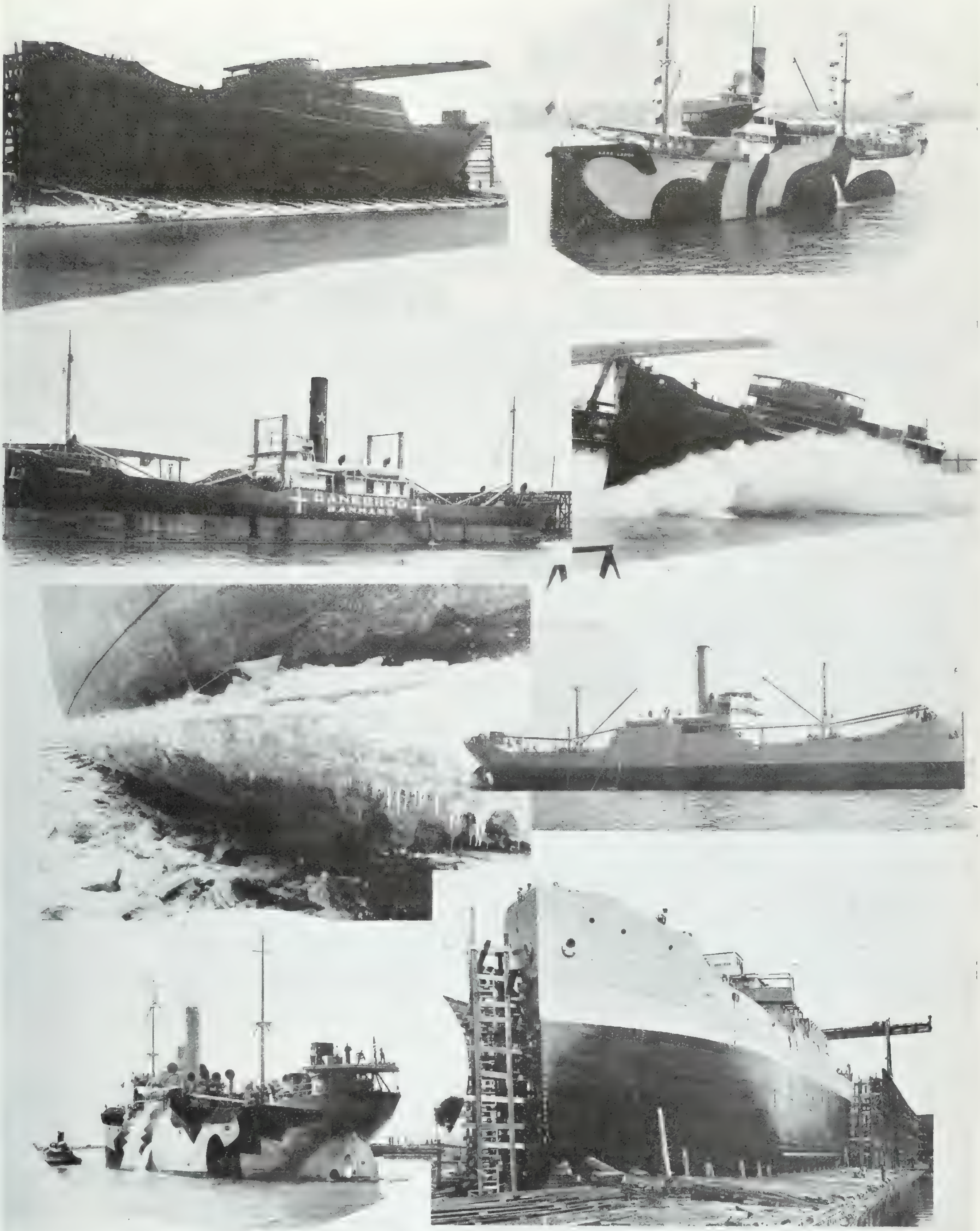
It is unfortunate that limitations set by the size of canal locks confine the American Ship Building Company for the present to a small-size ocean cargo vessel. It would have been possible to have produced at least twice the tonnage had it been possible to build larger ships and get them through the locks. As things were, the Great Lakes district produced in numbers more than half of the vessels acquired by the government through construction. In addition to this new construction, many vessels were docked; cut in two parts; bulkheaded; towed to salt water in two parts; docked; riveted together and converted for use on salt water. The winter of 1917-1918, during which work had to be carried on with the utmost dispatch, was the most severe that had been experienced in many years. An analysis of the numerous statistics published from time to time will show that the American Ship Building Company contributed to the total of ships produced with regularity and remarkable frequency in spite of weather and other more subtle obstacles.

In connection, directly and indirectly, with the war since January 1, 1916, the American Ship Building Company has contracted for 240 vessels aggregating 889,000 deadweight tons capacity, of which about 130 vessels are in service, about forty-five more will go down to the ocean in spring, and about sixty-five will be delivered from time to time during the summer. All this is in addition to the repair work and other work necessary in connection with the shipping on the Lakes themselves.

Guided by Experience

The work, which entailed great additions to the equipment of the yards, was carried on with very little trouble, and for the most part according to the customs and practices of shipbuilding and engineering which are practically the same or very similar in all good, established concerns. It might have been possible to have devised a speciously simplified ship, standardized in every minute detail, seeing that the company was favored with groups of sixty at one time, all alike, but it was considered better practice to go ahead and build some ships according to the customs of our forefathers, more or less modified by modern science and experience, but mostly handed down from time immemorial.

The results obtained by the American Ship Building Company and all the other established concerns



Shipbuilding on the Great Lakes. Left, from top to bottom: First—Ready to launch into narrow water at the Chicago yard. Second—A Lake-built vessel of the Norwegian type. Note the high bulwarks connecting the sections. Third—A vessel in drydock in the winter. Fourth—A completed vessel. She is a plain cargo-carrier, but she has all the necessary accommodations and furnishings. Right, top to bottom: First—American Ship Building Company's Type 7; 261-251 by 43 feet 6 inches by 24 feet 2½ inches; 3550 deadweight tons; eight booms, eight winches; four hatches, 22 by 18. Second—One of twenty-five vessels ordered by the Cunard line, built to 100A1 Lloyds. The launching is at Chicago. Note the narrow water in which it is customary to launch Lake vessels. She is 3000 tons deadweight; 261-251 by 43 feet 6 inches by 20; draft, 17 feet 8½ inches. Third—Steamship War Fox, same as above. Fourth—Ready to launch, showing the craneway partially removed to make ready for launching. This is Hull 243, completed in twenty-four working days.

which contributed "their bit" in time to be of some use in the crisis immediately preceding the disintegration of the Central Powers have proved the utility of going ahead and building, by methods known to be good, ships of a type that experience shows are efficient. The credit belongs to those who stuck to shipbuilding during the long, lean years before the boom, whose experience perfected the methods and whose matured judgment gave the counsel which produced the ships.

Description of Yards

All the yards of the American Ship Building Company differ and all are the result of local conditions and experience, so that it is necessary to consider each alone. The physical characteristics of the plants are:

The steamship Carl D. Bradley at the Lorain plant. She is a conveyor steamer. A long lattice boom (not shown in illustration) is swung from the tower forward. It carries a belt for unloading. A belt runs under the hopper bottom of the holds and discharges to a bucket ladder, which in turn discharges at the top of the tower into a hopper. The latter discharges into a belt on the lattice boom, and that on the piles ashore. The lattice boom is 150 feet long. The steamship is 524 by 54 by 30, of 11,000 tons deadweight capacity. This is a good example of the hatch arrangements of all modern Lake freighters.

The Cleveland plant has a total area of twenty-three acres. Part of this is located very near to the business center of the city, but the greater portion lies about one mile westerly, with a frontage of about 2100 feet on what is known as Old Cuyahoga River Channel, one-half mile from the main river of the same name. In general the yard is long and narrow, with three building berths having an aggregate length of about 900 feet, served by two overhead traveling cranes carried on single and double runways. In spite of this inadequate system, this yard has done very remarkable work. The various shops are strung along the inner property line and are very close to the building berths. The boiler shop for this plant is not part of the main property, but is located about a mile easterly. At the westerly end of the yard the old river channel terminates in two timber dry docks with wood caissons. No. 1 dock is 552 feet long and fifty-eight feet wide at the gate; No. 2 dock is 450 feet long and forty-eight feet wide at the gate. On the main Cuyahoga River Channel there is another part of the Cleveland plant, consisting of a timber dry dock 350 feet long and forty-eight feet wide at the gate. This is a repair plant used for repairing and docking small vessels and vessels of wood construction. The various shops, sheds, yards and docks at Cleveland comprise a complete works for the construction and repair of lake and ocean vessels complete, including hull, engines, boilers, auxiliaries and outfits, and in ordinary times a general engineering business is also carried on. The general offices of the American Ship Building Company are located at the Cleveland shipyard and all the planning, scheduling, ordering of materials and general accounting for all the plants are done there.

Yard at Lorain, Ohio

At Lorain, Ohio, on the Black River, which flows into Lake Erie about thirty miles westerly from Cleveland, is another plant, covering about forty-seven acres. At this plant there are eight berths aggregating some 2500 feet in length, with four overhead traveling cranes. There are two timber dry docks with steel caissons. No. 1 is 586 feet long and sixty-six feet wide at the gate; No. 2 is 736 feet long and eighty feet wide at the gate. There is here a large machine shop, boiler shop and forge shop, as well as fitters' sheds, etc. The castings used at Lorain are made in the Cleveland plant foundry, and taken by motor truck to Lorain; the heavy forgings for the Cleveland plant are made at the Lorain plant forge shop.

At Buffalo, New York, the plant covers twelve acres on Buffalo River, about a mile and one-half from the harbor entrance. The water frontage is about 774 feet. There are three building berths aggregating 1200 feet in length; they are served by four mechanically-operated hoisting derricks and two overhead traveling cranes. There are three

Vessels at the Detroit plant. They are Norwegian type. Left to right: Bacchus, War Patrol, Ebba and War Major

timber dry docks. No. 1 is 470 feet long and sixty-one feet wide at the gate; No. 2 is 630 feet long and eighty-one feet wide at the gate; and No. 3 is 401 feet long and forty-seven feet wide at the gate. There are a machine shop, punch shed and blacksmith shop, besides minor shops. This yard had been used mostly as a repair plant in recent years, but in the rush for new tonnage its equipment was improved and considerable new work was assigned to it.

The Chicago plant, consisting of twenty-two acres of land on the Calumet River in Chicago, about one mile from the harbor entrance, has a river frontage of about 1450 feet. There are five building berths, aggregating 1500 feet in length, equipped with four traveling cranes. There are two dry docks. No. 1 is a concrete dock 737 feet long and ninety-one feet wide at the gate. At this plant there are a machine shop, punch shop, blacksmith shop and other minor shops, but neither boiler shops nor foundry.

The Detroit plant consists of two parts, one at Detroit and the other at Wyandotte, Michigan. At Detroit there is a yard covering fifteen acres on the Detroit River, about one mile from the center of the city. The river frontage is about 903 feet. There is a dry dock 371 feet long and seventy-four feet wide at the gate. The shops are large and modern, consisting of machine shops, boiler shops, foundries, blacksmith shop, etc. At Wyandotte is the construction plant for hulls, covering twenty-four acres. There are ten building berths, completely equipped with overhead traveling cranes, tower whirler over stock yard, etc. There are a large punch shed, forge shop, machine shop, carpenter shop, etc.

At Milwaukee, Wisconsin, are two plants, known as the west and south yards. The west yard covers about four acres on the Menominee River, about one mile from the harbor entrance. The plant equipment here consists of a timber dry dock about 312 feet long and forty-two feet wide at the gate and shops and facilities for the repair of wooden ships. The south yard, consisting of eight acres, is on the Kinnickinnic River, about one-quarter mile from the harbor entrance; there is one timber dry dock, about 455 feet long and sixty-one feet wide at the gate, and punch shop, machine shop and complete equipment for repairs. The Milwaukee plants are used for repairs only.

The plant at Superior, Wisconsin, has an area of about thirty-eight acres. There are five building berths, aggregating about 1800 feet in length, equipped with overhead traveling cranes. There are two timber dry docks. No. 1 is about 609 feet long and sixty feet wide at the gate; No. 2 is about 620 feet long and sixty feet wide at the gate.

For some years previous to the war, all these yards, with the exception of Detroit-Wyandotte and Lorain, had been used practically as repair plants only. The Lorain yard particularly had been built especially for the construction of the great ore steamers. Most of the new construction was of a nature that required a greater plant than the smaller yards possessed. The new demands on construction necessitated the improvement and rehabilitation of all the yards where it was feasible to embark on new work.

The Buffalo drydock. This shows the plant as it was before berths were put in to facilitate building ships. The plant has not been used for new construction for some time, so that new buildings, berths, cranes and equipment of all kinds had to be provided

Do We Need an American Merchant Marine?

By Winthrop L. Marvin

SOME weeks ago a series of adroit arguments against the value of an American merchant fleet as a factor in overseas carrying appeared in the Journal of Commerce of New York, over the signature of Joseph J. Slechta, who is best known on the Atlantic seaboard as the former New York manager of a foreign-owned steamship service operating under the flag of a certain South American government. In the light of the fresh, vivid experience of the great war, these articles inevitably aroused surprise and indignation among merchants, shipowners and shipbuilders accustomed to think in terms of "America first." The United States, for the double purpose of protecting its seaborne trade and of creating a naval reserve and supply fleet for its armies in Europe, had been expending a sum in excess of $3,000,000,000, not more than one-third of which would have been necessary if the country had given enough thought to "preparedness" to equip itself with a reasonable merchant tonnage and proportionate building facilities beforehand. The American people suddenly had been shocked into the consciousness that, lacking an adequate mercantile marine in their own control, their immense potential resources in fighting men were through many anxious months almost as unavailable for their own cause and that of their desperately-pressed Allies as if they had been on another planet. And now that the war is over and victory is won, there are hundreds of thousands of American homes to which the boys in khaki, no longer needed on the other side, might long since have returned if the ocean "tramps"—the only ships that could hastily be "improvised" in the stress of war—were not wholly unadapted to transport service.

If there were surprise and indignation when Mr. Slechta chose this time of all times to advance in an Eastern journal his proposition that America had no economic need of or justification for a merchant marine, what shall be thought of his reiterating and re-emphasizing his argument as he has done in the March number of Pacific Marine Review and in issues preceding? American shipbuilding and shipowning are today a particularly great and vital interest on the Pacific Coast, and the maintenance of the Stars and Stripes on the high seas is the most ardent of aspirations of the people of Washington, Oregon and California.

The Fallacy of "Cheapness"

There is nothing new in Mr. Slechta's proposition, or in the manner of his presentation of it. We have heard all this before. "Foreigners can build ships more cheaply; they can operate them more cheaply—therefore, let them do it!" As far back as 1903, the late Herr Ballin, close friend of the former Emperor Wilhelm and head of the great Hamburg-American Steamship Company, prepared and caused to be published throughout the press a long and earnest plea for America to keep off the sea—to start no steamship lines, to create no shipyards—because Germany could do all these things "more cheaply," and would be glad to furnish ample facilities for American trade. Herr Ballin urged that Congress should do nothing whatever to encourage American navigation on the high seas—and for years after this, right down to the great war of 1914, representatives of the so-called German-American states at Washington were mostly conspicuous for their hostility to American maritime legislation.

Taking up the same refrain, "Don't build any ships—we can carry your trade more cheaply," Herr Ringe, a shipping magnate of Bremerhaven, proclaimed in the Washington newspapers of November, 1909: "The greatest obstacle to an American merchant marine is the lack of trained men to man the ships. America is not and never has been a ship-carrying country."

Or—to quote Mr. Slechta, who simply paraphrases Herr Ballin and Herr Ringe—"Our young men lack incentive to adopt a seafaring life because the inducements ashore are so much more attractive to those with ambition and the desire for ease to which as a people we are accustomed."

No Americans at Sea?

It is perfectly easy to understand why Herr Ballin and Herr Ringe should make the assertion that the Americans ought to stay off the sea, and get along without ships and shipyards. All this was simply a part of the German propaganda, which was active and sinister in this country long before 1914. The Kaiser and his hirelings had very good reasons of their own for desiring that there should be no ships or shipyards or seamen in America. They well knew that without the means to build its own fleet and man it, the United States would be utterly helpless either to defend its own ports in war or to come to the relief of France and Britain when Teuton militarism in the plot already planned had reduced them to the last extremity.

It is easy to understand why these Teuton conspirators should urge Americans to keep to the land and to leave the carrying even of our own trade to ships and seamen "made in Germany"—because they were "cheaper"—but why in this year of illumination should Mr. Slechta, presumably an American citizen, re-echo their arguments? Why should he contend that there are no American seamen, and none to be had, when 3000 young Americans are passing every month through the Shipping Board's recruiting service, and 90 per cent of the 300,000 enlisted men of our navy are American born?

I well remember in years not so very remote that Europeans—and some, unfortunately, of our own countrymen—were insisting just as strenuously as now does Mr. Slechta that our boys in the United States, a multitude of them the descendants of the best sea-stock the world has ever known, would never face the rigors of the naval service, and that the battleships which President Roosevelt soon after sent on their memorable cruise around the world, never could leave port because competent officers and crews could not be induced to go aboard them!

"This nation as a whole lacks real incentive to make any sort of vital sacrifice for the sake of preponderance of shipping strength." "I never have read or heard a single argument which presents convincing evidence to the effect that our commercial supremacy is likely to be endangered by lack of ships flying the American flag."

Is this Herr Ballin who speaks? Or Herr Ringe? Of any other of the smug Teuton sea monopolists who had those very good reasons of their own for suppressing all thought of an American merchant marine?

No; it is Joseph J. Slechta, in the month of March, 1919, and addressing himself to a nation which has just been expending upwards of $3,000,000,000 in a frantic effort to create ships and yards after years of fatuous acceptance of just such sophistry from men who were plotting our own doom and the extinction of free government.

An Interesting Case in Point

"Our commercial supremacy" never "likely to be endangered by the lack of ships flying the American flag?" Has Mr. Slechta read the recent reports from our consuls and merchants in South America? Has nobody informed him of the tens of thousands of tons of commodities awaiting shipment to France, to Asia, to Italy, to Africa, because all our hurried building has not yet supplied us with our rightful proportion of our own ocean ships, and the ships of the enormous British fleet, now that peace has come, are held strictly to serving British interests first and foremost?

And has Mr. Slechta forgotten an interesting paragraph on page 211 of the proceedings of the House Committee on Merchant Marine and Fisheries in the investigation of shipping combinations under House Resolution 587, in the year 1913, wherein the manager of the foreign department of the American Locomotive Company is quoted as follows in a communication to the "general agent, Lloyd Brazileiro," 8-10 Bridge Street, New York:

"We do not ask you to quote us rates on locomotives that would be below your cost of transportation, but what we must insist upon from the steamship companies operating from New York to Brazil is to quote us such rates as are equal to the rates obtainable on locomotives from European ports to Brazil."

The American Locomotive Company, the United States Steel Products Company and other great representative American concerns were declaring that American manufacturers were being systematically discriminated against by the various foreign steamship companies which at that time monopolized our carrying trade to Brazil and Argentina.

Legislation to Prevent Discrimination

Does Mr. Slechta recall the results of that long and careful investigation by the Congressional committee? Does he know that that committee very promptly recommended the enactment of stalwart legislation to prevent the discriminatory and oppressive practices complained of—in spite of the interesting fact that some agents asserted that if this were done "We will bring down the boycotting of the nations whose citizens own these steamship companies against our manufacturers. I feel this very strongly." (Page 54.)

Time was when the American merchant marine was wont to be regarded as almost a party issue in this coutnry—but it is a party issue no longer. Such experiences as that outlined above, and the supreme experience of the great war, have made our merchant marine a national issue, and nothing else. In the face of these facts how can Mr. Slechta declare that: "I have never heard a single argument which presents convincing evidence to the effect that our commercial supremacy is likely to be endangered by lack of ships flying the American flag"?

Doubtless Herr Ballin, Herr Ringe and the heads of the foreign steamship combinations in our South American trade all would have piously echoed this admirable sentiment.

Our Ships a National Issue Now

But let us now hear from the American side—from one who as the head of the Treasury Department and of the Railroad Administration was in close contact with trade and transportation until a little while ago, Hon. William G. McAdoo:

"Why is it necessary to our commerce to have a merchant marine under the American flag?

"This is an economic question of primary importance. We are one of the greatest industrial and producing nations on earth. We must have foreign markets to absorb our surplus products. Without them we shall have stagnation and depression and idleness and want. To secure our share of the open markets, such as Central and South America and the Orient, we must compete with other leading industrial nations of the world, such as Great Britain, Germany and France. If we have to depend on their ships to carry our goods in competition with them, to South America and the Orient, they will naturally favor British or German or French merchants, as the case may be, both in rates and service, as against American merchants. We have no control over or power to regulate these foreign steamship lines, or to prevent them from discriminating against our interests. If we have American ships, their first interest is to build up and extend American business, just as the first interest of the British ships is to build up British business, and the German ships to build up German business. After the European war is ended, competition for the open market of the world will be more intense than ever. We must have every facility that our competitors have, if we are to get an even chance.

Foreign Ships Favor Own Countries

"Let me illustrate: Suppose a merchant in Buenos Aires wants to place a large order for cotton goods, or steel rails. He gets quotations in England, Germany and the United States. The English manufacturer has an English steamship line to carry his product to Buenos Aires, and the German manufacturer has the same advantage in a German line. But the United States manufacturer has only a British or German ship to carry his product to Buenos Aires. Don't you suppose that the British and German steamship companies are going to give the best rates and service to the British and German manufacturers, instead of the American? Of course they are. Their first interest is in building up their own countries. But if the American manufacturer has an American steamship line to give him a fair show in rates and service, he may get the business.

"Let us bring the point nearer home. Suppose two men are running competitive grocery stores in Indianapolis, and that one of them had a fast automobile delivery service and the other had to use the automobile service of his competitor for the delivery of his goods. How much business would the grocer who has no delivery service of his own do? Not much. His competitor with the automobile service would soon put him out of business."

Fortunately, this imperative need of American ships for American commerce is something on which—Mr. Slechta to the contrary notwithstanding—Democratic statesmen and Republican statesmen after many years are now very thoroughly agreed.

An Attack on Our Shipyards

Contending that we have no need of American ships, that American men and boys will not go to sea, and that American trade should, economically, be intrusted to the "cheaper" foreign vessels, Mr. Slechta of course can see no occasion for the existence of American shipbuilding. To convince his hearers conclusively as to the hopeless "landlubber" race the American are, Mr. Slechta in continuing his article magnifies every result of the inevitable hurry and confusion that attended the emergency efforts of the Shipping Board. He condemns the wooden ship program as though the war at its supreme crisis allowed the cool deliberations of every-day commerce. He departs from the usual historic criticism of American steel ships as "flimsy" in construction, and to the amazement of his fellows abroad denounces them as too ponderous for use! As proof of the "haphazard methods" of American war shipyards and "of the deplorable results obtained," Mr. Slechta published the following alleged table of comparisons between standard types of American and British vessels:

Table of Comparisons Between British and American Vessels

Type	Description	Reference	Length, B. P.	Beam	Molded Depth	Draft	Disp., Tons	D. W. Capacity	Horsepower	Weight of Hull	Constant	Per Cent of Excess in Constant
British Type A	1-Deck Cargo	Mar. Eng. July, 1918	400′	52′-0″	31′-0″	25′-1″	11,375	8,580	....	2,225	.259	....
Hog Is. Type A	2-Deck Cargo	Eng. News Rec. July 4, 1918	390′	54′-0″	32′-0″	24′-0″	11,200	7,500	2,500	3,100	.414	60%
Newburgh Ship Yds.	2-Deck Cargo	Emer. Fleet News, Oct. 29, 1918	401′	54′-0″	32′-10″	25′-6″	12,500	9,000	2,500	2,930	.326	26%
British Type C	1-Deck Cargo	Mar. Eng. July, 1918	331′	46′-6″	25′-6″	23′-9″	7,200	5,350	....	1,390	.260	....
Submarine Boat Co.	2-Deck Cargo	Emerg. Fleet News, Oct. 29, 1918	324′	46′-0″	28′-6″	....	7,800	5,500	1,500	1,840	.335	29%
British Type E	2-Deck Cargo	Mar. Eng. July, 1918	376′	51′-6″	29′-0″	23′-9″	9,910	7,420	....	1,920	.259	....
Standard S. B. Corp.	2-Deck Cargo	Mar. Eng. April, 1918	377′	52′-0″	29′-6″	23′-6″	10,250	7,000	2,500	2,680	.383	48%
British Type Z	Oil Tanker	Mar. Eng. July, 1918	400′	52′-0″	31′-0″	25′-1″	11,400	8,405	....	2,425	.288	....
Chester S. B. Corp.	Oil Tanker	Mar. Eng. November, 1918	401′	54′-0″	....	25′-9″	12,650	9,000	....	3,080	.342	20%

Mr. Slechta, with these figures before him, contends that: "Taking the first two vessels in the list, it will be seen that 'Type A,' British vessel, has a deadweight cargo capacity greater by 1080 than a similar vessel built at Hog Island, while the American-built vessel absorbed in the building 875 tons of steel more than the British builder used on a vessel of almost exactly equal loaded displacement. Note that ton for ton of cargo capacity, the American vessel required 60 per cent more of steel than the British vessel. Vessels built by the Newburgh Shipyards require 26 per cent more steel; the Submarine Boat Company, 29 per cent cent more; the Standard Shipbuilding Corporation, 48 per cent more, and the tank type, built by the Chester Yard, required 20 per cent more steel than a similar tanker built in England.

"Block co-efficients vary between .75 and .79.

"British one-deck and two-deck types have same steel constant C, showing that the two-deck type takes no more steel than the one-deck."

An analysis of these figures by a practical shipbuilder and engineer brings out some facts that will prove highly diverting both to the technical and non-technical readers of Pacific Marine Review. In his comparative weights of hull, Mr. Slechta has used the net weight of steel in the British ships, while in the American ships he seems to have used the light weight of the hull, which would include wood, cement, equipment, etc. In other words, in his excess of zeal to discredit American shipbuilders, Mr. Slechta has compared one stage in construction with another very different—and, of course, is consequently all "at sea."

Mr. Slechta's Errors

Take, for example, the British "Type A." The net steel shown appears to be substantially correct, but in comparing with the Hog Island "Type A" he states the weight at 3100 tons—which would be about the "light weight" of the hull, as described above. The net steel in this case, as a matter of fact, would be about 2500 tons. So in the case of the Newburgh vessel, the net weight of steel actually would be about 2500 tons, while Mr. Slechta makes it 2930 tons.

Again, in the British standard "Type C" he manifestly has fallen into the same error, and in comparing his British ship with the Submarine Boat Company's steamer he is working on the light weight of the hull, as there are only about 1425 tons of net steel in this vessel.

With the British standard "Type E" the same discrepancy develops. It is another case of overzeal to make American shipbuilding contemptible, for the net steel weight of the Standard Shipbuilding Corporation's steamer probably will run to about 2200 tons, instead of 2680—and so, too, with the British "Type Z" and the oil tanker of the Chester Shipbuilding Corporation.

Mr. Slechta's entire table of comparisons is most misleading and unjust to American designers and builders. His allusion to "haphazard methods" is wide of the mark of well-established and well-conducted yards of the United States. Take, for example, Skinner & Eddy, the Moore Shipbuilding Corporation, the Federal Shipbuilding Company, the Texas Shipbuilding Company, the Carolina Shipbuilding Company, the Groton Iron Works, the Virginia Shipbuilding Company, the Oscar Daniels Company, Doullut & Williams, the Pacific Coast Shipbuilding Company, the Union Construction Company, the Seattle North Pacific Shipbuilding Company, the Standifer Construction Company and the United Steel Company's new yard at Chickasaw. They are all building a type of vessel which for comparison with the British standards will be readily appreciated when it is stated that the dimensions are about 400 by 54 by 34 feet, and the net steel weight is only 2400 tons with a deadweight capacity of 9500 tons.

Highly Efficient Ships

Compare this with the British standard "Type A," which is a single-deck vessel—and, by the way, the same constant, as Mr. Slechta says, would not "hold good"—while the above 9500-tonner is a two-deck vessel. To make the British a two-decker about 125 tons would have to be added to put in the 'tween-decks, and the weight would then be 2350 tons. The deadweight tons per ton of steel, assuming the two-deck vessel to be 8465 tons on Mr. Slechta's figures, are 3.6 tons, while the other produces 3.96 deadweight tons per ton of steel. This shows that a great many shipbuilders are being well advised and have, in fact, produced the lightest ships by about 10 per cent.

The Bethlehem Shipbuilding Corporation's plant, the Union Iron Works, could be cited for similar excellence, as its 12,000-tonner probably could carry more deadweight tons per ton of steel than any other vessel yet designed. Moreover, the Pennsylvania yard at Gloucester has built a most economical ship of 12,500 tons deadweight capacity.

The Todd Shipyard Corporation plants at Tacoma and Seattle, and the other subsidiary companies of the Bethlehem Corporation are building equally economical types, all as a result of building to the Isherwood system.

Even the American Bureau Assailed

Not even the American Bureau of Shipping, conducted in a most progressive spirit, without stockholders and without dividends, as an institution devoted to the national welfare, escapes the attacks of this headlong critic of the American merchant marine. Officials of the navy and of the coast guard, representing the government, and the most eminent of American shipbuilders, engineers, shipowners and underwriters, head this great American survey and classification society, which is destined in its full development to render our country independent of the British Lloyds' Register. Emphasizing the experience of the British Lloyds' staff, Mr. Slechta asserts of the American Bureau: "Its inspectors and surveyors are in no single instance maintained as above indicated. They are mostly retired captains, who have had no experience in construction or engineering, and little, if any, technical training outside of navigation."

As a matter of fact, just two of the 175 surveyors of the American Bureau in the United States are "retired captains"! The American surveyors are capable and experienced men—technically trained just as the British Lloyds' men are trained—and one and all of the American staff are American citizens. The American Bureau of Shipping, thoroughly reorganized and greatly enlarged, has, as it rightly and naturally should have, the bulk of inspection and survey responsibilities in the United States. An American survey and classification society is absolutely essential, as even Mr. Slechta is forced to admit, to an adequate American system of marine insurance. They logically go hand in hand—and it is a natural result that American interests are now, for the first time in many years, dominant in the marine underwriting business of this country.

No Patience With Exaggerations

That there are difficulties in the way of a further expansion of the American merchant fleet, every informed American knows and understands. But there will be no patience with these critics who wilfully exaggerate them. Once many Europeans —and some of our own faint-hearted countrymen— were protesting that manufactures could never be established in the United States. Yet our nation before the end of the nineteenth century had become the chief manufacturing power on the planet, now producing in a single year more iron than Great Britain and Germany combined. Later, obstructionists abroad and at home, as has been said, were certain that we could never create a fighting navy. Where are now those prophets of weakness and calamity? Even within a year or two, the launching and manning of a new merchant fleet of 3,000,000 tons was described as "impossible." Germany hoped and believed, and even our Allies feared, that the "bridge of ships" would not be built in time. Of course, there have been miscalculations and mistakes in the rush of war planning, but no man who knows or shares the American spirit will magnify them or distort them or urge them as tokens that the profound ambition of our race to ride the seas as proudly as its father rode them, is only an iridescent dream. It will do us no harm to pause sometimes and remember that we are, after all, as friends and enemies alike acclaim us, the sons of what has proved to be the most masterful nation in the world.

Pacific Marine Review
The National Magazine of Shipping

576 Sacramento Street
SAN FRANCISCO, CALIFORNIA U. S. A.

Official Organ of the Shipowners Association of the Pacific Coast

Subscription Price, per year (Domestic) $3.00
(Foreign) $3.50
Single Copies . . . . 25 cts

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NEW YORK OFFICE
339 Hudson Terminal Building, 30 Church Street
M. B. STEWART, Manager

Pacific Marine Review is sold at all leading News Stands
Entered as second class mail matter at Postoffice
San Francisco, California

Published on the First of Each Month. Copyright
1919 in the United States by J. S. HINES

THE AMERICAN BUREAU OF SHIPPING

AWAY back in 1861 some representative shipping men met in New York and formed an association for the collection and dissemination of information on marine and commercial affairs. In the following year they incorporated under the laws of the State of New York. In 1867 they established The Record of the American Bureau of Shipping, "American Lloyds," and from that day to the present time this bureau and its record have been important factors in American shipbuilding and American ship operations. The years of the life of this American classification society up to 1915 have been the lean years in American merchant shipping and consequently rather lean years for the society. However, in 1915, with the outbreak of the war and the creation of the United States Shipping Board, the affairs of the Bureau of Shipping began to assume greater importance.

In 1915 a thorough reorganization was started and the present president, Lieutenant-commander Stevenson Taylor, took charge.

Employs Nearly 200 Surveyors

When the great American shipbuilding program of the Emergency Fleet Corporation was announced, every effort was made by the American Bureau of Shipping to perfect its organization to meet this great need for surveyors, with the result that there are now employed by the bureau close to 200 surveyors. These surveyors have been on the job and have given good service. In the rush of the emergency, much work has been accepted which in commercial peace time surveying would not have been approved. The bulk of this work, however, has been on the classification and surveying of societies other than the American Bureau of Shipping.

We are citing these facts because we wish to pay our tribute to this, the only American classification society, and because in our March issue, in the article on "Reconstruction in Foreign Trade and Merchant Shipping," by Joseph J. Slechta, although certain admirable comments on the needs of our American merchant marine were made, unfortunately therewith were published reflections on the character and ability of the American Bureau of Shipping, reflections and criticisms entirely unwarranted, as we know of our knowledge and experience with the men connected with the bureau.

Not "Mostly Retired Captains"

Comparisons are always odious, so we go no further than to say that the published lists of surveyors of the classification societies show that the American Bureau has nearly twice as many surveyors as Lloyds and that these surveyors are, as their histories show, not "mostly retired captains" —indeed, there are but two in all of the bureau's surveyors at all entitled to be called "captain," and these gave up the positions from which they derived that title long ago to perform duties along the lines now exercised by them.

We feel sure that the builders on this Coast will not be misled by Mr. Slechta's statements, for they know how useful and important has been the service of the surveyors of the American Bureau of Shipping.

The American Bureau of Shipping is just coming into its rightful heritage and we extend to it our best wishes for a great and well deserved success.

HURLEY'S SHIP OPERATION PLAN

WE have just received the much-heralded and long and eagerly expected recommendation by the chairman of the United States Shipping Board on plans for the future operation of the United States merchant marine.

Briefly stated the plan is this: The ships should be sold to American citizens under no restrictions other than terms of the bill of sale and control of freight rates.

The ships should be sold at market price irrespective of cost.

Terms should be 25 per cent down, balance yearly payments for not to exceed ten years at 5 per cent interest.

"Merchant Marine Development Fund"

One-fifth of the interest to be paid into a fund to be known as the "merchant marine development fund."

Insurance on equity to be carried by purchaser in American companies. Insurance on balance to be carried by the government in its own fund as at present. Purchaser to be charged for this government insurance at market rates. Difference between cost and price of this insurance to go into merchant marine development fund.

No transfer to foreign registry without express permission from United States government.

Incorporation of purchaser compulsory under a Federal charter limiting stock issue.

Government to name one director on each corporation directorate. These directors to meet periodically in Washington to advise the Shipping Board on problems arising with regard to merchant marine and the administration of the merchant marine development fund. This fund to be used to relieve any financial difficulties which arise in the development of new trade routes or in ways other than mismanagement or carelessness.

Carefully Thought-out Plan

This on the whole seems to be a carefully thought-out plan, and while there are some details which are open to objection, we think it will be of great assistance in clearing up the atmosphere.

It should include a provision for making possible the immediate transfer of hulls not finished and the turning over of contracts on which work has not commenced so that our ship operators will have an opportunity while the hull is under construction of making such changes as they desire.

The main point is that the Shipping Board has now made a positive declaration, and we may hope that with assistance from the associations interested and using this plan as a basis, Congress will be able to construct some helpful legislation. In the next issue of Pacific Marine Review we shall publish an analysis of this proposed plan and of the building program of the Shipping Board, written by our friend "The Traffic Manager."

Government Operation

It is rather noteworthy in connection with the plan for operation recommended by Chairman Hurley to observe the remarkable unanimity of opinion among Shipping Board officials against the advisability of retaining government operation of merchant vessels. J. H. Rosseter, director of operations on March 4 in New York told the American Manufacturers' Export Association: "Government operation of ships would be absolutively destructive to our aspirations." He also stated that "we can build and operate successfully in competition with the world," provided "we clear our vision and start with determination for the goal."

Mr. Rosseter brought to his present position a life-long experience in successful ship operation and no one could be prepared better to make government operation profitable. His unqualified denouncement of this policy, taken together with Chairman Hurley's recommendations, is very conclusive evidence against government ownership and operation of merchant ships.

FIFTEEN YEARS AGO

OUR Volume 1, No. 1, was published in Seattle fifteen years ago this month. It was a very modest beginning of twenty-five pages, including advertising. From that time up to the present the book has been constantly growing in size and influence. In the old pages there is much of interest that will well bear repetition, and we begin herewith a monthly note of the fifteen-year-old happenings:

Freight Rates to the Orient

"We learn that the North Pacific Steamship Association has decided to continue during the month of April the current rate of $4 for flour and wheat to the usual ports of call in the Orient, with $4.50 rate to Shanghai. The lowest conference rate last year was $3 and the highest $5."

(Note: This was during the Russo-Japanese war.)

Foreign Trade

"The export trade of the Pacific Coast is chiefly handled by four ports: San Francisco, Portland, Tacoma and Seattle. Prior to the fiscal year ending June 30, 1902, Portland was second to San Francisco in the volume and value of her exports. In 1895 San Francisco's exports were between eight and nine times as great as Tacoma's, and Portland's were nearly twice as great. In 1900 San Francisco's exports were valued at nearly $40,000,000; Portland's at $8,216,608; Tacoma's at $7,296,821, and Seattle's at $5,862,496. During the last three years the domestic exports of the four ports were as follows:

San Francisco	$33,915,931	$37,311,891	$33,502,616
Tacoma	9,854,786	17,416,942	15,632,638
Seattle	5,759,403	11,422,207	11,861,713
Portland	18,381,732	12,129,867	10,820,844

Mistress of the Oriental Trade

"These figures demonstrate the fact that Puget Sound has become a formidable rival of San Francisco and is easily the second in importance on the Pacific Coast. The Oriental trade now centers on Puget Sound."

An Oil Burner

"The steamer Nebraskan, which sailed from San Diego February 3 and arrived in New York March 26, is the first oil-burning steamer to round the Horn. This is a remarkable passage and augurs well for the future of oil as a marine fuel."

TRADE COUNCIL ON MERCHANT MARINE

ADDRESSES on the American merchant marine by prominent business men of the United States will be delivered at the merchant marine session of the National Foreign Trade Convention on April 25, the second day of the meeting at Chicago. Among those who will speak are:

Homer L. Ferguson, president of the Newport News Shipbuilding & Drydock Company, will deliver a speech on "Shipbuilding."

Frederick J. Koster, president of the San Francisco Chamber of Commerce and of the Associated Chambers of Commerce of the Pacific Coast, will speak on "The Future of the American Merchant Marine on the Pacific."

Ernest J. Baldwin, a New York admiralty lawyer, will speak on "British and American Navigation Systems," pointing out the desirable changes in the laws affecting registration measurements, etc.

James A. Farrell, chairman of the National Foreign Trade Council and president of the United States Steel Corporation, will close the session with a speech on "American Maritime Policy."

PACIFIC COAST BUILDING

THE following table, from the report of the Federal Reserve Bank, San Francisco, shows that on December 31, 1918, shipyards of the Pacific districts had delivered to the United States Shipping Board 212 steel and wooden ships having a gross tonnage of 1,447,525, which was 50.7 per cent of the total tonnage output of all yards in the United States:

District	Steel		Wood		Total	
	No.	Gross Tonnage	No.	Gross Tonnage	No.	Gross Tonnage
Southern Pacific	42	390,125	14	49,000	56	439,125
Northern Pacific	96	791,900	60	216,500	156	1,008,400
Great Lakes	162	558,180	1	2,500	163	560,680
Atlantic (combined)	95	714,122	33	115,500	128	829,532
Gulf	..	......	4	16,400	4	16,400
Total (United States)	395	2,454,327	112	399,900	507	2,853,437
Total (Pacific Coast)	138	1,182,025	74	265,500	212	1,447,525
Percentage of total	34.6	48.1	66	66.3	41.8	50.7

"The Largest Shipyard"

ON January 30, 1919, there stood before the commerce committee of the United States Senate a clear-eyed, square-jawed American citizen, who for nearly seven hours in plain, unvarnished United States talk told those suspicious senators the story of accomplishment at Hog Island. This man, Matthew C. Brush, is quite a remarkable man in the industrial world. He is now, at the age of forty, president of the American International Shipbuilding Corporation. To use his own words:

"Previous to my presidency of the American International Shipbuilding Corporation, I was president of the Boston Elevated Railway Company for two years, and prior to that I was vice-president and assistant to the vice-president of the same company for six years. Previous to that I was general manager of a steam railroad, and an electric railway in Western New York. Previous to that I was vice-president and general manager of an electric railway in Massachusetts. Previous to that I was in Western Kansas, in charge of shops and roundhouses for the Rock Island Railroad. Previous to that I was a roundhouse foreman at Council Bluffs, Iowa, for the Union Pacific Railroad, and I also served as an apprentice boy on the same railroad.

Claims No Credit for Self

"Previous to that I graduated from the Massachusetts Institute of Technology. Previous to that I went to Armour Institute in Chicago to prepare for the Massachusetts Institute of Technology. Previous to that I went to high school in Chicago and to high school in Minneapolis. Previous to that I went to grammar school in Winona, Minnesota, and Stillwater, Minnesota."

President Brush claimed no credit for work done at Hog Island. He took charge in December, 1918. He made no definite promises as to deliveries. He merely showed those senators his methods of getting team work into the department heads, and the various executives and foremen who control the energies of Hog Island's 35,000 employes. Said he: "As an evidence of what we are endeavoring to do at Hog Island with respect to creating a team which must be the secret of our success if we are to have a success—and I feel confident we are—immediately on my taking charge I called together twenty-seven heads of the different divisions and departments and formed a council which would meet weekly. We thus all get a chance to understand each other and form a policy. I call this organization a council intentionally, because I think these men should feel that we are all on an equal basis, for mutual council rather than as a chief with a lot of subordinates. The policy which we agreed we would follow when I formed the council is this:

Free and Frank Discussion

"'After the freest and most frank discussion, with opportunity for each and every man directly or indirectly concerned to express his opinion or judgment on any matter or policy or detail of operation or construction, the decision must be rendered by the responsible executive head, and this decision having once been determined upon, the officers and any others concerned shall loyally carry it out, even though it be against their own judgment, until conditions to their knowledge have in any way, shape or manner changed which in their judgment may possibly change the executive's decision, at which time it shall not only be their privilege but their duty to again open up the question.'

Opinions from All

"The result is that we get expressions of opinion from the men all the way down the line. We have meetings there from our heads of divisions down. I attended a meeting the other night of sixty of the instructors, who instruct the new men in the training school. We have meetings of our foremen, at which free discussion of methods of work is carried on, and I feel very confident there is going to be created and is in process of creation now a very remarkable team—as fine a team as you have ever seen. I think I have never seen men spend their time, energy and ability more freely, and they are staying through with the game."

"You have done well, and I have listened to you with the utmost approval, mentally," said Senator Johnson of California to Mr. Brush at the close of the session. Even hard-headed old Knute Nelson, senator from Minnesota, was moved to write Mr. Brush a letter of which the following are excerpts:

"I need not tell you how gratified I was to see you and to get the information you furnished us. Everyone who heard you and listened to what you said was convinced that you are the right man in the right place. * * * You have a big burden, but from what I have seen and heard of you I think you are fully equal to the task."

Government Policy to Blame

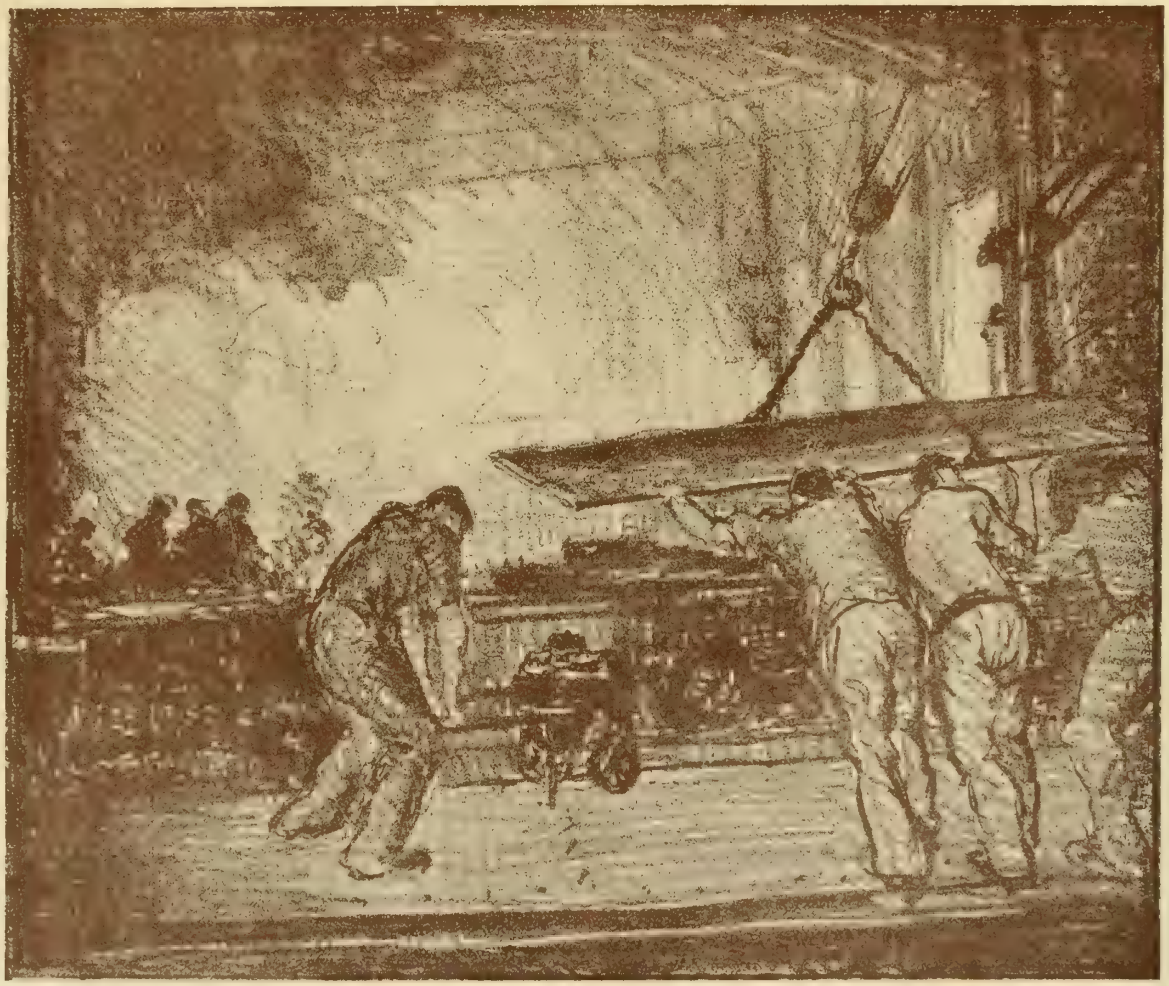
J. S. Hines, publisher of Pacific Marine Review, recently had the pleasure of a personal inspection of the Hog Island Shipyard in the company of Matthew C. Brush. He writes: "We had no idea what a really wonderful achievement these fellows have put across. When you see 35,000 men working in unison and co-ordinating to produce the output from fifty shipbuilding ways, you can only stand and gasp at the magnitude of their undertaking." And again: "The great trouble that I have found in Hog Island is not chargeable to the idea of fabricated shipbuilding or the size of the yard, but rather to the fickleness of government policy in changing plans and specifications. While going over one of the nearly completed ships with Mr. Brush, a ship built exactly to specifications, the hull superintendent came up to Mr. Brush and, with tears in his eyes, told how hard he had worked to make a record on the ship and get her out a little ahead of time, and how now, at the last minute, an order came from the government changing a minor detail already built into the hull. This order would mean a delay of from two to four days. Mr. Brush turned to me and said: 'You know, Mr. Hines, this sort of thing takes the heart out of my men and out of me.'"

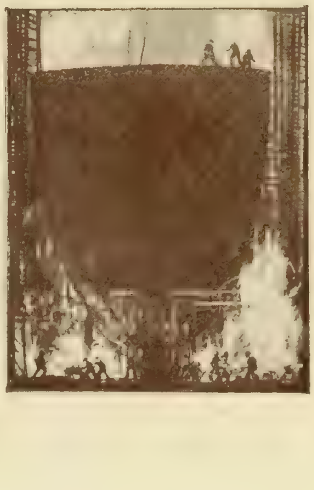
In the next issue Pacific Marine Review will publish an illustrated article fully describing the Hog Island Shipyard and its work. Matthew C. Brush certainly deserves all co-operation in his efforts to prove that the largest shipyard in the world is also entitled to be called: "The greatest shipbuilding plant in the world."

Dragging Great Bars of Steel White Hot From the Furnace

The Shipbuilders

Incessant, harsh, staccato, up from the shipyard rises the roar
of the hammers.
From its weird, runic undertones, strange voices come to
the poet:
Long soft sighs of the Norther through the pines on Oregon
hillsides;
Murmur of mountain streams; wild crashing of mighty waters
Harnessed by pygmy man to force his designs upon nature.
Come with me through the shipyard and see through the
eyes of the artist
How man applies this power to force his designs upon nature.



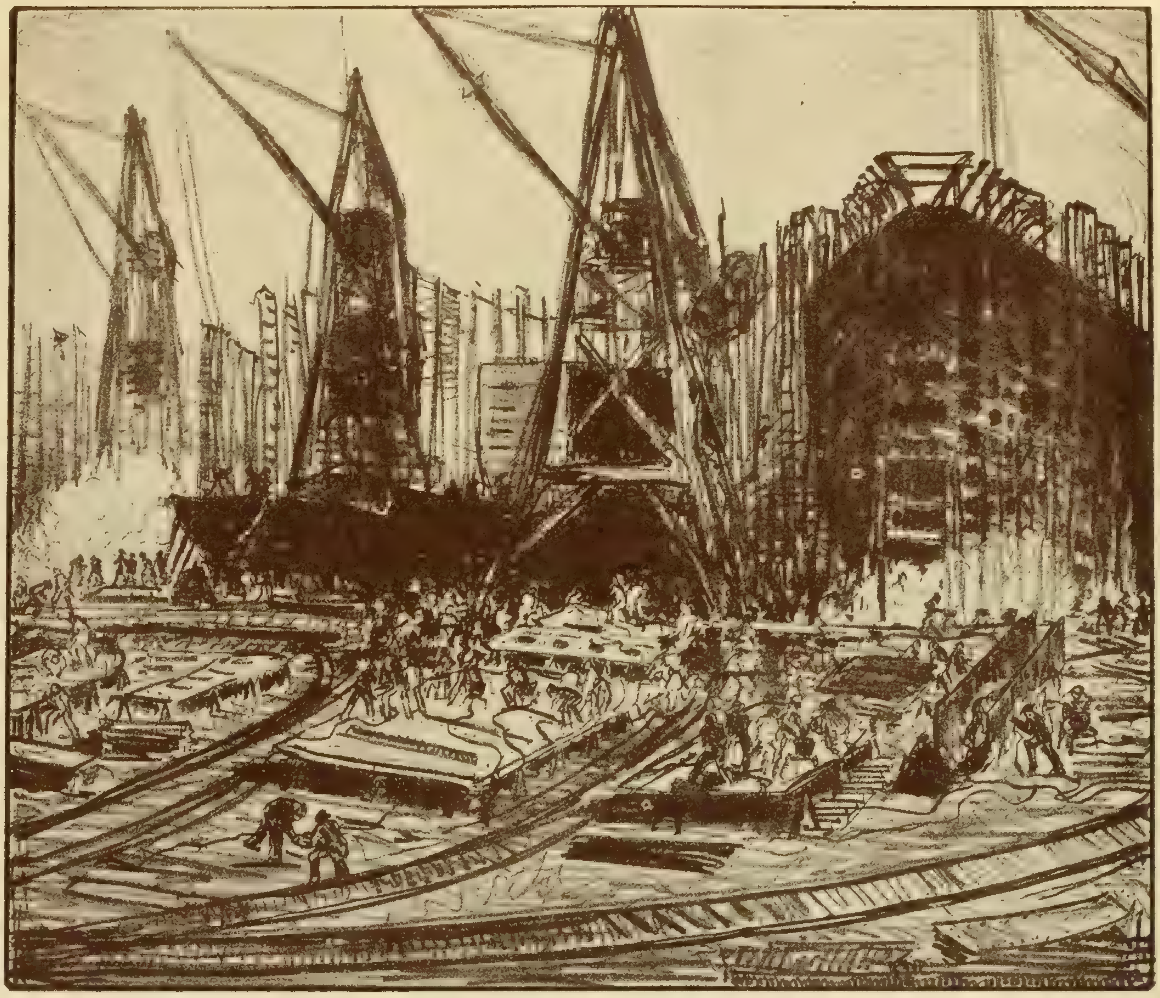


The Steel Shipyard

Here man is dragging great bars of steel white hot from the furnace.
Smash! Press! Shear! He will shape them anew to his purpose.
Drill! Punch! Scarph! Bolt, plate and angle and zee bar!
On white hot rivets roar the hammers, and ere night
Black against the twilight sky looms the forward bulkhead.

The Wood Shipyard

Mighty timbers of pine, sawn from the Lord of the Forest
Man will attack with saws and dubber and planer and hammer,
Driving home bolt and treenail until, as if by magic,
Framed and planked and caulked, a ship stands ready for launching.



Thus the brush and the pen sense the rough, fierce power
of the worker
Who at his country's call threw steel and wood into
ship shapes—
Mighty the will of man, all subduing, all comprehending.

The Artist at Work

Illustrations from lithographs drawn on the stone by CARL WALTERS of Portland, Oregon, and reproduced here through the courtesy of the G. W. STANDIFER CONSTRUCTION CORPORATION.

Japanese Shipping Since the Armistice

FIVE months ago Japan was clamoring for a greater shipping tonnage, moving heaven and earth to induce the United States to release steel for shipbuilding and with every shipyard in the empire working overtime. Today the Japanese are wondering what they are going to do with the ships they have on their hands and those so far under way in the yards that they must be completed in order to save what has gone into them. All work in the yards that can be dropped has been dropped and a number of the smaller yards have been closed.

The only good contracts the shipbuilders have are the contracts made with the United States government, as the majority of those private corporations that have ships on the ways are now looking around for legal excuses to avoid accepting delivery, while a number of those that have ships on order have already been declared bankrupt.

Japan Has 15,072 Vessels

A census of Japanese shipping has just been completed by the Department of Communications, which announces that the empire has a total of 15,072 ships on the sea. This includes all registered tonnage, of which 857,556 tons are sailing ships, 12,431 in number, and 2,310,959 tons are steamships, 2641 in number. Of these latter there are 616 of 1000 tons and over, aggregating 1,859,348 tons. Classified by tonnage, these are:

Size	Number	Total Tonnage
Under 2000 tons	237	334,088 tons
Under 3000 tons	144	348,354 tons
Under 4000 tons	96	320,907 tons
Under 5000 tons	39	175,948 tons
Under 6000 tons	49	279,513 tons
Under 7000 tons	23	146,199 tons
Under 8000 tons	13	98,266 tons
Under 9000 tons	1	8,150 tons
Under 10,000 tons	8	76,028 tons
Over 10,000 tons	6	71,896 tons

When the armistice was signed there were 145 slips in active operation turning out shipping. Already the number has dropped to 105, with these emptying as rapidly as possible and closing down for lack of further orders. There are yet a large number of uncompleted ships to be launched, but their completion meets with no enthusiasm, either from the shipbuilder or the owner. During January eight steamers were put into the water, and up to February 25 seven others had been launched. Of these fifteen ships, six were from the big Kawasaki dockyards at Kobe, these being: Ryufuku Maru, 5857 tons; Chifuku Maru, 5860 tons; Tokufuku Maru, 5860 tons; Jufuku Maru, 4860 tons; Portland, 5860 tons, and Washington, 5860 tons. The other launchings this year in Japanese yards include the Hiei Maru, Uraga Dockyard, 4730 tons; Toyosaki Maru, Uchida Shipyard, 2200 tons; Manei Maru XIII, Nitta Shipyard, 1700 tons; Xinsho Maru, Osaka Ironworks, 3200 tons; Buyo Maru, Asano Shipyard, 5520 tons; Koya Maru, Harima Shipyard, 6875 tons; Fukuyo Maru, Asahi Shipyard, 3800 tons; Genei Maru, Toba Shipyard, 2000 tons, and the Shinto Maru, Fuji Nagata Shipyard, 2200 tons.

During the first part of March the Mitsubishi Dockyard was to launch two steamers, one an 8000-ton ship, the Kainan Maru, for the Katsuda Kisen Kaisha of Kobe, the other the Madras Maru, of 3700 tons, for the Osaka Shosen Kaisha.

700,000 Tons for 1919

It is estimated that the Japanese yards will launch a total of 700,000 tons this year, all commenced prior to the signing of the armistice, which includes about 230,000 tons to the order of the United States Shipping Board, being the tonnage agreed upon in exchange for American steel at the rate of one ton of shipping for two tons of the raw material. Of the balance, only about 70,000 tons are on order, the rest representing shipping which the yards are building on their own account, having trusted to sell them at huge war-swollen figures when they laid them down and refused to accept outside orders.

Now they have this shipping on their hands, partially completed with war-price materials. The market for ships has ceased to exist and all the short cuts to wealth wiped out. When they laid these ships down, buyers were clamoring for tonnage and offering as high as 700 and 800 yen a ton. Today the quotations are around 300 and 400 yen, and even these figures are nominal, because there are no actual offers at any figure.

Under these circumstances, the shipyards are planning to organize their own operating companies and put their tonnage to work. The Kawasaki Dockyards is floating the Kawasaki Kisen Kaisha; the Katsuda Kisen Kaisha at Kobe has combined with the Taiyo Kaiun Kaisha to form a new steamship corporation to be known as the Taiyo Kisen Kaisha, which will operate the ships of both concerns. The Asano Dockyards, the Katsuda Kaisen Kaisha, the Hashimoto Kisen Kaisha and the Taikoku Kisen Kaisha are arranging to combine and float a shipping company with a capital of 200,000,000 yen, to be paid up largely by shipping contributed to the new corporation. The Uraga Dockyard, the Yokohama Shipyard and some smaller shipbuilding concerns are also planning a shipping company, to go after South American business.

Stocks Also Go Down

The Kawasaki Dockyard, mentioned above, it is reported, may inaugurate a passenger service. At first its company, the Kawasaki Kisen Kaisha, will go after North American and South Sea cargo, but may utilize its big shipbuilding plant by laying down some first-class passenger boats.

Naturally the big slump which has struck the shipbuilding industry has hit the financial standing of the corporations. For purposes of comparison, the quotations for stock in some of the Kobe companies as they were when the war boom was at its highest and as they are now are here given:

	July, 1917 Yen	Present Yen
Kawasaki Dockyard	250	110
Kobe Pier Co.	150	45
Meiji Kaiun	760	280
Taiyo Kaiun	120	28

In addition to laying plans for securing a greater share of the world's carrying trade, even in the face of the big opposition now certain from the suddenly-developed American merchant marine, the Japanese shipowners and shipbuilders are after government aid. Delegations of dockyard men have been waiting upon the government urging the adoption of a protective tariff on steel and all steel and iron products, in which they are backed up by manufacturers of machinery and the iron founders. Other delegations are urging the resumption of the government bonuses to shipbuilders. So far, it is reported, the government has not become enthusiastic in either direction, Minister of Communications Noda telling the delegations that the government would take the matters under careful consideration.

Much Shipping Is Idle

Charter rates are falling steadily and each new announcement of the American Shipping Board of lower and lower Pacific rates sends fresh shivers through Japanese shipping circles. Many companies are now operating ships under pre-armistice charters and the rapidly-falling freight rates are hitting these companies hard. The biggest cuts at present are in the coastal trade, in which the multitude of smaller steamers and sailing ships can engage, and the rates have dropped so low that much shipping is idle, finding it unprofitable to operate. The chartering late in February by the N. Y. K. of the Hanabusa Maru, 3800 tons, and the Toyohashi Maru, 3350 tons, two of the best ships in the coastal trade, at 7 yen a ton shows the depths into which charters have slumped. These vessels commanded nearly four times that figure five months ago. The following table shows the charter rates quoted before the armistice and at successive intervals since, for all classes of steamers:

	Large Yen	Medium Yen	Small Yen
Before armistice	45	30	26
December 31	30	25	20
Early in January	25	23	20
Middle January	25	13	15
January 30	17	13	10
February 15	17	13	11
February 25	12	12	7

Coal carriers between Wakamatsu and Yokohama have recently been chartered at rates as low as four yen, the same carriers commanding ten and twelve yen before the armistice.

British Cutting Rates

Ocean competition is not coming alone from the United States Shipping Board. The British lines are returning to the Orient and rate-cutting has been started by them. To meet this the N. Y. K. has just announced new rates, effective March 1, to Liverpool at 150 shillings a ton and to Marseilles 220 shillings. This meets the British rate. Before the armistice the cereal rate was 1000 shillings.

The N. Y. K. and the O. S. K. have also announced new low rates to South America, a cut from 170 yen to 150, with an additional 10 per cent rebate, and to South Africa a cut from 180 yen to 150, with the same rebate, effective March 10. A special rate for wool shipments to Japan is also reported by these lines at 3 cents a pound.

Power Plant of the Leviathan

THE following notes on the turbine plant of the steamship Vaterland, now the Leviathan, are taken from the Journal of the Association of German Engineers, December 4, 1918:

The boiler rooms are four in number, and on both sides of each boiler room are the coal bunkers. The total coal capacity of these bunkers amounts to about 8700 tons, and their close proximity to the boiler room reduces handling to a minimum. The steam is delivered direct from each boiler room to the high pressure turbine room, through lap-welded steel steam piping 360 mm. in diameter. Each pair of these pipes is led into a group-valve casing and is closed by two hydraulic stop valves, so that each boiler room supply can be separately isolated. The steam is passed thence through a water separator and two control valves to the turbines. In addition to the main pipe line there are two auxiliary feed pipes of 250 mm. diameter.

Turbine Plant in Two Series

The turbine plant is in two series, each series consisting of one high-pressure turbine and one intermediate and two low-pressure turbines. They are arranged to work together in a number of different ways. They will normally work in the usual triple-expansion system, the live steam being fed first to the high-pressure, expanded to the intermediate turbine, thence in equal quantities to the two low-pressure turbines, and then exhausted to the condensers. If desired, however, the high and intermediate pressure turbines may be connected direct to the condensers and used as a double expansion system, or, again, all the low-pressure turbines may be fed separately direct from the boilers and singly connected to the condensers. The turbines are installed in three separate watertight compartments, so that in the event of accident or breakdown at least one or two power systems are likely to remain intact.

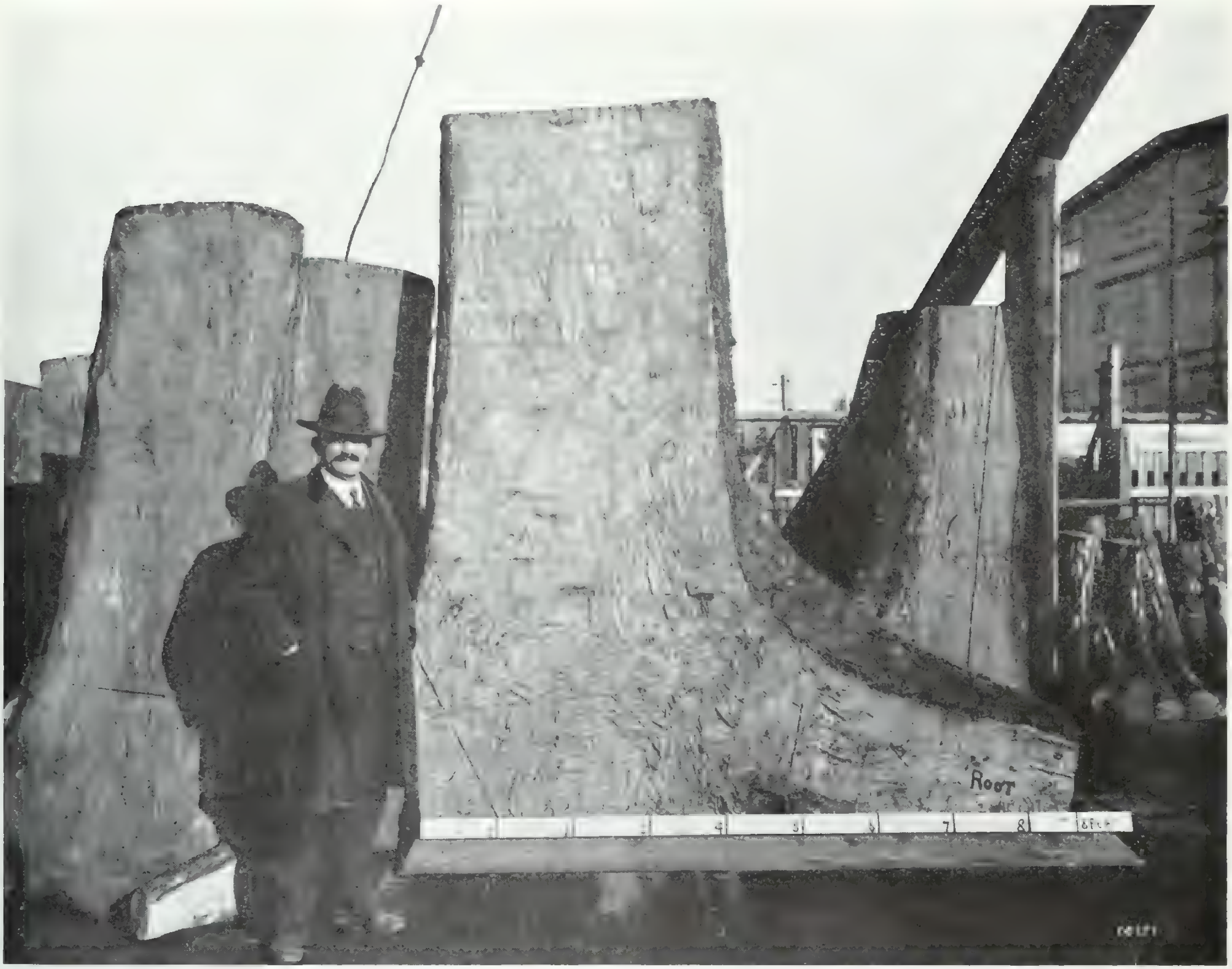
The turbines are special features conducive to economy, and it is claimed that the low-pressure drums are the largest ever constructed, being about the same diameter and 275 mm. longer than those on the Britannic. The high-pressure turbine crank casings are of cast steel, but cast iron is used for the lower pressure crank casings. The low-pressure bearings are 900 mm. diameter and 1950 mm. long. The turbine drums are cast steel, and the axle-ends of Siemens-Martin steel. The propellers are cast in one piece in manganese bronze and weigh 16 tons each and are 5000 mm. in diameter.

Four Weir Type Condensers

There are four condensers of the Weir type, each with a cooling surface of 1546 square meters, from which on the cross-Atlantic voyages a high vacuum was maintained.

The greatest attention has been given to the ventilation of the machine rooms, so that a low temperature is maintained, and the article proceeds to describe the more important of the auxiliary apparatus. Half of these are on the starboard side of the vessel and half of them on the port side. The refrigerating plant consists of three equal double-acting carbonic acid gas compressors. The electrical plant is supplied by five turbo dynamos, each of 288 k.w. capacity and giving 115 volts at a speed of 2000 r.p.m.

Knees for Ships Made in Portland



A great firwood knee made by the Rieg Ship Knee Company of Portland, Oregon, for a vessel of the Ballin type. When finished it has these dimensions: Root, 8 feet 8 inches; stem, 10 feet 7 inches; throat, 48 inches. It weighs in the rough 5400 pounds. The man is Riley Boyd, camp superintendent, who has been making knees for twenty-six years.

Structural Steel for Ships

THE Carnegie Steel Company of Pittsburgh has announced that the second edition of its pamphlet, "Structural Steel for Ships," is now off the press and ready for distribution. It contains sixty pages, instead of sixteen, as in the first edition, and includes many additional tables. A commentary has been added, which is an elementary discussion of rolling mill practice and steel works procedure as related to the manufacture and shipment of ship steel and reflected in the American standard practice.

Latest Work on Ship Steel

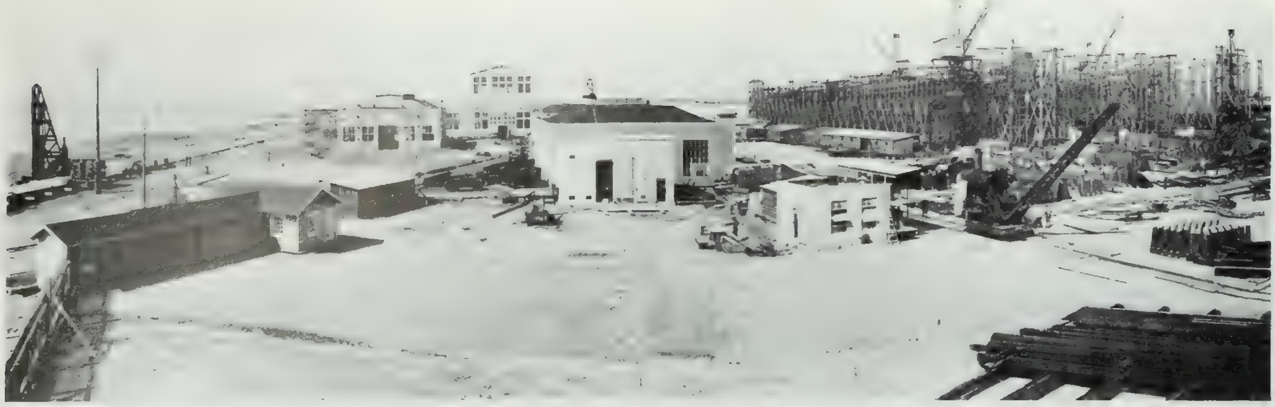
This pamphlet is of great value to the shipbuilder, because it is the latest word on the subject of structural steel for ships and contains a great store of information and working data.

The booklet gives tables on structural shapes recommended for ships and includes angles, channels, bulb angles, weights of flat rolled steel, permissible variations of plates ordered to weight, permissible overweights of plates ordered to thickness, elements of equal leg angles, elements of bulb angles and elements of channels. It also includes facsimiles of standard order forms for shapes, plates and bars.

Describes Rolling Mills

The commentary describes and illustrates the kinds of rolling mills utilized in the manufacture of ship steel, traces the route followed by an order from a shipyard, through district and general offices to the mills, through the mills to the shipping beds and thence back to the shipyard. It thus explains fully in what way irregularities in order practice complicate and delay the manufacture of ship steel and how the adoption of standardized practice benefits both the shipyard and the steel maker. It also recommends a convenient and uniform marking system for cargo vessel materials and a practical method of plain material storage at the yards—all fully illustrated by diagrams and figures.

If the recommendations in this pamphlet are followed, a long step forward will have been taken in the standardization of ship yard order practice and that will lessen, if not wholly remove, the delays which often have occurred in the actual placement at the mills of orders sent in by the yards, but which, by reason of inadequate, incomplete and inconsistent advices, district and general offices have had to hold, pending removal of irregularities by correspondence. An intelligent appreciation of what the steel makers have to do with orders and how they do it should enable the shipyard order clerk greatly to expedite the manufacture and shipment of the very materials his yard often needs.


Union Construction Company, showing the machine shop, compressor plant and four ways

An Industrial Island

DIRECTLY west of the Oakland Sixteenth street depot, about a quarter of a mile off the solid shore line, there rises out of a sea of mud a group of beautifully clean, gray, red-roofed buildings. On foggy mornings the impression is so mirage-like as almost to convince the observer of its unreality, but the substantial wooden mole or bridge carries the autoist safely over, and our car is soon parked on a clean gravel yard with the rear wheels against a bulkhead, on the other side of which almost bottomless mud stretches away in all directions, except where the channel has been dredged to deep water.

This is the island reclaimed from the mud by Union Construction Company, builder of ships for the Emergency Fleet Corporation of the United States Shipping Board, and here it has built as well-planned yard as any in this district, and a yard which, in the estimation of the writer, notwithstanding its environment of mud, can take the first place for cleanly physical condition of its plant and equipment.

The contracts now held by the company call for ten 9400-ton vessels of the Isherwood type construction. Four of these are under way and work is progressing nicely.

Served by Four Cranes

The material enters the yard by rail on the northwest side and is routed into the plate and angle storage yards on the north side of the island. These storage yards are served by a Northwest electric traveling crane and three steam locomotive cranes. The plates are stored on edge in heavy racks, made of rough timbers bolted together and protected by plates and angles. Just south of the storage yard is the laying-off park, which is served by a full portal electric traveling crane. This laying-off park is parallel with and immediately adjacent to the north side of the plate shop, which has the usual arrangement of mold loft and schrieve board upstairs, so that templates and molds are very easily transferred to the work. The plate shop is well supplied with motor-driven punches, plate planers, double scarfing machine and a hydraulic flanging press. The machines are all served by numerous Yale-Towne chain blocks traveling on trolleys, while an electric overhead bridge crane in the center travels across the shop, serving the various trolley runways.

South of the plate shop is the fabricating park at the head of the building slips. This park is served by four revolving boom brackets, the arms of which each carry two trolleys for blocks. Each boom is pivoted at its lower end in a block of concrete, while the upper end is supported by two light girders from the frame of the plate shop. These boom jibs swing the plates from the plate shop out to the fabricating park.

Five Traveling Tower Derricks

After fabrication the material is handled by the five electric traveling tower derricks which run the length of the four building slips.

Having ample room, the designers of this yard were able to make this arrangement so that the material practically travels in a straight line from storage yard to hull, and yet give enough space to the fabricating yard so that there is no conges-

Walter W. Johnson, president, Union Construction Company

The fabricating park, plate shop, laying-out park and storage yard, Union Construction Company

tion. The ways are of very solid construction, resting on piling driven through the mud to solid bottom. The entire surface of the building slips is floored with heavy timber.

Just east of the slips and parallel with them is the outfitting basin. The east side of this basin is formed by a long bulkhead wharf on which the rails are laid for the electric traveling tower derrick, which is used to handle the machinery back of this wharf, and parallel with it is the machine shop, which is adequately equipped with lathes, both engine and turret boring mills, radial drill presses, milling machines, shapers, planers, and all small tools and jigs necessary to take care of the work. The majority of the tools are electric individual drive and are located in the wings, leaving the central bay clear to be used for assembly of parts or erection of machines or engines. This central bay is spanned by a twenty-ton electric traveling bridge crane.

Harry G. Peake, vice-president and general manager, Union Construction Company

In the power plant there are two compressors driven by direct connected electric motors. These compressors are of the compound two-stage type and each is capable of delivering 2500 cubic feet a minute at 100 pounds pressure. A third compressor of like capacity is now being installed.

Gas is used as fuel in the rivet heating forges and the Selas reducer plant is said to be the largest in the state. There are two machines, one having a capacity of 25,000 and the other 8000 cubic feet an hour.

A very attractive two-story frame and concrete building houses the drafting, sales, accounting and executive offices, and nine booths are provided for checking in and out the 2500 employes.

The visit of the writer to this plant left an impression that every detail had been worked out with good judgment and with a vision that included future possibilities as well as present emergency. The personnel of the working force seemed to evidence a great interest in the work and a self-respecting energy and cleanliness that is in very pleasing contrast with the mud by which they are surrounded.

The Union Construction Company's plant is very conveniently located and will be thoroughly equipped for repair work on vessels, and it confidently expects by fair dealing to build a large business during the reconstruction period which is sure to come for our war emergency fleet.

Executives Are Practical Engineers

Walter W. Johnson, president of the Union Construction Company, is thirty-six years of age. Harry G. Peake, vice-president and general manager, is thirty-seven years of age. These gentlemen have been associated in business eight years. In 1911 they formed a partnership to carry on an engineering business and have specialized in designing and constructing gold dredges and mining machinery. Both these men are mechanical engineers, and prior to their partnership they worked for three years in Oroville in designing and constructing gold dredges and other types of machinery for one of the large California companies.

They have designed and constructed more than thirty-two dredges for use in California and for shipment to Alaska, Portugal, Bolivia and Russia. Incidentally, they are now engaged in building one of the largest gold mining dredges ever constructed. This dredge is for shipment to Siberia and will be equipped with 1500 horsepower engines. Mr. Johnson says that a gold dredge is a more difficult proposition to build than a ship.

First Decided on Wood

At the time that war was declared by the United States, Mr. Johnson and Mr. Peake pondered how they could best use their great engineering experience in the service of their country. Their experience in construction of wood hulls for dredges inclined their decision to wood shipbuilding. After extensive investigation of proposed sites for a wood shipyard, they decided that the Key Route Basin offered greater advantages than any other location on the Coast; and especially so from the standpoint of contemplated repair work. It is approximately the geographical center of San Francisco Bay and is served by overland rail connections. However, after the site was selected, advice of friends prevailed and a more permanent organization was effected and the plans changed so that, beginning with steel ship construction, they could establish a large general engineering and construction firm and make of their site a real "industrial island."

E. G. Burr, assistant to President Johnson, deserves a great share of the credit for the ideal planning of the yard, and to Paul E. Morse, works manager, is due the prompt and efficient manner in which construction followed on plan.

Yard Is Well Planned

The arrangement of machine shop and outfitting wharf was especially planned for convenience in repair work. The traveling derrick on the wharf can easily handle all the machinery parts and swing them from the ship right into side doors of the shop. We do not know of any yard that has these two co-ordinating units of the plant scheme so wisely placed. In fact, in a great many yards the finished machine and engine parts have to travel one-half to three-fourths of a mile from the shop before reaching the outfitting dock, while in the Union Construction arrangement the greatest travel would be the width of the shop. This readiness of motion or flux of materials through the various constructional processes is a very important item in shipyard economy, and failure to plan for it may mean losses instead of dividends.

Many Alaskans Employed

Every effort is being made by the management to increase the efficiency and raise the morale of the working force. An interesting fact in this connection is that men from Alaska form a large proportion of the working force in the plant. Walter W. Johnson spent nine years in the Far North and gained a very wide circle of staunch friends among the sturdy workmen in the mining and trading centers there. When it became known that he was building ships for Uncle Sam, many of his old friends decided that he was a good chief to work under and "hit the trail" for San Francisco.

A yard bulletin called "The Reprint" has recently been issued for the first time. This sheet will be published at intervals and distributed among the employes in order that they may be kept in close touch with the management.

With its energetic young executives and its splendidly-growing plant, the Union Construction Company should win for itself and hold a very high place among the great industrial plants of California.

O. S. K. Business is Excellent

THE report of the Osaka Shosen Kaisha for the half-year ending December 31, 1918, has been received from Osaka. As has been true of the reports of almost all well-managed shipping companies, the report is of a nature to be very gratifying to stockholders. "The business conditions of this company during the latter half of the year were satisfactorily good and excellent results were obtained, owing to the fact that cargo still continued abundant and freight rates were accordingly kept high."

Brisk Business After Armistice

"To sum up, the effect of the armistice signed toward the end of this term did not yet come to show itself," says the report, "and the company's business became even more brisk during this term, with many newly-built steamers put into service, so that the total receipts amounted to more than 100,000,000 yen. The number of the company's steamers employed, together with those chartered during this term, totalled 160, with an aggregate gross tonnage of 402,729 tons, which were allotted to forty-seven home and foreign services, and carried 1,038,190 passengers and 89,471,410 pieces of cargo at a charge obtained of 91,171,578 yen. Adding to the above other miscellaneous receipts, total receipts of 100,654,942 yen were obtained, after subtracting from which the total expenditure of 49,313,997 yen, net profits of 51,340,945 yen were secured. As compared with the corresponding term of last year, an increase of 58,991,428 yen in the total receipts and 29,148,697 yen in net profits are shown, while, as compared with last term, still an increase of 15,474,079 yen in net profits can be seen."

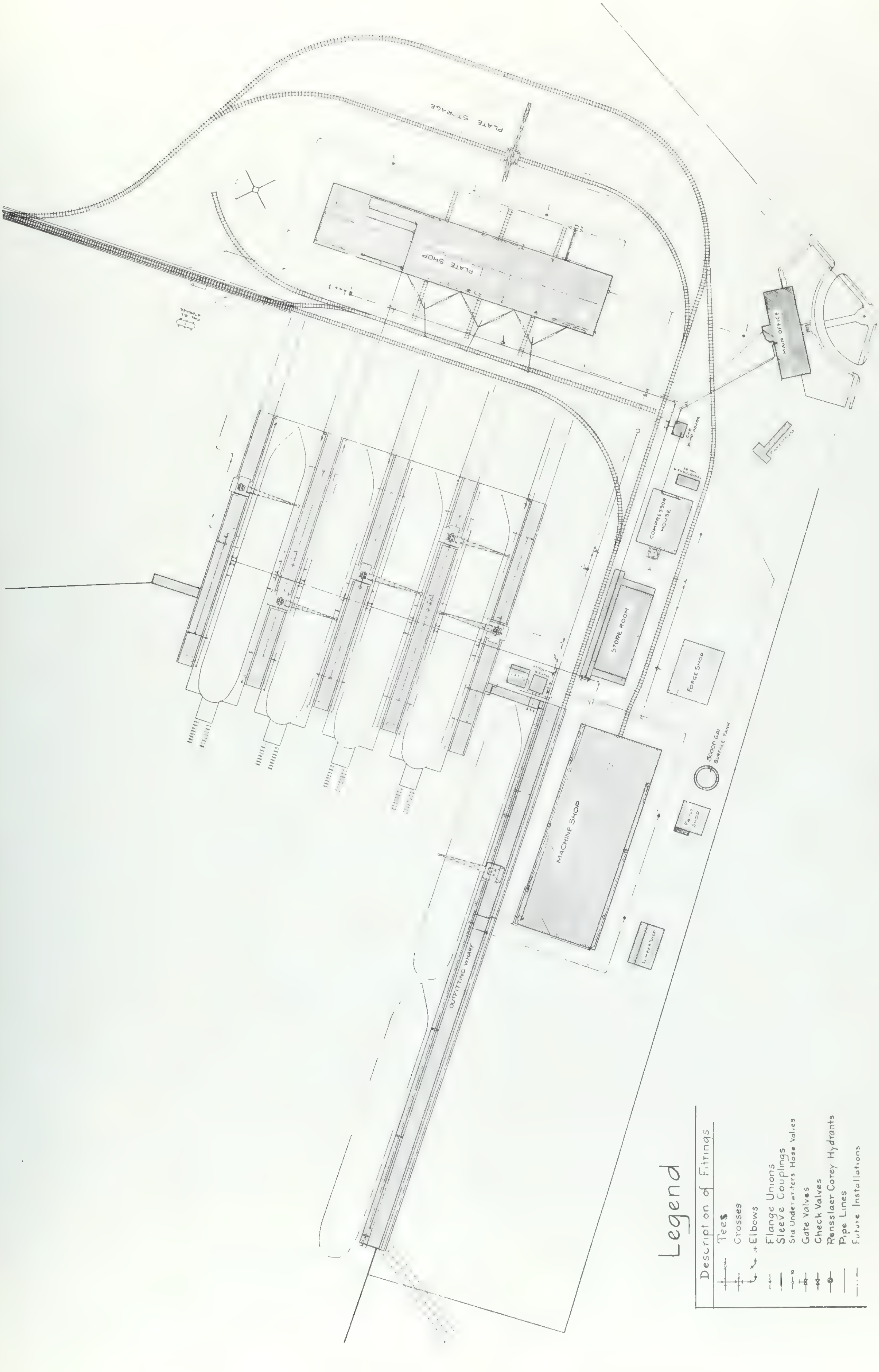
Portions of the report covering certain lines are:

"On the North American services, as a result of the enforcement of import embargo by U. S. government, notable decrease in outward cargo, together with the increase of ships' tonnage employed on this service, gave rise to the fall of freight. On homeward voyages, on the contrary, as the cargo movement was exceedingly brisk, more than ten extra boats were dispatched, and the results were as good as those of last term.

Japan Rates Firm

"On the home services, although the demand for ships' tonnage was somewhat moderated due to the delayed distribution of new crops in various districts of the empire and the dullness of business transactions since the middle of this term, yet cargo remained plenty and freight rates were firm; hence the results were excellent.

"On the South American services, our trade with South America and South Africa continued to show a brisk aspect, while exports from intermediate ports to South America, such as rice, hemp and sugar, were abundant, so that a remarkable increase in receipts was seen."



Plan of the Union Construction Company's Plant

From the Bottom of the Sea

By Ralph E. Cropley

Of the ships sunk by the Germans in British waters between January, 1915, and May, 1918, 407 have been salvaged. One hundred and forty-seven of these were refloated during the first five months of 1918, the increase being due to improved methods rather than to greater activity of the U-boats. While they lay in the repair basin awaiting their turn, I have been fortunate enough to see some of these ships vanquished by the fortunes of war. With their gaping wounds, deck houses shot away, shreds of rigging dangling from broken masts like devastated cobwebs, stackless, paintless, streaked with rust and caked with barnacles, they spoke of distant lands, of strange horizons, of storm and tempest, of deeds well done.

The hardships and personal sacrifices experienced in salvaging them are worthy of place beside the glorious records of the men who navigate the danger zone or go over the top into No-Man's Land. For the sea, which sometimes has suddenly destroyed the work of weeks and swept men to their deaths in the twinkling of an eye, has not been the only enemy to combat, as U-boats have frequently brought destruction to the lives and hopes of the salvagers. Yet, in spite of all, the necessity of making this world a safe and decent place to live in has caused men to stick to it and retrieve, from the bottom of the sea, ships which one never would have thought could have been made seaworthy again.

Runs Into Arctic Mine Field

Among the tales of ingenuity and daring there is none more praiseworthy than that of the Liverpool. The name is necessarily fictitious. She is a ship which in times of peace is well known to the traveling public. While making a hurried trip to Archangel before the ice should close that port, she ran afoul of a mine field which German submarines had studiously laid in the Arctic Ocean.

"I suppose they kissed themselves good-bye," I remarked to the naval officer who was telling me about it as we lounged before a crackling wood fire in the Harvard Club.

"Almost had to," he replied, taking an extra puff on his pipe as if in the way of emphasis. "If the old man had not had grit, a good head on his shoulders and a well-built ship to back him up, I don't think any of them would have been saved. It was a devil of a fix to be in up there 'midst the ice floes, winter coming on rapidly, a hole as big as a house abreast your No. 2 hatch and no port of refuge within less than 300 miles, and that only reached through ice fields.

"Fortunately, the bulkhead aft of No. 2 held, even though the Liverpool settled by the nose and took a bad list. How long it would hold, of course, was the problem. The old man dared not steam ahead, as the ice would finish her in short order and she never could have lasted long enough to back her 300 miles to port, even if her rudder didn't get smashed by the ice.

Not One Would Have Lived

"Something had to be done, and that quickly, for if she sank and her crew of 500 had taken to the boats, it was almost a certainty that not one of them would have lived to tell the tale. Why? Well, not a boat could have reached open water before the Arctic froze solid and no rescuing ship could have gotten to them in less than six months. Six months on the ice, with only lifeboats as shelter, which any moment might be crushed, was an impossible situation, to say nothing about the question of food.

"As no ship could reach him before the ice blocked the sea, the old man backed her 100 miles to the nearest land and shoved her ashore. She would at least be a shelter during the six months, the worst thing happening to her being that the drift of the ice would cause her to grind her bottom to bits. Suddenly the old man developed a brain wave which turned out to be an inspiration. The Liverpool had a large cargo of munitions—no explosives, just empty shells, etc. This the crew was speedily set to dumping overboard on the side from which would come the drift of the ice. Being ashore the water wasn't very deep alongside and the cargo was enough to form a breakwater to protect her, if she could be got afloat, from having the bottom ground out of her.

"As the cargo came out she floated except at the bow. The old man soon saw that he couldn't float her there, even if he put a temporary patch over the hole. So there was nothing to do but to part the Liverpool from her bow and this was done by dynamite, as had been done in cases of other ships whose noses got too familiar with some rocks. And during the six months she lay behind her cargo breakwater, her sunken bow also functioned as a part of that ingenious contrivance. I tell you what, it was some achievement to do in a week's time, with no assistance of any kind except what marine engineers were able to tell the old man via wireless.

Keeping the Men Busy

"The old man said he nearly got nervous prostration trying to think up schemes to keep his crew fit during those days when there was no daylight at all. Mind you, he had just 500 men. He gave them military drills on the ice, cricket games, had ice-boats built and had races, and blessed some genius for devising a way to manufacture home-made skates. Then he made his crew go to school, the textbooks being novels from the ship's library. The wireless gave them the news of the world, and even solved problems which stumped the temporary schoolmaster. They found in the library some of Sheridan's plays and had a go at that. When the salvage ship arrived at the end of six months, as soon as she could push her way through the ice, thanks to the old man's genius, she found the Liverpool's crew in a pretty fit condition."

The fitting of a new bow to the Liverpool as she floated in not too calm a sea was a feat in itself. Equipping new bows to ships which have left their old ones on the rocks is a delicate task even in a drydock, for the two parts have to be brought to a dead line in every particular. Yet the marine engineers who figured on the Liverpool's plight, as advised them via wireless, overcame the difficulties of fitting a bow to a floating ship, by equipping the Liverpool's new bow with a socket which would fit into the other section of her hull and form a "blow-out" patch over the joint. Of course, above water the two parts could have been held together by stringers if necessary. It was the bent and twisted plates under water which gave the most difficulty. And as we Americans used electric welding for joining together, as they floated, the halves of the boats brought through the Welland Canal, so was it used on the Liverpool. And under her own steam she came back to civilization, a monument to what man can do when he has to. Not the least remarkable part of the case was the building and launching of the new bow and towing the unwieldy structure 1200 miles over waters infested by mines and U-boats.

Thump, Thump Along the Bottom

Another one of my naval friends has told me of an experience which a cruiser had while chasing raiders in the South Atlantic. It was a nasty, stormy night, as at full speed the cruiser followed up a rumor that the Kronprinz Wilhelm had been seen that day in such and such a latitude and longitude. The night was as dark as indigo and the men on the bridge could barely see the phosphorus of the seas as they came pouring over the bow when she'd stick her nose under. It was creepy as she plunged on, with not a light breaking the gloom, not even from the heavens. Suddenly, as she shot over the crest of a roller, there was a crash which seemed like the crack of doom. Those up were flung to the deck and those in their bunks were flung out of them, and instead of sticking her bow into the next wave as she should have, the cruiser seemed to straddle the hollow between the crests. Immediately after the crash the piercing yells of human beings in the throes of terror were heard, and then thump, thump, thump along the cruiser's bottom as if Father Neptune were pounding on her. In fact, one wag suggested they might have run into the old man and he was swatting them with his trident as if they were an annoying fly. It all took place before you can say "Jack Robinson" and was so terrifying and shrouded in such mystery that every man Jack on that cruiser, to this day, is quite sure his length of life was materially shortened by the experience.

A hurried examination showed the cruiser eventually would sink if she couldn't be got to port. Fortunately, she wasn't far distant from a neutral port which had a drydock large enough to take her, and thither she went. When the water fell away from her and revealed her bottom, all hands could but wonder at the queer turn of fate by which she hadn't sunk immediately. For, under water her fore foot was pushed back like a bellows so that forty feet of ship occupied but a quarter of that space. The plates of the bottom were dented and cracked, yet strangely nothing was torn or ripped.

In the rush through the blackness of the night, as she came over the crest of one wave, the cruiser apparently had come down on a low-lying tramp steaming at right angles to her course. The tramp at the moment happened to be in the trough of the sea and the cruiser had crushed her beneath her bows, her speed driving her on so that the tramp in sinking bumped along the cruiser's bottom. What vessel the tramp was is not known to this day, for though the sea was searched for survivors none were found, nor any wreckage which might give a clue. The conclusion reached is that the tramp had been one of the "stool-pigeons" which the Kronprinz Wilhelm and the Prinz Eitel Friedrich were known to have.

Give Her False Fore-Foot

The facilities at that particular port couldn't cope with the situation in the matter of permanent repairs and it was evident she couldn't steam 6000 miles as she was, to a shipyard which could repair her permanently. So the marine engineers set to work and furnished her with a false forefoot made out of wood, which they bolted over the damaged one, crushed up like a bellows. Then in the double bottom they built in tons of wood to strengthen the damaged plates, ribs, etc., floated her out of drydock and started her on her way. Any ship meeting her at sea never would have suspected her injury, and so well had the temporary repairs been made that she stayed out on patrol and it was four months before she was drydocked again. In fact, it was even suggested she shouldn't be repaired at all, for permanent repairs necessarily would be a delicate job, as the removal of damaged sections which extended into the sound portions of the hull would have to be accomplished with the imminent danger of the entire vessel collapsing. Nearly 200 new bottom plates and as many ribs and floor beams had to be replaced. Section by section the new ones were worked into her, no one section being removed until the one under repair had been completed. As for the bow, when the false fore-foot and the damaged one were removed, the cruiser had an appearance not unlike that of the gaping mouth of a fish. Nothing like the job had ever been undertaken, and that it was completed in ten weeks shows what can be done in spite of the forces of nature.

I was standing at my office window the other day watching the array of camouflaged ships steam seaward. There was envy in my heart, I admit, not only of the boy who is bound "over there," but of the man who paces the bridge. The merchant ship commander standing beside me, somehow seemed to sense how tough it is on a fellow who's bred to the sea to be declared technically unfit for war and compelled to stay ashore, for he in his bluff way tried to cheer me up, and finding he was failing on one tack, switched to a new one by calling my attention to a particular ship which was passing. I scrutinized her, noting her graceful lines and appreciating she belonged to the period when they built a liner as a lady and not as a freight-house. There was something strikingly familiar about her, yet she couldn't be the ship I thought she was, for that ship had been one of Captain Haddock's famous dummy squadron and was afterwards sunk for a breakwater. Puzzled, I turned to my companion.

She Lay Sunk at Kephola

"Yes, it is she—the old—"

He mentioned a name I'm not free to give.

"But, man," I exclaimed; "you must be wrong! Why, only the other day the New York Sunday papers had pictures of her as she lay half sunk at Kephola with a bad list to port."

He laughed—or, rather, it was a sort of wise chuckle. "Those pictures were taken over two years ago," he said. "That's she there now, before your eyes, once more doing her bit as effectively as she did it as a dummy battleship and as a breakwater, is a smart piece of work."

I could hardly believe either my eyes or ears, as I appreciated what a frightful condition a ship gets in after lying just awash on the bottom for a few years exposed to all the fury of the elements. Furthermore, I knew the dummies had been filled with rocks and cement ere their sea-cocks had opened, and it seemed unbelievable that such a solid weight had ever been taken out of the old ship without destroying her.

"I was at Kephola right after she was refloated," my companion said, "and I never saw a more dilapidated spectacle. In making her into a dummy, Haddock had built on wooden superstructures here and there and filled up well decks to give them a straight sheer fore and aft. This falsework, of course, remaining above water, the sea had pounded it till it clung to her in shreds, and as she floated with barnacles and sea-grass covering her hull nearly to the top, she really looked as if she had the mange."

"But how, in the name of Sam Hill, did they ever get that concrete out of her so she'd float?" I asked, watching the friend of my youth and wishing her luck on her voyage over-seas.

"By blasting."

"Blasting! She's so old I'd have thought it would have split her apart."

"It did with some of the dummies which weren't as well built as the ——. Of course, they didn't get it all out, as some of her deck beams, stanchions and ribs were cemented in, and to blast round them would be fatal. Yet they got most of it out and I'd rather be on her when Fritz was around than on most ships."

Concrete, With Plating of Steel

Naturally, I asked why, and was informed that my old friend was now pretty nearly a concrete ship with an outer plating of steel. And questioning the skipper for further tales of salvage, I learned of the timidity with which a certain famous ship had been floated. I have a picture of her lying on her side, half out of water, and can see the shell holes in her deck, made by the cruiser which finished her meteoric career as a raider. That she was ever righted and floated after lying there filling up with sand as the surge and the fury of the elements beat upon her for three years, is hard to understand. In the first place, the boilers had to be taken out and the engines as well, for, never meant to be suspended in space at a ninety-degree angle, they had broken from their bed plates and become a jumbled mass on the side which was bottommost. Through the upturned side they had to be hoisted, and as that side was frequently like a half-tide rock, never clear of the sweeping seas, a caisson was built on it to protect the workmen. And sometimes for days during a gale men would be marooned inside the caisson, wondering what moment their barrier would be smashed around them, or, as once occurred, a U-boat would appear and land a well-directed shot in their vicinity. Yet they plugged away, and one day turned the big ship over on her own bottom, floated her, and started her on her 1000-mile tow through the danger zone to a drydock, only to lose her when complete victory was barely theirs. The feelings of every man who had risked his life and suffered hardships to salvage her, were such that any one of them would gladly have throttled the U-boat commander who was so unsportsmanlike as to fire the fatal shot. Though she is lost now beyond recovery, the unbelievable had been done and there's some comfort in that.

Sunk Twice in Twelve Months

And speaking of U-boat sinkings, I've been told a tale regarding a ship which went down twice within twelve months. The first time she was torpedoed 100 miles off soundings and her merchant crew had struggled towards port only to lose the race when but a short distance from their goal. Although settling in but comparatively shallow water, only the tops of her masts remained above the surface. Divers immediately descended to her, as she was loaded mostly with munitions, and set to work getting them out of her, a very dangerous task when a mishap might scatter salvage ships and everything all over the seascape. The risk became so great, and yet the cargo was so valuable a military unit, that some other form of salvage had to be devised. This was done by the marine engineers building a cofferdam more than 400 feet in length by 50 in width. It was a very tedious and exacting task for the divers to drill holes in the ship's hull and bolt this immense contrivance in place, while the seas surged above tnem and the sections of the dam were ticklish to handle. Yet it was done eventually, and the hole made by the torpedo having been covered by a patch and made as water-tight as possible, centrifugal pumps began removing the water from within the cofferdam. Gradually the wreck rose a bit and as it did so tugs hauled it shoreward till it grounded again, and top sections of the cofferdam were sawed off in order to lessen the top weight so that as more water was pumped out the vessel would be able to rise still more and be hauled further in shore. And repeating this performance, demolishing the height of the dam as the ship came nearer and nearer the surface, eventually she was beached in a sheltered cover with her superstructure entirely out of water. There it was no difficult task for divers to remove the explosive cargo and make the hole in her side pretty nearly water-tight. This done, she was pumped out and floated. Aside from the patience, skill and danger of the munitions exploding, the outstanding feature of the salvaging was that even in war times, with U-boats hovering around, and scarcity of labor, the task was accomplished in three months. Unfortunately, it can't be performed on this same ship again, as her second torpedoing sent her down 'way out at sea.

Raised from Twelve Fathoms

The difficulties encountered in salvaging ships have taken a heavy toll of life, especially by the emission of poisonous gases from rotting cargoes. The work of weeks has oftentimes been destroyed by one rough sea. Yet the salvagers have kept at it as determined as the soldier or the sailor to win this war, and they have gone so far as to raise a large collier sunk in twelve fathoms of water—a dead lift of 3500 tons—and raising another vessel by means of compressed air from a depth of fifteen fathoms. These tales have been told by men who navigate the ships and profess no greater knowledge of marine engineering than I am blessed with. So I can but ask for indulgence and apologize for any misstatement or distortion of the facts, as, except for what the British Admiralty tells officially, salvaging was a closed book during the war and details difficult to obtain.

The Oil Engine—Its Economic Position in the Marine Field

By Theodore Lucas

Member Society Naval Architects and Marine Engineers.

THE close of the war puts American shipping, shipowning and shipbuilding up to the task of finding, for normally economic, competitive peace conditions, the right level at which it profitably can maintain its newly-created—or, at least, widely-broadened—existence. This means, of course, as long as freight rates and therewith the incomes of ships are generally settled by international competition, that the cost of operation must be reduced to the practical minimum. For convenience of illustration, the following items may be considered as comprising this cost:

1. Interest, depreciation, insurance and general expense on total purchase price of the ship.
2. Repairs and overhauls of hull.
3. Repairs and overhauls of machinery.
4. Wages of deck department.
5. Wages of engine department.
6. Fuel.
7. Lubricating oil, waste, general machinery stores.
8. All other supplies, stores, equipment, outfit, etc.

In scanning the list it is apparent that the choice of the propelling power affects several of these items and so has a most vital influence on the total cost of operation.

Usually the choice will limit itself to one between high-pressure steam, with probably geared turbines and oil-fired boilers, on the one hand, and internal combustion liquid fuel engines on the other.

Carrying Capacity Greater

These latter are usually considered as offering immense advantages for cost reduction, notably in items 5 and 6. Enthusiasts figure that the wages of the fireroom force is saved entirely. They figure that one pound of oil produces of actual power as much as four or even five pounds of coal, thereby not only reducing the cost of fuel greatly, but also adding to the useful carrying capacity of the ship by its lesser weight and to the hold space by its smaller bulk, and its adaptability to stowage in inner bottom tanks.

All this may be true to the largest extent, but to a varying degree may be much influenced by certain adverse factors, which may greatly curtail or even nullify these glowing advantages. One of these, and an ugly one, has been that marine oil engines so far have suffered very frequently from the most annoying breakdowns, due to defects in cylinders, water jackets, heads, pistons, piston pins and the many delicate details of valve gears, fuel pumps, etc. Aside from the actual cost of the repairs, the shipowner considers also that, during the period of these repairs, necessary for the operation of the ship, the interest, the depreciation, the insurance and the general expense, including usually the entire wages of an idle deck department, go on just the same.

Although rapidly decreasing under better understanding, oiling equipment and management, the consumption of lubricating oil is still considered very large in even modern marine oil engines. This is partly due to the peculiarity of trunk pistons, increased number of cranks, connecting rods, main bearings and many times duplicated details of valve gears, etc., most pronounced in four-cycle, single-acting, six or eight-cylinder engines.

More Labor for Engine Room

This in turn necessitates much more labor for the necessarily increased staff of the engine room proper, to which in addition comes the demand for more frequent overhauls, adjustments, grinding exhaust valves and fuel needles, packing pump plungers and needle stems, etc., as well as the almost incessant attention to the lubrication of all the small details of the valve gear, which frequently in roller pins, rollers, levers, spherical ends of stems and rods, have only open oil holes and no storage capacity for automatic feeding.

It may justly be said that these considerations have retarded considerably the introduction of the marine liquid-fuel engine and have filled shipowners, their superintendents and operating engineers with a certain distrust against this type of machinery, leaving them always in the suspense that one serious breakdown might wipe out two or three times the yearly savings in fuel.

From a thorough analysis of these eight items as well as of minor connected ones, it appeared that it should be possible to design a marine oil engine which would eliminate, or at least reduce, all or nearly all of these shortcomings.

This would mean that all internal parts subject to stress as well as temperature should be of simple sections, so that with proper elastic and expansible support they would be able to relieve themselves against the appearance of severe internal stresses. Thus the head might be split into two parts, the waterjacket into two parts, the cylinder barrel might expand longitudinally, and upon it might loosely ride the exhaust ring, fitted with stuffing boxes, and at the outside flange connected to the waterjacket by a flexible membrane. The piston might be in two parts, its upper water-cooled part being of very simple section.

Could Be Built by Welding

Further, all these parts, with the exception of the upper head and the waterjacket, might be designed in these simple sections so that they could be built up from wrought steel sheets by electric welding with due provision for welding ribs electrically in thoroughly workmanlike manner at possibly not a great increase of total cost over castings in steel or even in iron.

Still further, to minimize any danger from breakdowns by temperature stresses, the cooling water system might be laid out so that each main part had an independent supply and a visible or indicating discharge, all from or to large mains supplied by outside independently operated pumps with opportunity of increasing or decreasing quantities running after shutting main engine down, etc.

The piston cooling might receive special attention insofar that the heated water intended to never exceed 100 degrees Fahrenheit might be taken off

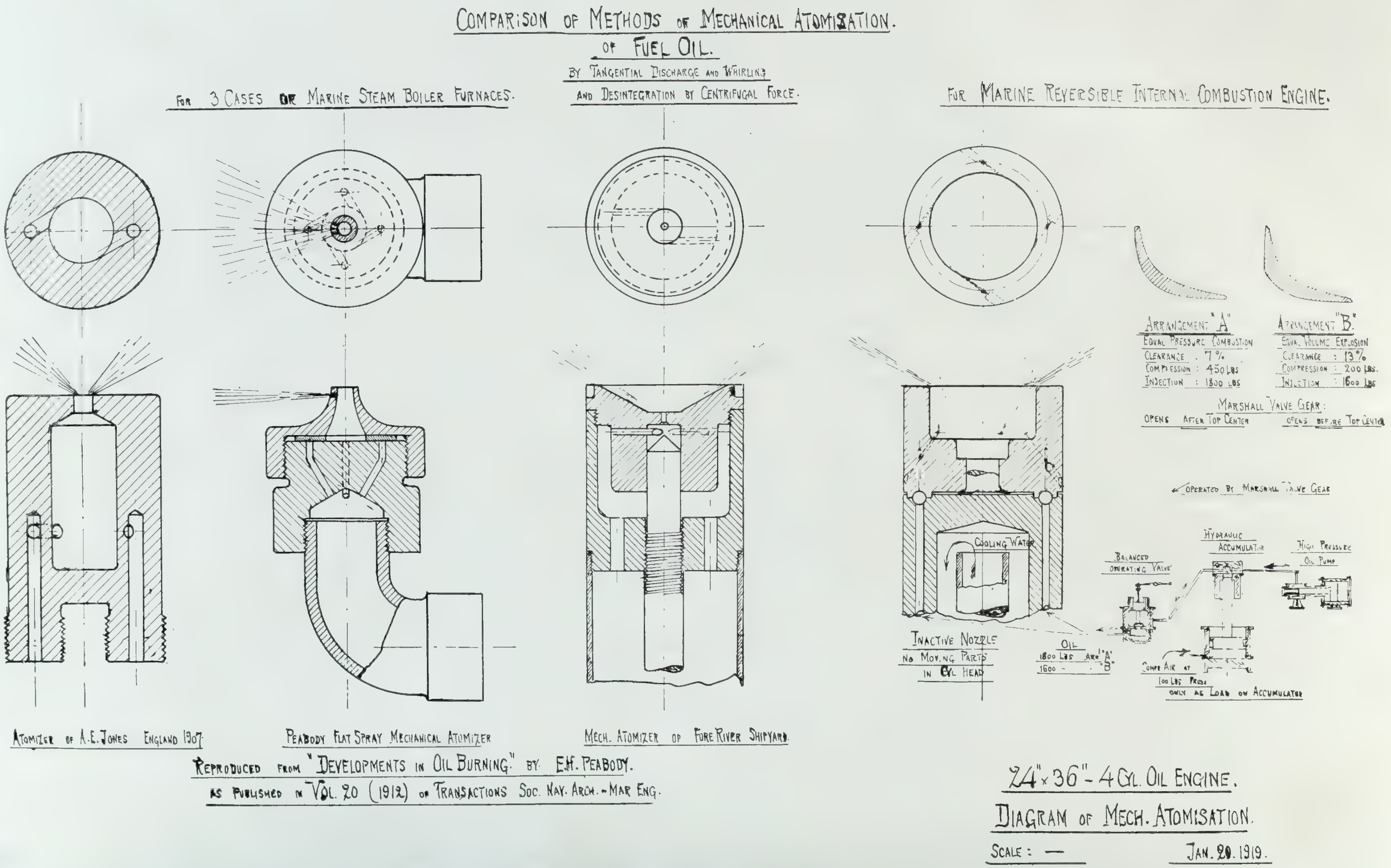
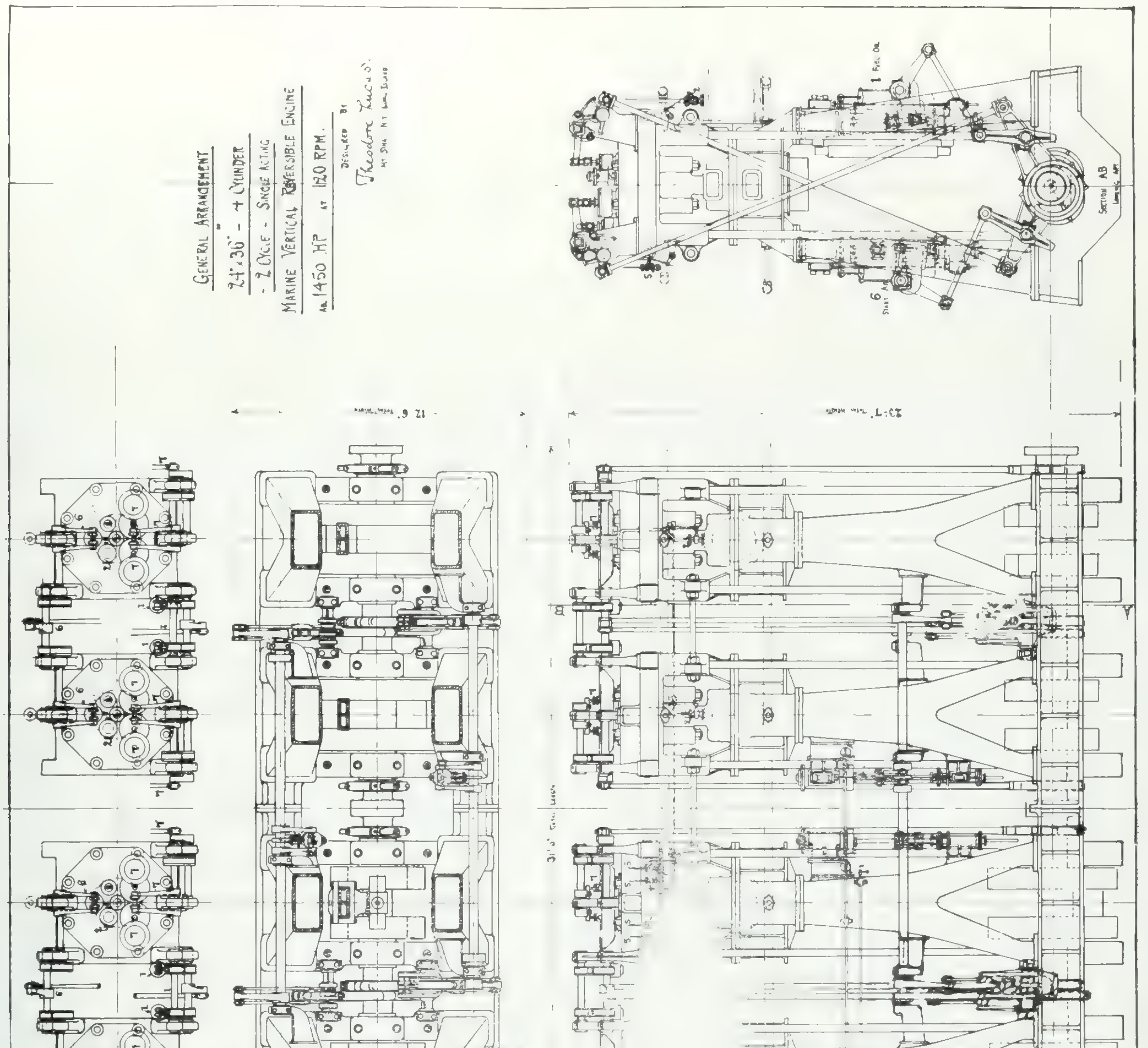

COMPARISON OF METHODS OF MECHANICAL ATOMISATION.
OF FUEL OIL.
BY TANGENTIAL DISCHARGE AND WHIRLING
AND DESINTEGRATION BY CENTRIFUGAL FORCE.
FOR 3 CASES OF MARINE STEAM BOILER FURNACES.
FOR MARINE REVERSIBLE INTERNAL COMBUSTION ENGINE.
ARRANGEMENT "A"
EQUAL PRESSURE COMBUSTION
CLEARANCE . 7%
COMPRESSION : 450 LBS
INJECTION : 1800 LBS
ARRANGEMENT "B".
EQUAL VOLUME EXPLOSION
CLEARANCE : 13%
COMPRESSION : 200 LBS.
INJECTION : 1600 LBS
MARSHALL VALVE GEAR:
OPENS AFTER TOP CENTER
OPENS BEFORE TOP CENTER
OPERATED BY MARSHALL VALVE GEAR
HYDRAULIC ACCUMULATOR
HIGH PRESSURE OIL PUMP
BALANCED OPERATING VALVE
COOLING WATER
INACTIVE NOZZLE
NO MOVING PARTS
IN CYL HEAD
OIL
1800 LBS ARE "A"
1600 " " "B"
COMPR AIR AT
100 LBS PRESS
ONLY AS LOAD ON ACCUMULATOR
ATOMIZER OF A.E. JONES ENGLAND 1907.
PEABODY FLAT SPRAY MECHANICAL ATOMIZER
MECH. ATOMIZER OF FORE RIVER SHIPYARD.
REPRODUCED FROM "DEVELOPMENTS IN OIL BURNING." BY E.H. PEABODY.
AS PUBLISHED IN VOL. 20 (1912) OF TRANSACTIONS SOC. NAV. ARCH. & MAR ENG.
24" x 36" - 4 CYL. OIL ENGINE.
DIAGRAM OF MECH. ATOMISATION.
SCALE : —
JAN. 20. 1919.

Figure 1. Comparison of methods of mechanical atomization of fuel oil



General arrangement of the Lucas engine

at the very top of a converging cone with the best assurance of carrying safely all air or gas bubbles out of the piston.

In regard to a very desirable possible reduction of the consumption of lubricating oil, a novel method of introduction of the cylinder oil might be chosen; that is, from the inside of the piston just below the piston rings and injecting it only for a short time at the top center so that the rings upon their downward travel would wipe directly into the oil. It might be possible thereby to lubricate the rings with greater economy and most effectively just at the critical time of the explosion and expansion periods and not giving any oil, while passing the exhaust port of the two-cycle engine. This method might be chosen under the reasoning that a very limited amount of oil injected by pump at the top center, completely used or quickly evaporated and burnt without residue, must be far more effective than a large amount thrown in promiscuously at the bottom center.

Soon Will Be on a Parity

A two-cycle engine, even in single-acting type, is, of course, already a long step toward a reduction of cranks and bearings and their large oil requirements. But undoubtedly it will not be long before a double-acting, two-cycle type will place the marine oil engine upon a parity with the marine steam engine so far as oil consumption is concerned.

The valve gear now almost universally adopted for marine oil engines is that of stationary, nonreversible cams, push levers and rods and spring-returned poppet valves. All these parts are loose, subject to considerable inertia stresses and very noisy—the latter feature in multi-cylinder engines being a grave objection of many engineers. In addition, this valve gear type allows only final positions of reversal without variable cut-offs, is troublesome and often difficult to lubricate, requires an excess of oil, and will still wear considerably.

It might seem as if normal marine, reversible, cut-off valve gears might be vastly superior in their operating performances as well as in the needed upkeep, attention and lubrication.

The accompanying illustration, Figure 2, shows that a Marshall gear of the cut-off, reversible type can readily be introduced into a marine oil engine, carrying with it the advantages of no loose parts, no big return springs, and no inertia effects, which would be noticeable by hammering or noise. It was found that easy reversibility and a very finely graduated oil admission might be gained with very much less complication than is embodied in the mechanism at present employed for a variation of the stroke of the suction valve of the fuel pumps.

The entire Marshall valve gear has by comparison with the total valve and fuel pump gear of the now customary type less parts and is in better shape, part for part, to use lubricating oil effectively with less attention, overhaul and annoyance from disablement.

Figure 2 shows the general arrangement of an engine such as would embody more or less completely the aforementioned points.

Introduction of Oil Is Difficult

The introduction of the fuel oil into the cylinders at just the right time of only a fraction of a second, usually with the minutest quantities under the highest pressures, is a very difficult problem.

The present constructions of numerous fuel pumps, fuel needles and their mechanism entail considerable initial expense and by their great delicacy are often a source of some anxiety to, and of attention by, the engine room force. Change in speed means, then, frequently also change in the air injection pressure, requiring the attention of the engineers in quite a few directions.

It appeared that great simplifications might be secured by the adoption of only a single, rugged, plain fuel-pump, even for multi-cylinder engines, and have it work into a hydraulic accumulator (Figure 1) which with an absolutely steady and practically unchangeable pressure would inject the oil with uniform velocity into any cylinder open. The cutting off of the oil stream, the reversal, the graduating of the output of the engine to full, half or quarter power, would then all be accomplished through the fuel oil Marshall valve gear actuating for different time limits or phases upon a large, simple, rugged operating-valve opening and closing earlier or later, according to needs, but always full open or tightly shut without any compressed air spray or complication.

Through Water-Cooled Nozzle

The final entrance of the oil is shown to occur through a water-cooled nozzle, absolutely inactive without moving parts in the fire and quickly detachable and replaceable. This nozzle has at its inner end very fine oil bores tangentially arranged and under a purely mechanically produced pressure of more than 1500 pounds a square inch whirling the oil most energetically around the inside wall of a recess and scattering it by the resulting centrifugal force into minute particles readily uniting with the oxygen of the compressed air. To help still further the rapidity of combustion, this compressed air is guided between a neck in the head and a corresponding step on the piston through an annular ring of fan-shaped section and thrown directly against the cone of finely atomized oil (Figure 2, left top section).

This exceedingly simple operation, requiring no expensive or delicate mechanism, is absolutely nothing new, but exactly the same well-tried and well-tested mechanical atomization which, for about ten years, has found so much favor in oil firing of marine steam boilers. The only purely mechanical difference is that the pressure had to be increased to overcome the higher reaction pressure in the cylinder and also to increase the centrifugal force in the oil particles for more complete atomization and a more rapid union with the oxygen.

With the help of an igniter plug, used at starting only, and a compression release for replacing combustion products by fresh air, the Marshall valve gear lends itself readily also to the task of exploding at will a charge of oil at any arbitrary position when the crank has its full leverage, thereby imparting a very powerful starting or braking tongue. This can be alternated with the starting air, which also has an entirely independent reversible Marshall valve gear and which at 100 pounds initial pressure with about 60 per cent maximum cut-off shows its indicated work in a regular steam engine cord. This alternation will warm up the cylinders gradually while starting and quickly prepare them in the best possible manner for going on oil alone with the minimum consumption of starting air.

With 225 or 500 Compression

This Marshall valve gear has also the advantage that it can be used either with a compression up to 500 pounds and a corresponding clearance of about 7 per cent, like the normal Diesel, or with a compression of about 225 pounds and a corresponding clearance of about 13 per cent, like an equal volume explosion engine, according to the wishes of the builders or owners.

The main details in other directions follow very closely those of the more or less well-established practice of marine steam engines, mainly because they are probably the best for the purpose and are likely to give the operating engineer as much confidence as he has with steam engines. This applies to bedplates, columns, slipper guides, cylinder cas-

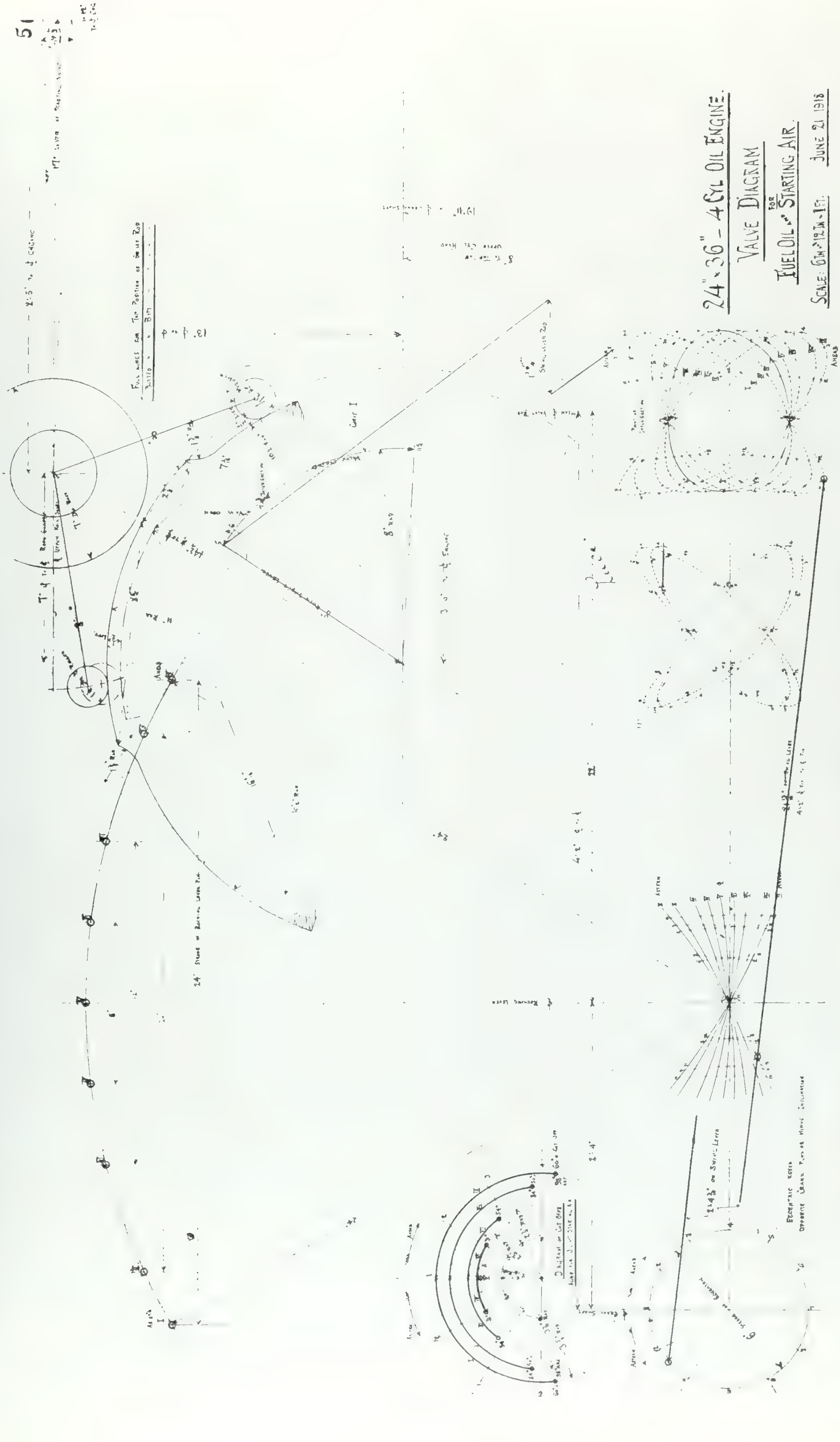


Figure 3. Valve diagram for fuel oil and starting air

ings, crankshafts, connecting rods, crossheads, piston rods, valve gears, everywhere adjustable bearings, fully accessible and carefully cooled or lubricated, as required.

The details of the mechanism actuating the necessary poppet valves are simplified insofar as that everything is rigidly controlled, all reversing or graduating of cut-off being done at the rocking lever of the Marshall gear. The movement consists mainly of the connection of the eccentric rod to a rocking quadrant or cam with two steps of different radii, upon which rests a double-armed lever, locked by having its arms always in contact with both steps and with a third direct connected lever operating the valve (Figure 51), in this case interposing only one very shallow, stiff spring to allow about one-thirty-second inch for an adjustment of the valve face upon its seat.

This construction, while being economically lubricated and easily attended to by the engineer force, possesses a relatively great freedom from noise. The cause of this is that nowhere can occur a flying apart or hammering together of rods, levers, springs, etc., affording thus to the operating engineer a much clearer perception of the proper working of the valve gear.

To insure still further handiness and reliability of operation or reversal of the engine a compression release valve is fitted in the head, operated by 100 pounds compressed air upon a piston which opens a relatively large valve inwardly into the combustion chamber and the passage of which connects with the main exhaust pipe. The stem of this valve is hollow, communicating directly with the combustion chamber and having its other outlet closed by a little pilot valve, normally opening only when the larger valve has moved at least one-quarter inch. Through this arrangement fresh air can be blown into the combustion chamber, driving before it the exhaust pipe.

Atomization Must Be Fine

If the combustion chamber with such a full charge of fresh air had the igniter plug throw a continuous shower of its jump sparks it would be ready even in cold condition to produce an explosion as soon as the oil, in very finely-atomized condition, would be introduced. Experiments by a firm building oil engines in New York City have confirmed the previous knowledge that such oil mist will readily ignite so long as the atomization is sufficiently fine. Such complete atomization can immediately and at all times and all positions of the cranks be provided by the loaded accumulator, which as an additional advantage has a storage capacity of running the engine for several minutes. This feature will allow powerful starting of the engine even if the starting air should have been accidentally lost.

An additional advantage of this compression release, more fully developed than usual, is its feature of acting as a very large safety valve with a relatively rather light spring. An excess pressure, say above 600 pounds a square inch, will go into the fine, fresh-air bore of the stem, lift the pilot valve and get upon the working piston, which immediately will descend, thereby opening the exhaust valve wide with the immediate release of pressure and flow of gases to the exhaust pipe.

To facilitate the operation of these two independent valve gears, a powerful reversing engine is provided for each with compressed air and oil check cylinders, which speedily can follow the hand lever of the engineer. The stops on the valve stems and the connections are made so that the engineer with one stroke can travel half of the quadrant from full ahead to full astern to midway stop. It is thereby possible to alternate very quickly the operation of the two gears to the mutual advantage that the oil starting warms the cylinder, while the air starting every time clears the cylinder of semi or fully-burnt gases, which might lead to a backfire upon accumulation.

In the design of this engine it was attempted to show a marine propelling plant which should be simple, strong and of moderate weight; of reasonable cost to the builder by as much simplification in manufacturing operations as would be compatible with thorough workmanship; and of a sturdy reliability and handiness for continuous seagoing service with the greatest possible freedom from breakdowns. It was supposed not only meritoriously to win, but also justly to retain, the confidence and trust of shipowner and engineer. At the same time it aimed to fully realize the undoubtedly pronounced economic advantages of burning liquid fuel directly in the cylinders and thus do its full share in helping to maintain American shipping on its highest possible level.

BIPLANES CARRY MAIL TO OUTGOING SHIPS

NEW uses for the airplane are being found almost daily, the latest being the carrying of papers and consignee's mail to ships after they have left port. Much time has been lost and cargo has been delayed while waiting for consignee's papers and shippers have long been awaiting a remedy. The Kerr Steamship Company has solved the problem by the use of the airplane. This shipping company is to operate a fleet of planes, among them the Christmas Bullet, which is a strutless and wireless biplane said to make a speed of 170 miles an hour with a six-cylinder Liberty motor. The plane will be able to deliver mail from twenty-four to thirty-six hours after the ship leaves port. Mail will be carried in waterproof sacks and will be dropped on the deck of the boat by aviators who have learned the gentle art of bombing.

The Christmas Bullet is a biplane designed by Dr. W. W. Christmas. It will be displayed at the Aeronautic Exposition. For some years, attempts have been made by experimenters to perfect an airplane with flexible wings — or, in other words, closely following the flexibility of the wings of a bird. The biplane designed by Dr. Christmas has met with much success and his theories of flexing wings have been demonstrated to be practicable. The British and French governments have manifested considerable interest in this machine, due probably to the reports of its great speed.

The biplane is entirely free of struts, cables and wires in the bracing of the wings, and there is an absence of wiring in the internal structure of the wings. Puffs of wind or sudden changes of direction do not affect the progress of the machine, for the shock is partially absorbed by the resiliency of the wings.

Hull Insurance (Part Five): Particular Average

By Benjamin Rush

A PARTICULAR average loss, in contradistinction to a general average, is a partial loss sustained by the particular subject matter insured, and caused by the perils insured against. Expenses incurred by or on behalf of the assured for the safety or preservation of the subject matter insured, other than general average and salvage charges, are called particular charges. Particular charges are not included in general average.

In ordinary cases a vessel which has been damaged is repaired by her owner. A vessel is generally intended to navigate, and a damaged vessel is unfit for navigation. The usual measure of the damage sustained by the shipowner is the cost of repairing minus the improvement resulting therefrom.

General Rules of Particular Average

The general rules, relating to the adjustment of particular average, are as follows:

When a ship has been repaired, the assured is entitled to the reasonable cost of the repairs, less the customary deductions but not exceeding the sum insured in respect of any one casualty.

When the ship has been only partially repaired, the assured is entitled to the reasonable cost of such repairs, computed as above, and also to be indemnified for the reasonable depreciation, if any, arising from the unrepaired damage, provided that the aggregate amount shall not exceed the cost of repairing the whole damage computed as above.

When the ship has not been repaired, and has not been sold in the damaged state during the risk, the assured is entitled to be indemnified for the reasonable depreciation arising from the unrepaired damage, but not exceeding the reasonable cost of repairing such damage computed as above.

In an unvalued policy on hull the underwriter would pay the same proportional part of the sum he has agreed to insure as the damage or the expense of repairing it is of the ship's value at the commencement of the risk. In a valued policy he pays the same proportion of the cost of repair as his subscription bears to the valuation in the policy. If the damage to the ship has not been repaired, the only mode of ascertaining its amount is by the aid of surveyors or other experts.

"One-Third New for Old"

When, however, the damage has been repaired, the established mode of estimating its amount is to deduct one-third from the whole expenses both of labor and materials, which the repairs have cost, and then assess the damage at the remaining two-thirds. This is termed "deducting one-third new for old," and is done on the principle that unless a ship is quite new the substitution of new for old material is a benefit to the shipowner, who gets the ship the better for the repairs by the substitution of new work for old.

Although this is the legal rule, it is one which was formulated at the time when wooden ships were in general use. For such vessels the rule undoubtedly would apply, but it is very questionable whether it is a just and equitable one when applied to vessels of steel or iron construction. Consequently the Association of Average Adjusters has formulated modifications of this rule as applicable to iron ships.

In brief, this ranges from no deduction whatsoever on the iron work of the ship itself down to the deduction of one-third on certain portions of her fittings.

In most hull policies, the following clause is now inserted, namely, "that in the event of claim no one-third new for old to be deducted from the cost of ironwork repairs of hull, masts or spars."

Sometimes the following clause is inserted:

"Average payable without deduction of thirds new for old whether the average be particular or general."

Liable for Successive Losses

The effect of the latter clause is that no deduction whatsoever is made on account of age or wear and tear. Old materials should be sold and credited against the bill for the cost of the new repairs.

As to successive losses happening under the currency of the same policy, during one voyage, the law provides that the insurer is liable for successive losses even though the total amount of such losses may exceed the sum insured, except that where under the same policy a partial loss which has not been repaired or otherwise made good is followed by a total loss, the assured can only recover in respect to the total loss.

If the assured, after sustaining an average loss, sell his vessel unrepaired, he is nevertheless entitled to recover for the partial loss, on the ground that the damage sustained is a continuing prejudice, for the ship's value must have been lessened by it. Therefore the amount of the loss must be calculated as though the ship had been actually repaired.

There remains to be considered the question of actual or absolute total loss and/or constructive total loss.

A total loss as defined in insurance law is one on account of which the assured is entitled to recover from the underwriters the whole amount of the subscription. In the case of actual or absolute total loss, no notice of abandonment need be given, as the assured is entitled to claim from his underwriter the whole amount of his subscription without giving such notice.

Constructive Total Loss

A constructive total loss is one which entitles the assured to make such a claim on condition of giving such notice. If he fails to do so the loss can only be treated as a partial loss.

An actual or absolute total loss has been defined by Lord Abinger as follows:

"If in the progress of the voyage the thing insured becomes totally destroyed or annihilated, or if it be placed by the perils insured against in such a position that it is totally out of the power of the assured, or of the underwriter, to procure its arrival, the latter is bound by the very letter of his contract to pay the sum insured."

The great principle, therefore, on which all the cases of total loss depend appears to be this: The impossibility, owing to the perils insured against, of ever procuring the arrival of the thing insured. If by reason of these perils the assured is permanently and irretrievably deprived not only of all present possession and control over it, but of all reasonable hope or possibility of ever ultimately recovering possession of, or further prosecuting the adventure upon it, that is a case of absolute total loss, independently of the election of the assured to treat it as such. Notices of abandonment would, in such cases, be a mere idle formality, because nothing remains to be abandoned.

In such cases, therefore, no notice of abandonment need be given, but, if any remains of the wrecked ship ultimately come to hand, or if any money has been realized by its justifiable sale, the net proceeds of such sale are considered as a salvage to which the underwriters are entitled after payment of a total loss.

What Constitutes Total Destruction

A vessel is considered to be totally destroyed if, by the perils insured against, she be reduced to a complete state of dismemberment so as to have lost her characteristic form, even though her hull may still hold together as a wreck.

It is to be noted that the sale of the vessel can never convert a constructive total loss into an absolute total loss.

A constructive total loss is one which entitles the owner to make a claim on his underwriters upon condition of giving notice of abandonment. The assured is entitled to give such notice where the subject matter insured is reasonably abandoned on account of its actual total loss appearing to be unavoidable or because it could not be preserved from actual total loss without an expenditure, which would exceed its value when the expenditure had been incurred.

In particular there is a constructive total loss: First—When the assured is deprived of the possession of his ship by the peril insured against, and (a) it is unlikely that he can ever recover the ship, or (b) the cost of recovering the ship would exceed her value when recovered, or (c) where she is so damaged by a peril insured against that the cost of repairing her would exceed the value of the ship when repaired.

When Assured May Abandon

In estimating the cost of repairs no deduction is to be made in respect to general average contributions to those repairs payable by other interests, but account is to be taken of the expense of future salvage operations, and of any future general average contributions to which the assured would be liable if repaired.

This is the English law. It has been held in the United States that the assured is entitled to give notice of abandonment upon his underwriter when the cost of the repairs would exceed 50 per cent of the value of the ship.

Where there is a constructive total loss, the assured may either treat the loss as a partial loss or abandon the subject insured to the insurer, and treat the loss as if it were an actual total loss.

Where the assured elects to abandon the subject matter insured to the insurer, he must give notice of abandonment. If he fails to do so, the loss can only be treated as a partial loss.

Notice of abandonment may be given in writing or by word of mouth, or partly in writing and partly by word of mouth, and may be given in any terms which indicate the intention of the assured to abandon his insured interest in the subject matter insured unconditionally to the insurer. Notice of abandonment must be given with reasonable diligence after the receipt of reliable information of the loss, but where the information is of doubtful character, the assured is entitled to a reasonable time to make inquiry. When notice of abandonment is properly given, the rights of the assured are not prejudiced by the fact that the insurer refuses to accept the abandonment.

Silence Is Not Acceptance

The acceptance of an abandonment may be either expressed or implied from the conduct of the insurer. The mere silence of the insurer after notice is not an acceptance. Where notice of abandonment is accepted, the abandonment is irrevocable. The acceptance of the notice conclusively admits liability for the loss and the sufficiency of the notice. Notice of abandonment is unnecessary when at the time when the assured receives information of the loss there would be no possibility of benefit to the insurer if notice were given to him.

The facts as they exist at the time a notice of abandonment is given must be such as to justify it; but if they be so, then the rule is that an abandonment once rightfully made is conclusive between the parties, and the rights flowing from it become vested rights, and are not to be divested by any subsequent events.

The best general statement of the circumstances which confer on the shipowner a prima facie right to give notice of abandonment is contained in the following passage from the judgment of Story, J., in the case of Peele vs. The Merchants' Insurance Company. The right to abandon has been admitted to exist where there is a forcible dispossession or ouster of the owners of the ship, as in cases of capture, where there is a restraint or detention which deprives the owner of the free use of his ship, as in cases of embargoes, blockades and arrests; where there is a total loss of the physical possession and use of the ship, as in cases of submersion; where there is a total loss of the ship for the voyage, as in case of shipwreck, so that the ship cannot be repaired in the port where the disaster happens; where the injury is so extensive that by reason of it the ship is useless, and the making repairs will exceed her value.

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This is the last article of Mr. Rush's series on "Hull Insurance."

NEW CHECK ON TOOLS

WASTEFULNESS in the use of tools has caused a great deal of bother, not only to the company as a matter of expense but to the men. It isn't convenient for a mechanic to go without a needed tool when somebody else has five or six put out of the way in the tool box. Some men have been found holding out enough tools to keep half a dozen workers going.

George Pennington, of the Pacific Coast Shipbuilding Company, Bay Point, California, has started installing a double checking system in the machine shop, and it is to be put in the other departments as well. Each man will be given ten checks, bearing his number, on a ring. The check room will have ten duplicate checks for each man, with his number on them also. To get a tool, he will have to turn in a receipt check, which will be hung on the board. A round check will be hung against the man's number and a hexagonal check, with his number, will be put on the tool record. No man can get more than ten tools.

How China Builds Ships for the United States

By H. K. Kwong
Secretary, Kiangnan Dock and Engineering Works

THE Kiangnan Dock and Engineering Works will soon lay the keels of the four 10,000-ton steamers ordered by the American government. The significance of this event cannot be too strongly emphasized, since this is the first time that a great marine power has seen fit to ask of China assistance in shipbuilding. It comes as a recognition of the immense progress this country has made in marine construction; and when the contract for four steamers with option of eight more is accompanied by the public statement of Mr. Hurley, chairman of the American Shipping Board, that he finds the Chinese government dockyard at Shanghai splendidly equipped and ranking as one of the most efficient plants of the world, it explains why the United States wants China to throw in her shipbuilding facilities for the cause for which the Associated Nations were fighting Germany. Nonetheless, America, in awarding the contract to the Kiangnan Dock and Engineering Works, acted not without a sincere desire for the friendship and with good-will toward this country.

Has Built 316 Vessels

Hitherto China has been building vessels for her navy and merchant marine in America, England and Japan. The table is now turned. China is to show that she is herself capable of doing what she has been wont to get done abroad. A new chapter of her industrial history is thus begun. In the thirteen years since the Kiangnan Dock and Engineering Works was changed from a dockyard devoted entirely to repairs and building vessels of the navy to one that takes in also commercial boats, it has built altogether 316 ships. Besides the Chinese government, Chinese merchants and shipowners of other nationalities in China, it has constructed vessels for the Russian government. The largest steamer built in China up till 1912 was launched at the Kiangnan Dock and Engineering Works in the spring of that year, when the steamship Kiang Hwa (a 4100-ton boat) of the China Merchants' Steam Navigation Company hit the water.

The 10,000-ton steamers which China is to build for the United States will be the largest ships ever undertaken in the Far East outside of Japan. Yard No. 317—this will be the name of the first of the four sister steamers until she is christened at her launching—is 425 feet long, 55 feet beam, with a loaded draft of 27 feet 6 inches and equipped with a triple expansion engine. All the construction work, the engine and boilers will be built in China. The United States is, however, to supply the steel materials.

To Employ 2500 Men

Pending the arrival of steel plates to begin work, extensive preparations are being made to put the dockyard in readiness. More than 2500 laborers, skilled and unskilled, will be required, and steps have already been taken to insure the enrollment of this number of men when they are needed. From the arsenal the Kiangnan Dock and Engineering Works has acquired several mow of land along the river front for ship-berths. This, together with the land bought from private owners, brings up the total area of expansion to more than twenty-five mow (one Chinese mow is equivalent to one-sixth of an English acre). The dockyard now has five ship-berths for steamers of 10,000 or higher tonnage, besides numerous berths for smaller vessels. A cofferdam is erected in front of the berths to keep the water from washing up on the ground and causing softness to it. The foundation of the berths is prepared by driving 16-foot piles into the ground at regular intervals. Cranes will be erected in the shipping yard to facilitate transportation. These cranes are now being made in the work-shops of the dockyard.

It is the plan of the dockyard officials to erect a new boiler shop, machines for which are now being shipped from the United States. The machine shop will also be enlarged with tools bought from America. As a part of the scheme to convert the dockyard from a steam-run to electricity-run plant, electricity will be used to propel the new machines. A large number of pneumatic hammers and drills have been bought; thus the Kiangnan dock will do away with hand riveting, etc., and make use of the labor-saving machines which are now being generally employed in America.

New narrow gauge railroad tracks will be laid to connect all the workshops and principal go-downs (storehouses) in order to facilitate transportation of materials and parts of machinery from one part of the dockyard to another. When the whole scheme of extension and improvement is complete, the shipbuilding plant will be thoroughly modernized and brought into line with the best dockyards of America and England. It will undoubtedly be one of the largest and most modernly equipped shipyards of the Far East.

Motorboat Miss Detroit, the fastest boat in the world. She won from Miss Minneapolis, also a famous champion, at Detroit last year. She has a record of sixty-five miles an hour. C. C. Smith of Algonac, Michigan, built the Miss Detroit, but she is not the only fast boat to his credit, as he also built the Miss Minneapolis and several others. The Miss Minneapolis won the gold cup in England two years ago.

Marine Insurance News and Comment

THE directors of the North of England Protecting and Indemnity Association are taking cognizance of the possibility of their members suffering loss as a result of the abnormally high values placed upon their vessels abroad for purposes of general average, etc., and their inability to recover from their underwriters on hull and machinery to a greater extent than the value in those policies. They cite the case of a vessel being insured for and valued at $250,000 and being valued for average at $400,000, with the result that the owner would collect from his underwriters only five-eighths of the general average, etc., assessed against the ship on that value.

Proposed Rule of Association

The directors suggest that the question should be raised at a general meeting and also suggest a rule to be placed before the meeting for approval and adoption, as follows:

"(bb) In the case of claims where the contributory value of the vessel has been fixed in a foreign, colonial or dominion port for general average, salvage charges, and/or sue and labor expenses which are not recoverable in full under the policies on hull and machinery by reason of the difference between the insured value as expressed in those policies and the sound value of the vessel as found in the adjustment, this class of the association will pay such proportion of such loss as the tonnage entered bears to the total tonnage of the vessel.

"Provided, nevertheless, that there shall be excluded from the claim upon this class such loss as arises from the insured value in the policy, being, in the opinion of the directors, less than the fair market value of the vessel.

"Provided, also, that in case the member does not accept the above-mentioned opinion of the directors, he shall be entitled to claim arbitration to determine the fair market value of the vessel, and the rights of the member shall be determined by the result of such arbitration. All the costs, charges and expenses, including the arbitrators' fees, shall in all cases be paid by the member demanding the arbitration."

There is no doubt that such a protection afforded by a protection and indemnity association or by a "club" would be a great boon to a shipowner at the present time when values are abnormally high. It would be a great hardship on the shipowner to insure his vessel under a full policy up to the full price the vessel would sell for in open market. This is recognized by underwriters and they are willing to accept insurances on values much below this sum, notwithstanding the very high cost of repairs. But the shipowner may protect himself for this excess contribution to general average, etc., by taking out insurance on "disbursements," or "freight" or "prospective earnings," all of which may include the "excess general average" feature, or he may take out specific insurance covering this liability. An extra rate is, of course, charged for this, but presumably the members of the association will have additional "calls" to cover this extra protection.

Only at Foreign or Colonial Ports

But it is noted that this protection is granted only where the value is fixed at some foreign, colonial or dominion port; presumably it is assumed that the value would be less at a port in Great Britain or Ireland, at which places the contributory value would be nearer the actual market value. But is this the case? In the mad scramble for tonnage which we have witnessed it seemed to make no difference in what part of the world the vessel might be, if she were for sale there were eager purchasers ready to pay almost any price, and it made no difference whether the ship was at the time at a port in England or China, and it is in the application of the first provision that trouble is likely to arise.

Most valuers, if not all, are inclined to look upon this question of contributory value in a reasonable and business-like way. They do not feel bound to fix a value which speculators are willing to pay in a frenzied market at a time when tonnage is scarce and freights abnormally high, but look upon a ship as a permanent investment, and although its value is certainly greater at such times than in normal times, yet its selling value at the moment does not represent its true value, and its true value is what should constitute the contributory value. That being the case, would not this value represent the fair market value, whether fixed in England or elsewhere, in which event the owner would be barred from any recovery from the association?

Shipowners Would Welcome Rule

It may be said that the association does not propose to question the correctness of the contributory value, but merely to ascertain the fair market value of the vessel in order to determine its liability for the excess of general average. In the event that the arbitrators chosen in England should decide that the fair market value was considerably less than the contributory value as fixed by experts at the port of destination of the vessel, a port outside of England, would not the owners, or the association through the owners, have a right to demand a reconsideration of the valuation and to open the apportionment of the general average?

Shipowners generally undoubtedly will welcome the addition of some such rule to those of the association, as they will gain by it some additional protection, and no doubt all difficulties surrounding its application will be carefully considered before it is adopted.

LOWER FREIGHTS FROM ENGLAND TO AUSTRALASIA

SUBSTANTIAL reductions in outward freights from the United Kingdom to Australia and New Zealand, beginning immediately government requisitions come to an end, were decided upon at a meeting of the representatives of the shipping lines concerned held in London recently.

The introduction of scale rates for fine goods makes the reductions in respect of articles vary considerably. Flat rates are difficult, especially as merchants are strongly of opinion that a system of graduated rates is far more suitable for commercial purposes at present than are flat rates. A point on which they want assurance, says the London Times, is stability of freights, and this is guaranteed by the shipping companies concerned.

Open Policies and Covers

A COMMITTEE representing company and Lloyd's Underwriters after much deliberation have agreed upon standard conditions for open policies and covers, says the report of the Institute of London Underwriters. These conditions were circulated to the different underwriting associations and to Lloyd's Insurance Brokers' Association and are already in general use.

INSTITUTE STANDARD CONDITIONS FOR OPEN COVERS

1. This open Cover is effected to insure for the voyage and/or voyages and on the conditions named herein the interest specified herein shipped within its limits either by or for account of..in which he (they) has (have) an insurable interest unless insured elsewhere prior to such interest being acquired or the insurance of which is in his (their) hands or under his (their) control as selling and/or purchasing Agent. This insurance does not cover the interest of any other person or persons.

2. In the event of loss or damage by insured perils before shipment or prior to sailing to any interest insurable hereunder or to the vessel by which the interest is or is intended to be shipped whereby shipment or sailing within the specified limits of this cover is prevented all that interest shall nevertheless attach hereto which would have come within the limits of this cover but for the loss or damage in question.

3. It is a condition of this Insurance that until completion of the Contract the Assured is bound to declare hereunder each and every Shipment without exception whether arrived or not Underwriters being bound to accept same up to but not exceeding the amount specified herein.

4. In the case of loss and/or damage to the insured goods before shipment the Underwriter shall not be liable in respect of any one accident for more than £....................................unless otherwise agreed. The movement of goods upon interior waterways or land conveyance shall not be deemed to be shipment within the meaning of this Clause.

5. The basis of the valuation of the merchandise declared is for the purpose of this insurance agreed to be at..............................

6. Nothing herein shall prevent a transfer of the Policy on sale pledge or other transfer of the interest in the insured goods by the above named Assured or his (their) Assigns.

7. This open Cover is declared to be for £......................... part of £....................................

Note.—In cases where it is not practicable to fix the commencement of Contract by the Sailing or Bill of Lading date Clause 2 may be modified to meet the special circumstances.

The Assured are requested to give the earliest provisional notice of intended shipments advising in each case the name of the vessel and approximate value of the shipments.

INSTITUTE STANDARD CONDITIONS FOR OPEN POLICIES

1. This open Policy is effected to insure for the voyage and/or voyages and on the conditions named herein the interest specified herein shipped within its limits either by or for account of..in which he (they) has (have) an insurable interest unless insured elsewhere prior to such interest being acquired or the insurance of which is in his (their) hands or under his (their) control as selling and/or purchasing Agent. This insurance does not cover the interest of any other person or persons.

2. In the event of loss or damage by insured perils before shipment or prior to sailing to any interest insurable hereunder or to the vessel by which the interest is or is intended to be shipped whereby shipment or sailing within the specified limits of this cover is prevented all that interest shall nevertheless attach hereto which would have come within the limits of this cover but for the loss or damage in question.

3. It is a condition of this Insurance that until completion of the Contract the Assured is bound to declare hereunder each and every Shipment without exception whether arrived or not Underwriters being bound to accept same up to but not exceeding the amount specified herein.

4. In the case of loss and/or damage to the insured goods before shipment the Underwriter shall not be liable in respect of any one accident for more than £.......................in all in conjunction with preceding and/or succeeding slips unless otherwise agreed. The movement of goods upon interior waterways or land conveyance shall not be deemed to be shipment within the meaning of this Clause.

5. The basis of the valuation of the merchandise declared is for the purpose of this insurance agreed to be at.......................................

6. Nothing herein shall prevent a transfer of the Policy on sale pledge or other transfer of the interest in the insured goods by the above named Assured or his (their) Assigns.

7. This open Policy is declared to be for £......................... part of £...

Note.—In cases where it is not practicable to fix the commencement of Contract by the Sailing or Bill of Lading date Clause 2 may be modified to meet the special circumstances.

The Assured are requested to give the earliest provisional notice of intended shipments advising in each case the name of the vessel and approximate value of the shipments.

RUNNING OUR EASTING DOWN

(Fireman's Fund Record)

AMONG the 8500 agents of the Fireman's Fund Insurance Company, we would probably be widely over-shooting the mark if we took 5 per cent of that number as being among those who have any direct, intimate interest in ships and sails and storms at sea. For, as Shylock says in the "Merchant of Venice," "Ships be but boards, sailors but men," and barring special circumstances and cases, it is not boards and men that make any particular appeal to the imagination. However, continuing the quotation: "There be land rats and water rats, water thieves and land thieves (I mean pirates), and then there is the peril of waters, winds and rocks." Out of the reality of these sea perils has grown the great, world-embracing business of marine insurance.

A busy day of marine underwriting makes one a traveler on every kind of vessel, from the busy, coughing gas boat to the great, rushing, castellated liner; from the seasick sloven of the ports, the scow, to the graceful, fine-lined, full-rigged ship with tall spars, white sails and whistling rigging. It makes of one a merchandiser of silks and teas and feathers from the Orient; steel plate, canned fruits, motor cars and colored shirts from the United States; nitrate and cottonseed cake from the West Coast of South America; salmon from the icy waters of Alaska and on through the whole list of common or garden things we ordinarily connect with the busy shops of the city or the more peaceful stores of the country, with their friendly gossip and neighborly stories of an evening retailed as easily as the goods on their shelves. It would make one a visitor to Bombay with the "hills behind the city"—to Rangoon and Nagasaki, Pago Pago and Hilo, to New York and San Francisco and Key West, to Bermuda and London. It would open a romance beyond the dreams of Jules Verne and yet all the time one would be busy with the strain of quick decisions, of correct underwriting and profits at the end to be rendered, like the things that are Caesar's, where they are due.

Insurance, a Great Developer of Commerce

By W. D. Keeson
Manager Insurance Department, Gaston, Williams & Wigmore, Inc.

INSURANCE is a very interesting subject, whether viewed from the theoretical, economical or practical standpoint. The connection between it and modern commercial enterprises is much closer than is generally appreciated by the average person.

Theoretically, insurance is, in some respects, the greatest mutual organization which has ever existed. The many millions of policyholders might be likened to members, each paying a certain amount into a common fund from which the losses sustained by an individual member are paid. Instead of a speculative or gambling enterprise, as has often been supposed, it is a very scientific business which is based on the laws of average and the distribution of risks.

Economically, insurance has played a very vital part in the world's material progress. In fact, great commercial undertakings date from the day that men first conceived the idea of sharing each other's losses. Were it not for the fact that the vast values represented in the modern factory, warehouse, office building and ships could be insured, commercial development would have been greatly retarded. It is safe to say that, generally speaking, no man, or group of men, would risk their entire capital in an enterprise which might be swept away or seriously impaired by a fire or the sinking of a large steamer.

Common Misunderstanding

The terms and phrases used in an insurance contract are naturally of an extremely technical nature and are not such as the average business man encounters in the ordinary form of commercial contract with which he is accustomed to deal. He has not the opportunity of mastering the intricacies of a business presenting few points of similarity with his own. Many an assured, after a loss upon finding himself unprotected, is firmly convinced that his policy was an "ex parte" contract, the real meaning of which was deliberately hidden under a confused mass of verbiage. Such, needless to say, is not the case.

What the assured frequently fails to appreciate is that the causes of loss are so many and varied that it would be impossible to fix upon an adequate rate to charge for protecting him against every direct or indirect loss which he might sustain as the result of certain events, regardless of how they might be caused.

The Insurance Broker

Since the standard forms of insurance contracts were not designed to cover every phase of activity of each shipowner, manufacturer or merchant, they must necessarily be modified to meet individual requirements. This requires the services of a skillful broker. The broker, specializing in insurance for years, has gained an experience with which the assured, dealing with his own individual risk, can hardly hope to match, and from his knowledge of the requirements of both underwriter and assured is able to facilitate the handling of business to the best advantage of both.

No assured, however, can safely consider his insurance problems as securely and finally disposed of by merely calling in an insurance broker and asking him to arrange his insurance. No insurance contract has ever been issued which did not either expressly or impliedly place some limitation upon either the risks covered or what might or might not be done by the assured; but while policy contracts contain many restrictive clauses they can almost, without exception, be modified or removed according as the business of the assured requires.

In most instances the underwriter will, upon request, either eliminate unduly restrictive clauses, extend the scope of the contract, or grant additional protection without charge, if, in his opinion, his company is not being burdened with any considerably increased risk. The fact that underwriters have often shown a liberal attitude in foregoing their technical rights, which if strictly insisted upon by them would often prevent an assured from collecting a loss, does not, however, warrant an assured ignoring their existence. After all, a contract is a contract, and where an insurance contract is concerned, experience has shown that it needs constant revision from time to time, as the operations contemplated or specified therein are varied by changed business methods or conditions.

Safeguards Exports

That commerce and insurance are inseparably connected is well illustrated by the concurrent development of both these industries during the last four years. As our manufacturing capacity and foreign trade increased, new American insurance companies have been organized to insure the products manufactured and shipped abroad.

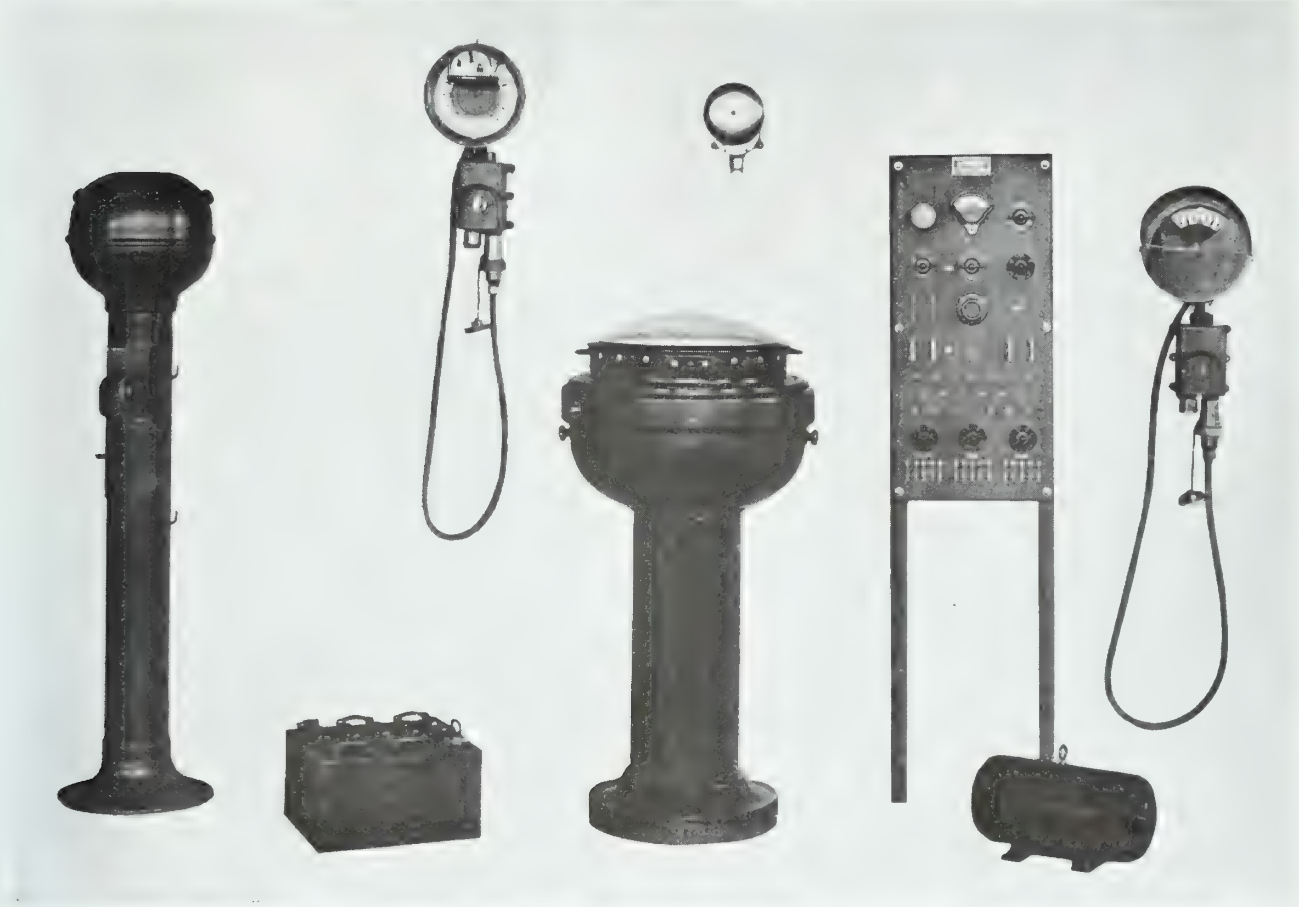
It has been repeatedly pointed out with clearness that we can only meet foreign competition by furnishing better goods at lower prices with superior service. Insurance comes under the head of both cost and service. One thing which will help us to a very considerable extent to hold our foreign trade is the obtaining of adequate insurance at minimum rates. Unless loss claims with clients are settled promptly upon a broad and liberal basis it reacts strongly against the exporter in many ways.

There is every reason to believe that the American insurance companies realize the important part which they are going to play in helping this country hold her newly-developed foreign markets.

As the cost of insurance is mainly governed by loss ratios, it naturally follows that the assured who fails to exercise every precaution to minimize preventable losses, either through allowing merchandise to go forward improperly packed, or shipping it on steamers regardless of their class or type, is going to invite claims for damage which will not only interfere with the smooth handling of his business, but will cause the cost of his insurance to rise to a point where it might possibly force him to compete on disadvantageous terms with his trade rival.

The Gyroscopic Compass

It is not recorded in the Bible whether Noah carried a magnetic compass with him on his historic voyage, but it is well known that the magnetic compass has been used by navigators for many centuries. Although they have not discarded the magnetic compass, the large naval powers of the world have adopted the gyro-compass and have used it with signal success during the great war. Now that hostilities have ceased, it is possible for Pacific Marine Review to tell its readers something of this instrument, which already has revolutionized navigation in the navies of the world and which is now being introduced to the merchant marine.



Sperry gyroscopic compass equipment for merchant vessels. Left to right: Master compass; repeater (above) and storage battery (below); pelorous; switch panel (above) and generator (below); and another repeater.

The following account was written by Lieutenant-Commander Charles T. Owens of the United States Navy:

"This type of compass has been developed to a very high degree of accuracy and reliability during the last few years and is now extensively used on war vessels in the United States and in Europe. It is also in use on a few of the large trans-Atlantic liners. This compass is entirely independent of magnetism and is therefore not subject to the disturbing magnetic influences always found on board ship which often render the magnetic compass unreliable and for which careful compensation is required. It points to the true geographical pole instead of to the magnetic pole, thus eliminating the variation of the compass. As its directive force is very much stronger than that of the magnetic compass, errors due to lag and sluggishness of the compass are also eliminated.

"A gyroscope, if so mounted as to have freedom of motion about three rectangular axes, will maintain its axis of rotation fixed in space, unless it is acted upon by some externally impressed angular force. Since it maintains its axis of rotation fixed in space, this axis will have an apparent motion relatively to the earth's surface, which is evidenced by its continually changing its inclination to the horizontal plane. To illustrate this, let it be supposed that the gyroscope is spinning with its axis pointing directly at a star in the horizon whose bearing is due east. It will soon be observed that the axis is following the star in its apparent diurnal movement. If in the Northern hemisphere it will gradually rise and turn toward the south, reaching its highest elevation in six hours when the star is on the meridian, and returning to the horizontal again in twelve hours when the star is bearing due west. That extremity of the axis pointing to the star will continue to follow the latter as it falls below the horizon, reaching its greatest depression in eighteen hours and returning to the horizontal in twenty-four hours as the star again appears on the horizon. During this twenty-four hours the earth has completed one revolution on its axis while the star and the gyroscope have remained fixed in space. Had the axis of the gyroscope initially pointed to the celestial North pole (the North Star, approximately) its inclination to the horizontal would have remained unchanged throughout the twenty-four hours.

"In the gyro-compass the spinning wheel or gyroscope is mounted in a casing on ball-bearings and is made to rotate at the highest practicable speed by an electrical alternating current induction motor. It is so suspended as to have freedom of motion about three rectangular axes, and would, if not acted upon by any externally impressed angular force, have motion relatively to the earth's surface exactly as described above. By means of a weight applied to the casing carrying the gyroscope, however, gravity is made to impress an external angular force as soon as the axis of the gyroscope begins to tilt above the horizontal, and the result is that the axis of the gyroscope is drawn toward the meridian and is held pointing steadily to the north. This is in accordance with the following law discovered by Foucalt: 'Any revolving mass, such as a spinning wheel, tends to swing around so as to bring its axis of rotation parallel to the axis of any externally applied angular force and in such a relation that the direction of rotation is the same as the direction of the said applied or impressed force.'

"Combined with the gyroscope casing is a compass card graduated in a similar manner to the card of a magnetic compass, having its north-south line parallel to the axis of rotation of the gyroscope, and the entire structure is suspended from gimbal rings mounted in a binnacle or stand.

"The mechanical devices employed to render the compass accurate and reliable, not only on shore but on a moving ship where it is subject to the motions of rolling, pitching and yawing, are much too complicated to describe here. It may be stated, however, that the readings of the compass card must be corrected for certain errors due to the fact that on a moving ship the gyroscope is acted upon not by the simple easterly motion of the earth alone, but by the resultant of the earth's motion combined with the ship's, and the axis will therefore be deflected from the true north by an amount depending upon the course and speed of the ship and the latitude. The correction may be made by mechanical correction devices attached to the compass which move the lubber's line by the proper amount to make the course as read off from the card the true course, or it may be taken from tables or charts especially prepared for the purpose.

"Electrically connected with the 'master compass' above described are 'repeaters' which may be located at various stations about the ship. These resemble in external appearance the ordinary magnetic compass and are so designed that they can be shipped in gimbal rings in place of peloruses for use in taking bearings, or rigidly mounted in front of the helmsman for steering purposes.

"From the above description it will be seen that whenever the axis of rotation of the gyroscope in the gyro-compass is not pointing north and south, the rotation of the earth will cause an apparent tilting of the axis with relation to the horizontal plane, thus bringing gravity into play to swing the compass in to the meridian. In reality it is the horizontal plane of the earth which is constantly changing its inclination in space and it is this which gives the compass ts directive force. It follows therefore that at either of the earth's poles where the horizontal plane remains fixed in space the compass has no directive force and at the equator where the inclination of the horizontal plane is changing at the most rapid rate, the directive force is a maximum. This may be compared to the magnetic compass which has a maximum directive force at the magnetic equator and none at the magnetic poles. In this connection it is interesting to note that the directive force of the gyro-compass is not only many times greater than that of the magnetic compass at the equator, but that on going into higher latitudes the directive force of the magnetic compass tends to decrease much more rapidly than that of the gyro-compass.

"While the gyro-compass has practically replaced the magnetic compass wherever it is installed, it is considered necessary to retain the magnetic compass as a check on the gyro and for use in case of casualty to the latter. It is doubtful if the magnetic compass will ever be entirely dispensed with on any ship."

The Sperry Gyroscope Company of Brooklyn, New York, which has over one thousand of its gyro-compasses in use on ships of the United States, British, French and other navies of the world, has many interesting stories of the achievements of its compass during the war.

In April, 1915, a British submarine, equipped with one of these compasses, penetrated the Dardanelles and was able to sink Turkish and German shipping in the Sea of Marmora. Another British submarine left its base at Harwich for a patrol of three weeks' duration. During that time the undersea craft made seven rendezvous and finally returned to Harwich, picking up the buoy at the mouth of the harbor without any difficulty. The whole patrol was carried out and the trip completed without the navigator once seeing the sun.

HARBOR WORK IN COPENHAGEN

SINCE the war began, and especially last year, the work of extending Copenhagen's harbor has been going on with nervous haste, says Commerce Reports. Understanding that great future possibilities are here, everything has been done to improve both the freeport and the old harbor, so that they will be able to take care of the increased traffic that is expected. A trip through the harbor shows that the work is going on at full speed and incidentally creating new land and new enterprises. The extension comprises 170 acres; 1000 laborers are employed daily. The extension of the freeport, which is almost finished, comprises a new basin 31 feet deep, 390 feet wide, and 2000 feet long, with an aggregate length of quay 3500 feet—in all, 31 acres of land and 22 acres of water area. A further extension of 81 acres is now taking place toward the north, and the freeport will then be between 30 and 50 per cent larger than formerly.

The jetty north of the freeport is mainly intended for storing of fuel oils which are pumped from the ships into tanks on the grounds. The East Asiatic Company has already built two tanks. On the farthest point of the jetty the Great Northern Telegraph Company has a cable depot.

By the extension of Kalkbraenderi Harbor, a land area of 13 acres has been gained with 2100 feet of new quay. The depth has been increased to 21 feet, and an independent northern entrance to the harbor has thereby been made. It is the intention to use the west side of this harbor for timber, and the east quays for coal import.

Let Dollars Strike Instead of Men

THE industrial unrest which at the present time is manifest in every quarter of the world brings into great prominence the age-long problem of the so-called conflict between capital and labor. It would seem, as we look back over the pages of history, that every attempt made by either of these ancient enemies to adjust their mutual difficulties and come to some basis of understanding and trust has only resulted in greater strife. Perhaps this phenomenon is due to the fact that every general move to insure peace between these rival camps has been along the lines of increasing the machinery of war. Each side has striven to fortify itself against the encroachments of the other, and each side to a very large degree has lost sight of the real issue, which should be the combination of capital and labor in such a way as best to fortify the producing power of labor against those fluctuations in the economic history of the world when panic and failure, hanging on the flanks of struggling humanity to pick up the stragglers, grow bold and attack in mass formation.

There can be no reasonable doubt that many of the reasons for the panics that have occurred lie hidden in the very foundations of our present financial and economic system. Similarly, quite a few reasons may be found in the attitude of organized labor. Without going into a detailed discussion of the causes of our industrial troubles, let us take as an axiomatic foundational beginning the proposition that "in production we all benefit."

Two More Ears of Corn

If a farmer were to discover a method whereby at the same cost on the same piece of ground two ears of corn could be produced in place of one, he would be hailed as a benefactor of the human race. If a mechanical engineer invents a machine whereby a good machinist can machine twice as many valve cages in an hour as he could before, that machinist is not so sure that the mechanical engineer is a benefactor, and in the past much opposition has been made by organized labor to this kind of benefaction. Yet the farmer would have in his case just as reasonable an argument against the two ears of corn as the machinist could possibly have against the two valve cages. Taking for granted, then, that it is axiomatically true that "in production we all benefit," it becomes highly important that we all strive to safeguard, and if possible increase, useful production, and, that being the case, strikes, insofar as they stop for a time the production of large masses of individuals, are a very serious economic waste.

Now, the only reason for which any disciple of organized labor wants a strike is because he thinks that to be the only way of forcing an adjustment of a grievance. In pondering over these problems and in trying to focus upon them the impressions of a long experience with organized labor, there has come into the mind of the writer a possible solution as outlined in the title of this article.

Let the Dollars Fight

In the commercial world, when disputes involving the risk to property or business arise, it is customary for the parties involved to put up bonds or other security or cash, and allow part of their capital to fight out the dispute until the case is settled, so that in the meantime the business of both parties may go on unhampered. The method is almost as old as the human race, and in some form or other this giving of security to cover a future contingency arising out of a present problem is universally applied. Why not, then, apply it to disputes in the industrial world?

Applied time is the capital of labor; wages is the interest on or earnings of that capital. Active machinery is the capital of industrial finance; production is the interest on or earnings of that capital. Why should all the capital of this combination be forced into idleness through disputes which involve at most only a part of the interest? Why not have the capital kept busy earning while part of the interest is put up by both parties in a trust fund which shall go to the party winning the dispute when that dispute shall be settled? There does not seem to be any satisfactory answer which either labor or capital, so called, can give to these questions.

Submit to Arbitration First

If this solution should be tried, there probably would be many and varying methods. Perhaps the most simple would be a form of agreement entered into between the individual or corporate owner of the industrial plant and the men employed in that plant that all matters of dispute first should be submitted to the ordinary committee of arbitration. On failure of this committee to reach a conclusion satisfactory to both sides, a strike would be called. The men would go on working, but out of each man's wages one dollar a day would be reserved and put in a fund. For each man the owner of the plant would put one dollar a day in the same fund, and this would continue until the problem for which the strike was called was satisfactorily settled. The fund would be kept by a responsible third party named by the agreement, and its final distribution would be subject to the terms of the agreement. With a committee or court of arbitration representing both parties and the Federal or state government, there should be no difficulty in settling disputes in this way without recourse to the strike by or lockout of the working force.

To some this idea may be novel; to many it may be old; but it is offered with a sincere desire to help in the solution of a difficult problem.

SHIPMENTS OF OIL FROM TAMPICO

DECLARED exports of crude oil and petroleum products from the Tampico district to the United States during the year 1918 amounted to 39,618,121 barrels. The movement from Tampico was 27,898,734 barrels; from Tuxpam, 9,011,100 barrels; and from the loading station at Port Lobos, 2,708,287 barrels, Consul Claude I. Dawson of Tampico has reported.

Shipments to points other than the United States during the year 1918 were reported as 14,301,742 barrels; the movement from Tampico was 6,523,913 barrels; from Tuxpam, 6,953,492 barrels; and from Port Lobos, 824,337 barrels. The gross shipments therefore reached a total of 53,919,863 barrels.

James Timpson, a Full Diesel-Powered All-American Motorship

By Rex W. Wadman

THE motorship James Timpson typifies the modern type of American tramp—an economical, efficient and dependable ship, modern to the last little detail, driven by Diesel engines operating through reduction gears and steered electrically. Here is a vessel that can go to the four corners of the earth and compete successfully with any other type of ocean freighter, that can carry the maximum amount of cargo in proportion to fuel and crew required.

The Motorship James Timpson

The dimensions of the James Timpson are:

Length, 286 feet; beam, 46 feet; draft, 24 feet. Designed by Cox & Stevens, New York City. Built by Standifer Construction Company, Vancouver, Washington. Owned by I. T. Williams & Sons, New York City. Main power plant: Two Winton six-cylinder Diesel engines, bore 12 15/16 inches; stroke, 18 inches; rated at 500 B. H. P. Average cruising engine speed, 265 R. P. M. Average maximum engine speed, 300 R. P. M.

The average cruising speed of the boat with full cargo load is 8.79 knots an hour. Auxiliaries consist of donkey boiler, which operates the auxiliary air compressor, auxiliary 12 K. W. generator, bilge pumps, deck winches, and heats the ship. The main lighting unit consists of a 10 K. W. generator driven by a 15 H. P. oil engine. The donkey boiler is an oil burner also.

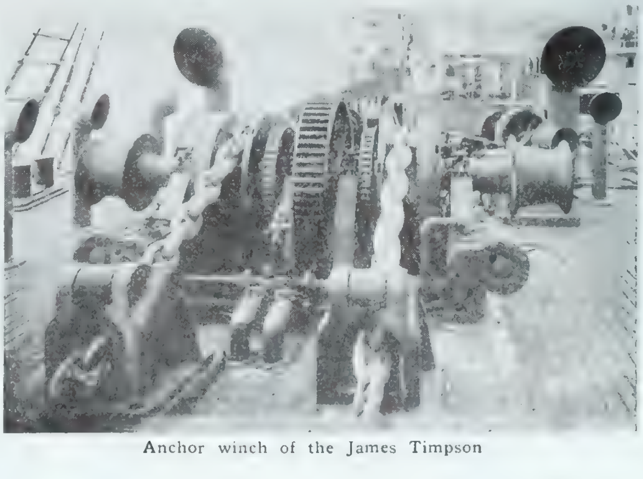
Chief Engineer Charles K. Wirosteck, in a recent report, stated that the ship had logged a trifle more than 14,500 miles and that, during that time, he had experienced no trouble with the main power plant or with the reduction gears. The only serious trouble developing was from the donkey steam boiler, which gave more or less trouble throughout the different voyages; in fact, it was necessary to make practically a new installation of this equipment recently, and a new system of fuel injection and burning for the steam boiler was installed, so that greater efficiency from this part of the power plant is now to be expected.

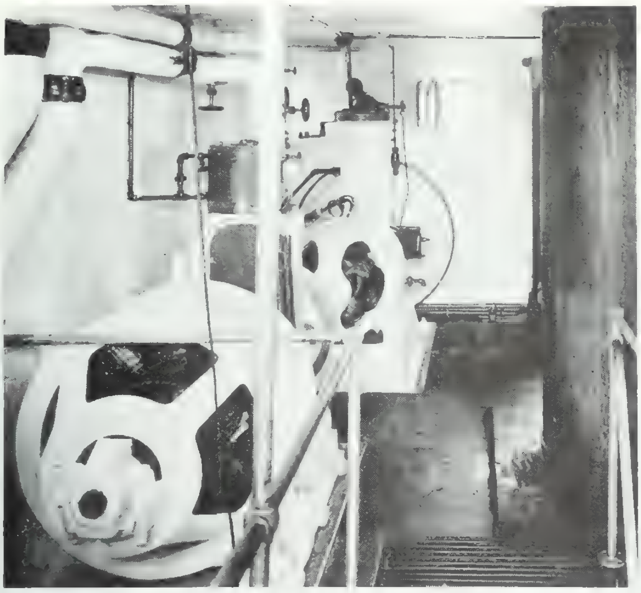
Beyond the fact that this boat is equipped with all-American Diesel engines, it is also equipped with reduction gears, one of the first American Diesel motorships so to be equipped. The gears were built by Falk of Milwaukee, and are on a three-to-one ratio, with both sets of gears floated. Cut from solid pieces of chrome nickel steel, of the double helical type, these gears have run 14,500 miles to date without giving a moment's trouble and without overheating once, and today they do not show any wear. In fact, it is hard to believe they have been in service at all. The use of these reduction gears makes it possible to install a much more compact and lighter power plant, and the successful adaptation of this principle to the James Timpson type of boat opens up a splendid field for the American motorship to successfully compete with motorships of other nations.

The use of reduction gears makes it possible to operate the engines at 265 to 300 R. P. M. and the propellers at 75 to 85 R. P. M. Wheels used are 9 feet 8 inches by 11 feet, four-bladed.

Four to Five Tons Daily

Unfortunately, a complete record of fuel consumption is not available, as the fuel oil is carried in main storage tanks from which the main power plant, the donkey boiler and the generating set obtain their fuel, and it is impossible to figure the consumption of each unit. The log shows, however, that from the time the boat left her yard at Vancouver, Washington, until she arrived in New


Anchor winch of the James Timpson



Electric power plant of the James Timpson

Timpson auxiliary air compressor

York City, she took aboard 2200 barrels of fuel oil, during which time her main engines were in operation about 1650 hours, and the total distance logged being a trifle more than 14,500 miles. Consequently, her daily fuel consumption for all units of the power plant averaged between four and five tons (twenty-eight to thirty-five barrels) with the engines operating at continuous full load. This represents 3000 tons of cargo carried on an average of 1.35 barrels of fuel oil an hour for a twenty-four-hour day. The ports called at and the legs of the voyage were:

1. Vancouver—Levinton, Ore.
2. Levinton, Ore.—Marshfield, Ore.
3. Marshfield, Ore.—San Francisco, Cal.
4. San Francisco, Cal.—Bay Point, Cal.
5. Bay Point, Cal.—San Francisco, Cal.
6. San Francisco, Cal.—Eureka, Cal.
7. Eureka, Cal.—San Francisco, Cal.
8. San Francisco, Cal.—Panama, Canal Zone.
9. Panama, C. Z.—Mejillones, Chile.
10. Mejillones, Chile—Iquique, Chile.
11. Iquique, Chile—Caleta Buena, Chile.
12. Caleta Buena, Chile—Panama, Canal Zone.
13. Panama, C. Z.—Colon, Canal Zone.
14. Colon, C. Z.—Baltimore, Md.
15. Baltimore, Md.—Norfolk, Va.
16. Norfolk, Va.—New York, N. Y.
17. New York City—Gulfport, Miss.

The lubrication oil consumption averaged about fourteen gallons a day of twenty-four hours for both engines.

It is interesting to compare the crew of the James Timpson with the crew of a steam-driven, coal-burning ship of the same size and cargo capacity—approximately 3000 tons.

James Timpson Crew	Steamship Crew
Captain.	Captain
First mate.	First mate.
Second mate.	Second mate.
Third mate.	Third mate.
Chief engineer.	Chief engineer.
Three ass't engineers.	Three ass't engineers.
Three wipers.	Three oilers.
Two donkey boiler men.	Six firemen.
Wireless operator.	Six coal passers.
Bosun.	Wireless operator.
Carpenter.	Bosun.
Six sailors.	Carpenter.
Cook and three helpers.	Six sailors.
	Cook and five helpers.
Twenty-six in all as a maximum.	Thirty-eight in all as a maximum.

The steering of the James Timpson is taken care of by a Herzog electrical steering unit operated by a 1½ H. P. electric motor, connected to the rudder stock by a reduction gear. It is operated by a small lever on the bridge deck in connection with a magnet. It takes approximately twenty seconds to throw the boat from hard a-port to hard a-starboard.

REPORT GRAYS HARBOR LOSS

OFFICIAL announcement has been made of the sinking of the Gaston, Williams & Wigmore motorship Grays Harbor, lost eighteen months ago. Gaston, Williams & Wigmore state that the report has been withheld pending investigation into the causes.

The Grays Harbor was moving "smoothly in a calm sea" off Brazil, when, at 6:30 p. m., August 19, 1918, her engines exploded and set fire to the vessel. First Assistant Engineer Fred Pierson and G. Macy, oiler, on watch in the engine room at the time, were killed, the fire preventing their rescue. Within a short time hope of saving the vessel was abandoned and Captain J. A. Johnson ordered the crew into the boats. Twenty-eight men got into two boats and stood by in the hope that something might develop that would permit them to return to the ship. About midnight the fire reached the oil tanks, which had a capacity of 1620 barrels, and exploded them. When day broke the vessel had disappeared.

At 2 o'clock in the morning of August 21, after about thirty hours of rowing and baling, the two boats arrived at Fernando Noronha Island, a Brazilian penal settlement. The guards, fearing an attempt to rescue the prisoners, refused to permit the refugees to land until a Portuguese sailor explained their predicament.

The Grays Harbor was 296 feet long, 48 feet beam and 26 feet deep; was rigged as a five-masted topmast schooner; had a capacity of 2,000,000 feet of lumber, and was equipped with four-cylinder, single-acting surface-ignition engines.

PACIFIC MACHINERY

Possibilities of Intensive Manufacturing on the Pacific Coast

By G. N. Somerville

PREVIOUS to the outbreak of the European war, manufacturing, in the true sense of the word, was an unknown quantity on the Pacific Coast, but with the outbreak of hostilities and the resultant demand for munitions of war, the entire manufacturing world was swamped with orders for machine shop products. Previous to that the then manufacturing centers in the Eastern and Middle Western states, commonly called the manufacturing centers of the United States, were very well organized, from a manufacturing standpoint, as is evidenced by the remarkable production accomplished in such lines of manufacturing as automobiles, typewriters, adding machines and a list too large to enumerate. The fact that these industries were well organized enabled them to compete successfully in the markets of the world, overcoming the cheap labor handicap enjoyed by our European competitors. At the same time, the working and living conditions of the American workingman were far above those in vogue in foreign factories, so that the labor cost an hour a man was much higher in this country than abroad. Notwithstanding this severe handicap, the initiative of the American workman and factory supertendent overcame, by means of automatic and semi-automatic machinery, what in former years would have been considered a great disadvantage.

Ships and Aeroplane Engines

With the opening of hostilities and the flooding of the manufacturing world with orders for war material, the Pacific Coast district was not entirely forgotten and the achievements of the Pacific Coast probably will always be remembered, particularly in the production of ships and auxiliary machinery, and in the manufacture of aeroplane engines, the representatives of which industries in this district were probably the first in the United States to arrive at a state of what we now call intensive manufacturing.

Now that the war is over and we are thinking so much of the development of foreign trade, we must stop to consider what is necessary to acquire foreign trade. A writer in the previous issue of Pacific Marine Review states: "We must find a local market for the other fellow's surplus in order to get him to buy the products of this district and the district served by this port of exit—namely, the central valleys of California, Nevada, and portions of the states situated a little further east." Probably one of the largest divisions of this possible export is machine shop products, and having been initiated into manufacturing in the true sense of the word, let us stop to consider how it will be possible for us to overcome in the future, as we have in the past, the labor handicap. The automatic and semi-automatic machinery now installed in many plants on this coast is responsible in no small measure for our past achievements and it goes without saying that a great deal more of this class of equipment will be installed in the future as demand for manufactured products increases. The automatic and semi-automatic turret lathes have possibilities of production not fully realized by many manufacturers. The day of the engine lathe in a manufacturing plant and for manufacturing operations is done. Repetition work must be handled on machinery equipped for the rapid production of duplicate parts, and this machinery is now procurable of such accuracy that large numbers of duplicate parts can be produced within practical manufacturing limits, and within time limits never possible with the engine lathe.

Turret Lathe Answers Purpose

The turret lathe with its multiplicity of turret tool posts and its adaptability to special tooling, together with a little ingenuity, accomplishes the desired result. Figure 1 shows one of eight heavy

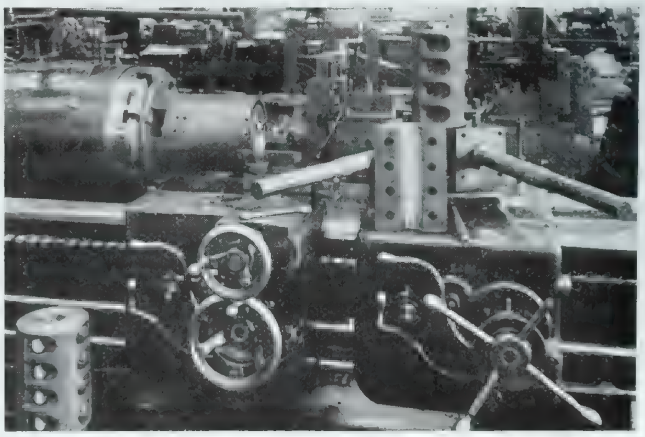


Figure 1. Holding fixture and machinery operation on couplings, which are rough-bored, finish-bored, counter-bored and faced in one operation

turret lathes installed in the plant of the Skandia Pacific Oil Engine Company at Oakland, California. This machine is set up for a boring and counterboring operation on tail shaft couplings, large numbers of which have been turned out at a remarkably low time rate. The particular operation consists of boring and then counter-boring for thrust rings. The width of the grooves necessarily must be held within practical tolerances to eliminate wasteful, time-consuming hand-fitting. This is accomplished by means of a simple, cheap, sliding tool holder, shown performing this operation in the cut. The boring, which is first done in two cuts, is accomplished by means of micrometer-adjusted boring bars, piloted in a bushing in the hollow spindle of the lathe. It will be noticed also that the ends of the coupling are faced off in this operation, and, to expedite this work at a single setting, a turret is provided on the cross slide. It is possible to finish both ends of this coupling without removing the work from the fixture. The type of a tool for facing the end nearest the face plate of the lathe probably is better shown in Figure 2, this being a rigid overhanging bar, mounted on the cross-slide turret.

Turret machines and their tool equipment comprise probably the greater part of the requirements for intensive lathe operations, but it is quite possible further to multiply the output by a careful study of holding fixtures for the work. Before the present tool equipment was devised, this coupling was bored, grooved and faced on one end only at a single setting, and the work was then taken out of the holding fixture, turned around and the other end faced. This involved, for every piece machined, a loss of time equivalent to that required for reversing the work in the fixture. After a little thought the present overhanging tool for facing the inner end was devised at a very slight additional cost, enabling the manufacturers to face both ends at a single setting.

Accurately Locates the Work

Another operation quite similar to the previous one, with the exception of the internal grooves, is shown in Figure 2. In this case the work consists of half-bearing shells which are bored and faced on both ends at a single setting. The interesting feature of this operation is the method employed for accurately locating the split of the bearings on a plane that passes through the center of the bearing, a feature not required in the tail-shaft coupling previously described. This was accomplished by the method of casting small projections one-quarter inch wide on one-half of the bearing shell. Previous to boring out, the shells were milled on the parting line, and these small projections also were milled off in the same plane. The holding fixture was similar to that used for the shaft couplings, with the exception that small ridges were provided and finished accurately in the same plane as the shaft center. Upon these ridges the small projections on half of the liner rest and are rigidly held against same by means of the set-screws shown in the illustration. After this first half is inserted and clamped in place the second half of the shell (without lugs) is inserted and clamped against the first half by means of set-screws. This accurately locates the work in the desired position, after which the boring is accomplished in two passes of the boring bars, which are here again piloted in the spindle. To enable the use of coarse feeds, and hence cut down the time, two cuts are utilized and to avoid the necessity of frequently changing tools, two boring bars are used. Micrometer adjustment is provided on both the rough and finish tools to take up loss of size due to wear of the tool points. Both ends of the bearing liners are faced by means of side-cutting tools, situated on the cross-slide turret.

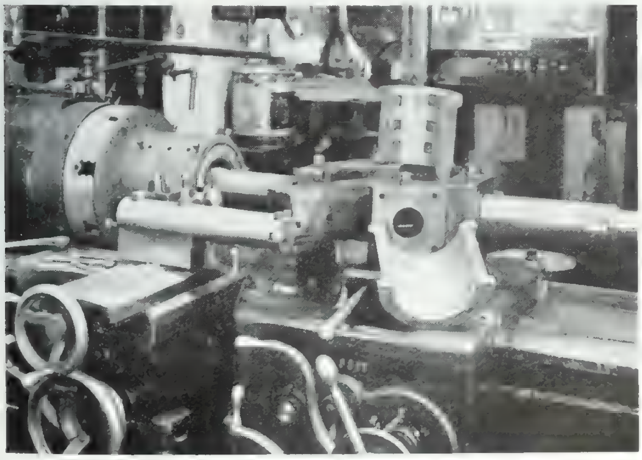


Figure 2. Methods of chucking and machining crankshaft bearing boxes for medium-sized engines. All these boxes are relined with bronze Babbitt bushing

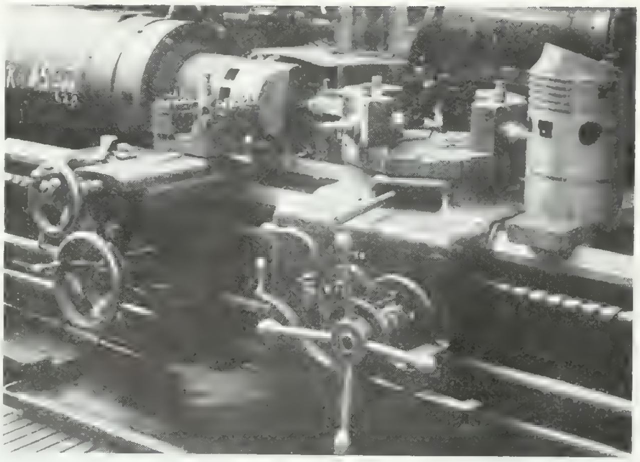


Figure 3. Turning and grooving operation on a twelve-inch piston

High Speed in Heavy Work

Another example of high-speed production on heavy work is shown in Figure 3, the work in this case being a piston ten and one-fourth inches in diameter and of cast iron, which is turned in a roughing and finishing cut and grooved for the piston rings at one setting of the work. Here the holding fixture is simply a plate with a register ring on which the piston fits and which is centrally located with reference to the lathe spindle. In a previous operation the lower end of the piston is faced and bored accurately to fit this register ring. To hold the work in place while performing the operation now being described, a draw-bar with a quick-acting nut is passed through the hollow spindle of the lathe and projects into the piston. A pin is passed through the rough piston pin holes and a hole in the draw-bar so that when the quick-acting nut at the other extremity of the rod is tightened the device serves not only to clamp the piston rigidly against the face plate, but serves as a means for driving. The outer end of the piston further is supported by means of a dead center fitted to one of the turret faces. In this operation the main turret is not utilized, the entire work being performed by tools located in the cross-slide turret. The outside diameter of the piston is rough turned to two different diameters, the top end being relieved somewhat for clearance, and a rough finish is here satisfactory. The body of the piston is somewhat larger and is turned with the cross-slide in another stop. Finally a broad-nosed tool gives the piston body the final cut and in a subsequent operation the piston is ground. The novel feature about this operation is the method of cutting the grooves, and the method here used is standard with this company on all pistons up to ten and one-fourth inches in diameter. The grooves vary from three-eighths inch to one-half inch in width and from one-fourth to three-eights inch in depth. The method of cutting the grooves is by means of gang cutters mounted in a holder on the cross-slide turret post, the tools being fed into the work with a very fine feed. This operation is performed in one cut, but in the particular piston being described the top grooves are cut with one set of cutters and the bottom grooves with another single tool. It has been thought advisable to divide the work in this way, rather than sacrifice rigidity by trying to make a long single-gang cutter do the work.

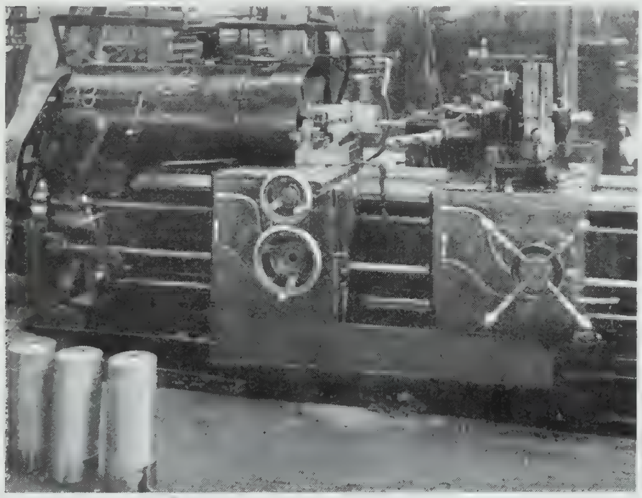


Figure 4. Operation on a seven-inch wrist pin made from a solid forging

Proper Lubrication Necessary

With the development of the heavy-oil internal-combustion motor for marine propulsion the larger sizes in cylinder bores are required and here extreme care is necessary to maintain proper lubrication of piston pins. This introduces a very difficult problem in the manufacture of these pins, some of which are shown in Figure 4. The material here is .20-.30 carbon steel. The pins are seven inches in diameter and the lubricating system requires that, for a distance on each end, the pins be reamed two and one-fourth inches and that between these reamed holes the pin be counter-bored to three and one-fourth inches to act as an oil well. The outside diameter of the pin is of three different dimensions; the middle diameter, which forms the bearing for the connecting rod, must be case-hardened, while the two end diameters are left soft. The pin is carbonized, after which the case is machined off the ends before quenching. This is done in a subsequent operation to that here described. The pins, it will be noticed, are formed on the ends to a radius of about eight inches. In the figure the machine is set up for performing the turning, boring, reaming and forming operations on one end of the pin. Because of the excessive diameter of these pins they will not pass through the hollow spindle of the lathe, which necessitates the work being performed on forged pieces of approximately the right length. The outside diameters are turned by means of tools in the cross-slide turret, plainly shown in the cut. It probably is of interest here to note that each position of the turret is provided with a stop, which when once set predetermines the diameter to which the work is turned. The metal is removed from the inside of the pin, first by drilling, after which a boring bar is passed through the hole preparatory to reaming the end. These tools are plainly shown in the proper places on the turret and the counterboring is done by means of a raising and lowering tool holder, which is fitted with a boring bar with the necessary stops to limit the size. This counterboring does not require great accuracy in size and a variation of one-sixteenth inch is easily permissible.

Coast Can Entrench Itself

The forming of the ends to an eight-inch radius is the last function performed on each end of the pin, and the tooling for this particular phase of the work is shown on the front tool post of the turret. A forming tool of heavy proportions is provided and additional rigidity is attained by means of the pilot fitting in the previously reamed two and one-fourth inch hole in the pin.

We have now had a glimpse of the possibilities of intensive manufacture as required to compete in foreign trade, and we have seen only a part of what may be done on a particular machine to aid in meeting this competition. Does it not, therefore, seem reasonable to assume that with the same careful study applied to the many different kinds of labor-saving devices now offered on the market that the Pacific Coast can entrench itself in the manufacturing field?

We often hear excuses offered for our absence from this field and these excuses range all the way from high labor hour rate costs to the distance from the iron and coal deposits on the Eastern seaboard. But even these are easily surmounted if we devote ourselves to a careful study of ways and means to overcome this handicap.

CHANGE IN OLD FIRM

THE long-established San Francisco iron and steel merchants, known as Woods, Huddart & Gunn, have recently incorporated under the name of Gunn, Carle & Company, with offices at 444 Market street, and have extended their connections to include distribution in California of electric industrial trucks and tractors, electric hoisting machinery, electric furnaces, and various industrial equipment. Under the able leadership of Charles M. Gunn, the new president, the firm has secured several very valuable California agencies, among them the Baker R. & L. Company's service tractors and trucks.

An Interesting Repair

ONE of countless examples showing how welding processes have minimized the time required to replace in service steamships which have suffered broken stern frames, shafts, shoes, rudder frames, rudder stocks, etc., is furnished by the accompanying illustrations of a recent repair of the cracked stern-wheel shaft of the steamship T. C. Walker of the California Navigation & Improvement Company, Stockton, California.

It is interesting to note that a successful weld was made more than a year ago in the high-pressure (port) side of this steamer. Since then another break occurred, this time on the low-pressure (starboard) side. A description follows of the repair operations on this second job.

The shaft was 12 inches in diameter and the hub at the edge of the weld 18⅝ inches in diameter. Conforming to the usual practice, the shaft was welded to the hub. The hub was of cast iron.

The steamer was ready for work on the repair at the Stockton shipyard at 10 a. m. on a Thursday and the job was completed at 4:30 p. m. the following Monday, or four days later.

The great requirement in this job was to save time, as it was the height of the season for carrying the products of the rivers to markets and every day saved was very valuable to the shipowner. This requirement prompted a change in methods Instead of wax, sand cores were used.

A view of the mold box in T. C. Walker repairs

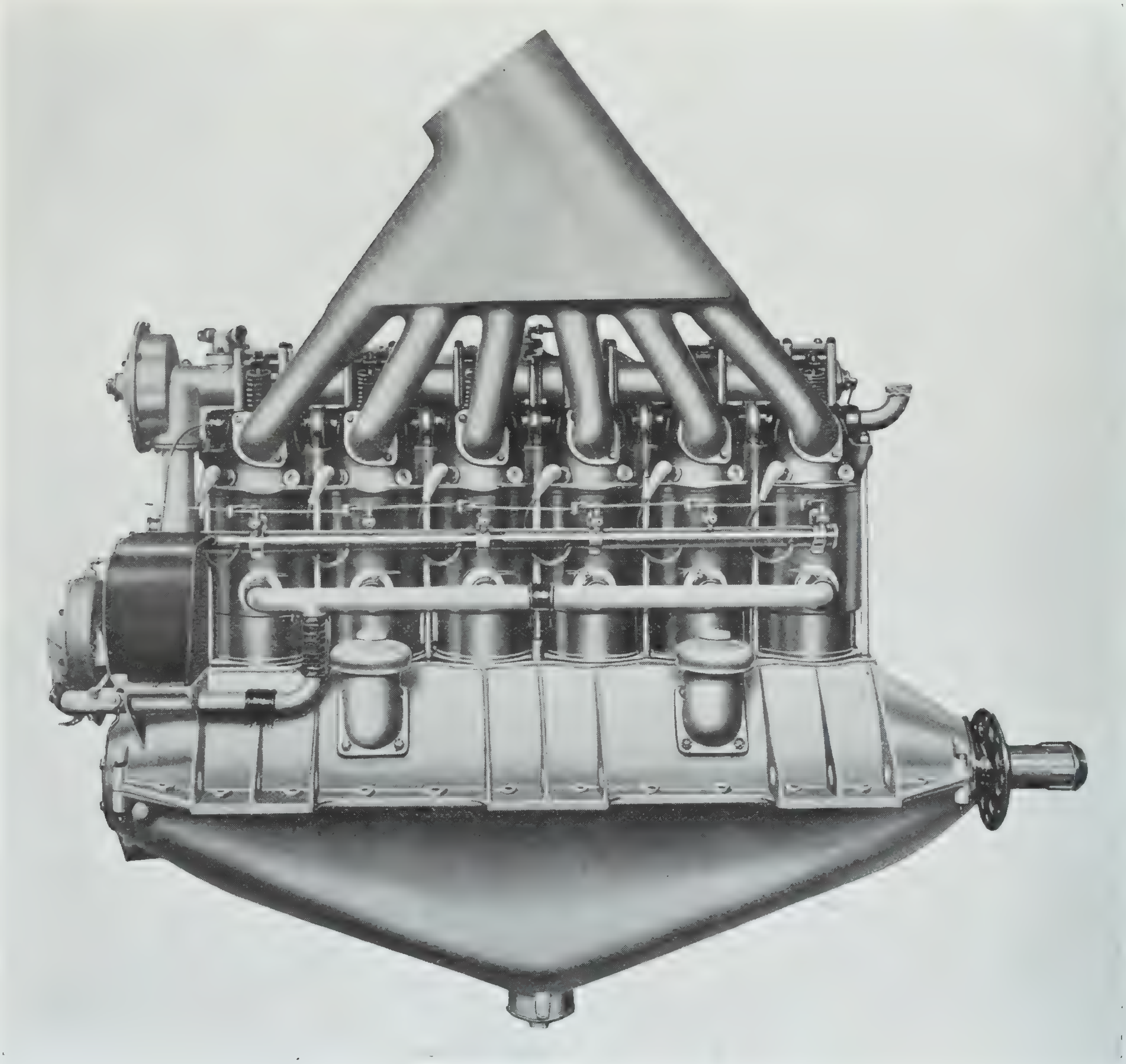
Thermit weld before removing riser and excess metal

Only one core box was used for the bottom and top half. The ring pattern gates and riser in the core box were faced with the usual facing sand backed up with foundry sand mixed with "core compound," in order to acquire a solid and strong core. One sack of 125 pounds was used with fifteen to twenty sacks of foundry sand. The facing sand was liberally supplied with nails before the foundry sand was tamped into the core boxes. The core was well gaggered, roded and vented. It took one core-maker one day to make the bottom and top cores, which contained the ring space, gates and riser spaces. In the evening the two cores were placed in the core oven, remaining there over night. There were a number of cracks in the facing sand as the result of this heating. All these were filled up and both cores again placed in the core oven over night. They came out perfect and very hard the next morning. The stern wheel had been previously raised four inches, and a platform under the shaft had been built twenty inches below the bottom of the shaft. In deciding upon this distance great care had to be taken to allow for clearance for the bottom core (drag core). This drag core and the cope (top) core were placed in position and strapped together with one-half inch bolts and plates placed under the bottom and top of the core. In this way the work of shaping, fitting and venting the wax ring, as well as the entire building of the mold around the wax, was eliminated, as the cores contained the ring space, gates and riser and also the preheating holes, so that virtually all there was to do was to pack backing sand around these cores and fill up the iron mold box placed around the cores. The fitting of this iron mold box caused delay and trouble, owing to the very restricted space, as shown in an illustration, there being only about fourteen inches between the wheel disk and the cylinder timbers. Actual supporting of the two crucibles was done with heavy one-half inch chains, tightly bound around the body of the crucibles, and heavy hooks fitted with turnbuckles and adjustment were hooked on one end into the links of these chains and the other end was hooked over the wheel rings on the inboard side and into eye-bolts fitted into posts on the outboard side.

The day after pouring, the mold was dismantled and the job found to be an excellent one in every way. The ingredients used for the reaction were 1250 pounds of Thermit, 240 pounds of punchings, twelve pounds of manganese and seven and a half pounds of nickel shot.

The work was done under the supervision of James Burns, port engineer of the California Navigation & Improvement Company.

A Notable Achievement in Motor World---



Hall-Scott A-5a motor made by a San Francisco Bay corporation

WHEN the United States Government needed the manufacturing facilities and the men to assure quantity production of aeroplane engines to help win the war, it found both ready to its order on the shores of San Francisco Bay. This may well be considered a cause for pride among San Francisco motor engineers and skilled machinists. There is almost no class of work that requires a greater degree of precision than the machining parts for these engines and the fact that so much of it has been done in the shops of Berkeley, Oakland and San Francisco shows the possibilities of manufacture that exist in Central California.

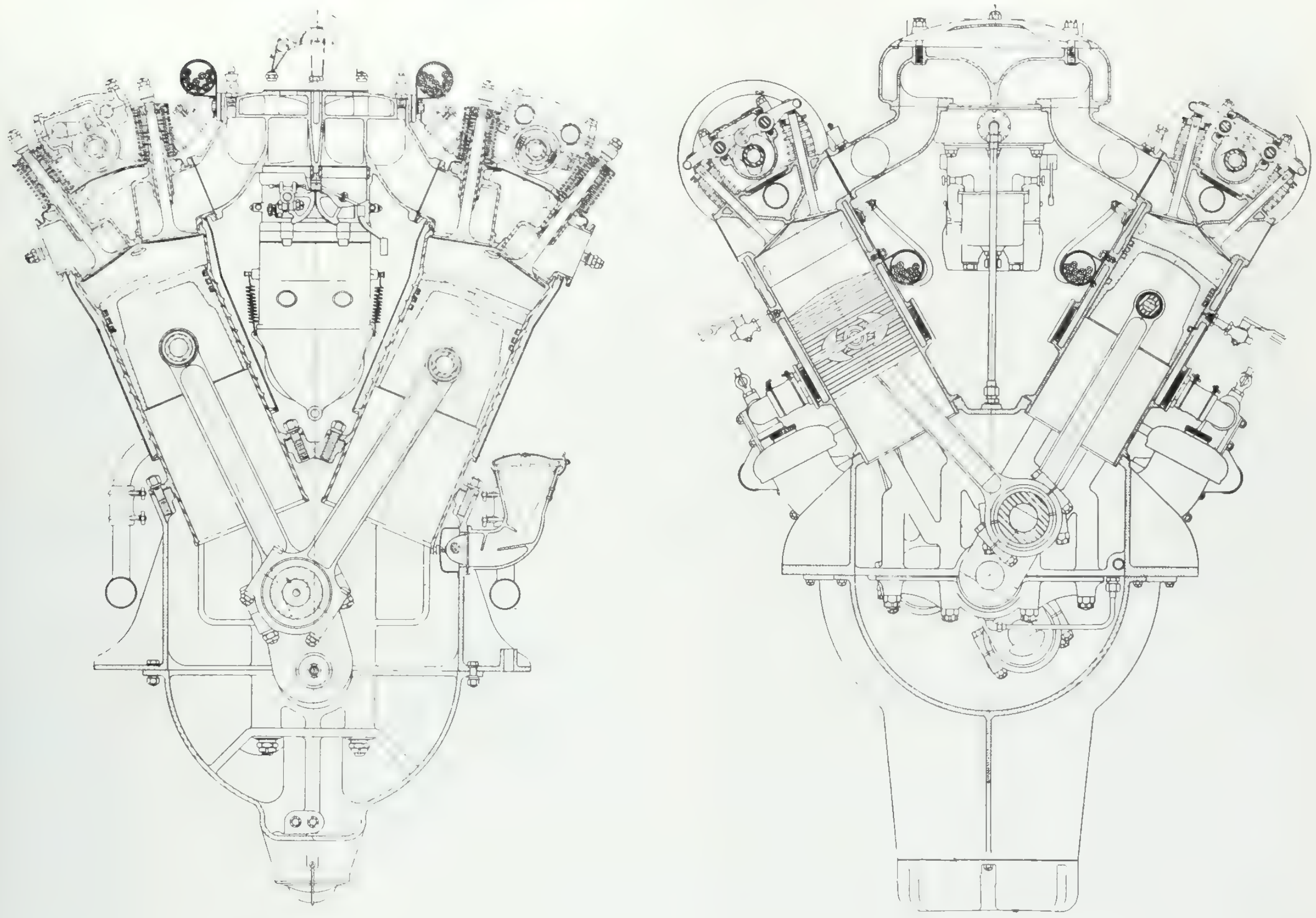
The Hall-Scott Motor Car Company, Inc., during the war employed 550 men, working in three eight-hour shifts. They produced and assembled great numbers of four and six-cylinder aeroplane motors, both for the European governments and for the United States. They supplied the dies for forgings and much of the design of the Liberty twelve-cylinder motor, and have machined great numbers of parts for that famous engine.

As an instance of the quantity of work being done, it might be stated that this company alone is now working on an order for the machining of 500 crankshafts for Liberty twelve motors for the United States Navy.

All lovers of the sport of motorboat racing will be interested in the recent announcement that the Liberty engine design is being adapted to marine requirements and that they will shortly be able to obtain Hall-Scott Liberty fours and sixes completely equipped for motorboat work.

The illustrations herewith give an idea of the Hall-Scott Motor Car Company design of aeroplane motor and a comparison of this motor with the Liberty motor. It will be seen that with the exception of some minor details they follow practically the same general design, in fact, E. J. Hall, chief engineer of the Hall-Scott Motor Car Company, designed the Hall-Scott motor, and in collaboration with Jesse G. Vincent, experimental engineer of an Eastern automotive, designed the Liberty motor.

---Hall-Scott Make Liberty Engine Parts



Left: The Liberty motor. Right: Hall-Scott A-8. The points of resemblance and difference can be seen at a glance.

Material-handling Machinery Manufacturers Organize

FOLLOWING the suggestion of the Department of Commerce and the United States Shipping Board, there has been completed in New York the organization of an association of manufacturers of machinery for handling materials. The suggestion was made by the two government agencies because of the need for intensive study of the freight-handling methods at both railroad and ocean terminals. By mobilizing the experience and ability of all manufacturers of handling devices in a single organization, the government will not only be able to reach this industry in an effective way when it needs co-operation, but the industry itself more effectively can attack the large and difficult problems presented at terminals and ports.

The active conduct of the association's work will be in the hands, as secretary and manager, of Zenas W. Carter, formerly commissioner of the Associated Metal Lath Manufacturers, and previously field secretary of the Granite Paving Block Manufacturers' Association. The officers of the association are: President, Calvin Tompkins, formerly commissioner of docks, New York City; vice-president, J. A. Shepard; treasurer, Lucian C. Brown.

The following companies have come together in the work of forming the organization and are now constituting themselves a membership committee to complete the charter membership of the association: Watson Elevator Company, Edward F. Terry Manufacturing Company, International Conveyor Corporation, Rownson, Drew & Clydesdale, Inc., New Jersey Foundry & Machine Company, Hayward Company, Elwell-Parker Electric Company, Sprague Electric Works, Otis Elevator Company, Manning, Maxwell & Moore, Inc., Robins Conveying Belt Company, Michener Stowage Company, New York City; Shepard Electric Crane & Hoist Company, Montour Falls, New York; Brown Portable Conveying Machinery Company, Chicago, Illinois; Karry-Lode Industrial Truck Company, Long Island City, New York; Whiting Foundry Equipment Company, Harvey, Illinois; Wellman-Seaver-Morgan Company, Cleveland, Ohio; Alliance Machine Company, Alliance, Ohio; Alfred Box & Company, Inc., Philadelphia, Pennsylvania; Meade-Morrison Manufacturing Company, East Boston, Massachusetts; Alvey-Ferguson Company, Cincinnati, Ohio; Heyl & Patterson, Inc., Pittsburgh, Pennsylvania; American Hoist & Derrick Company, St. Paul, Minnesota; Cleveland Crane & Engineering Company, Wickliffe, Ohio; Clyde Iron Works, Duluth, Minnesota; Ohio Locomotive Crane Company, Bucyrus, Ohio; Northern Engineering Company, Detroit, Michigan; Electric Controller & Manufacturing Company, Cleveland, Ohio.

Offices have been opened at 35 West Thirty-ninth street, New York City.

Electric Steering Gears

AS the brain is to the body so is the steering gear to the ship. Without an adequate and reliable gear which may be depended upon during all manner of weather, a ship is courting disaster; and the importance which has been attached to steering devices is evidenced by the vast amount of scientific knowledge and inventive ability which have been directed toward perfecting the various forms of steering engines and devices in existence at the present time.

Steering gears may be divided roughly into four groups—steam, hydraulic, electric and hand. The hydraulic gear is undeniably efficient, but of high first cost; requires an extensive piping system, and, where leaks occur, the tiller may not be in accord with the tell-tales located in distant steering stations. The steam steering gear, so universally used on large vessels, is also somewhat open to the same objections and also on account of its initial cost and weight has not found ready acceptance on vessels of medium size. This lack of a light, economical steering gear has resulted in stretching the usefulness of the hand gear to a point where disasters have been traced to the inability of human power to handle the tiller in heavy weather or in narrow channels and strong tides.

Hand Gear Entails Hard Work

The hand gear entails the hardest kind of manual labor and its manipulation on large vessels during heavy cross seas, or in crossing bars where a quick tiller is necessary, becomes a nerve-racking ordeal.

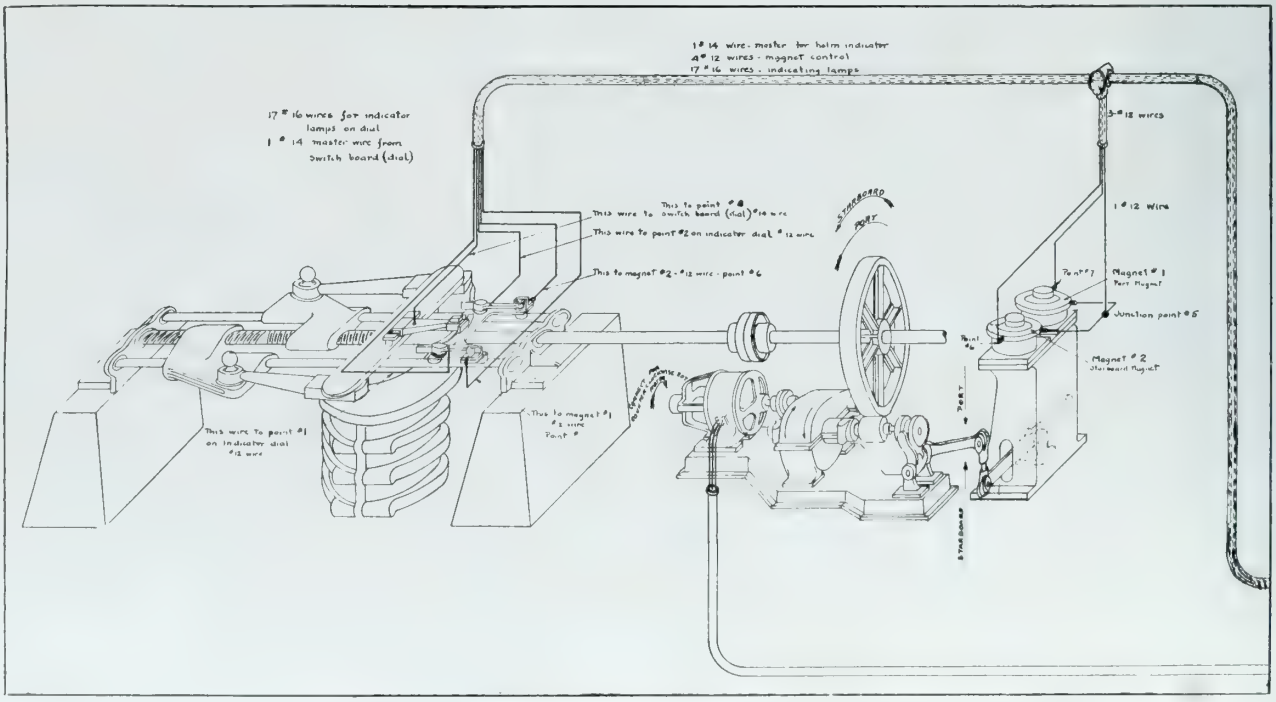
The electric steering gear or the electric control of a steam steering gear has several manifest advantages, among which are the replacement of telemotor pipes or tiller wires or chains with electric wires; the simplification of the tell-tale system, and, where electricity is used throughout, a cheaper and more economical engine.

Control stand in pilot house, Herzog electric steering gear

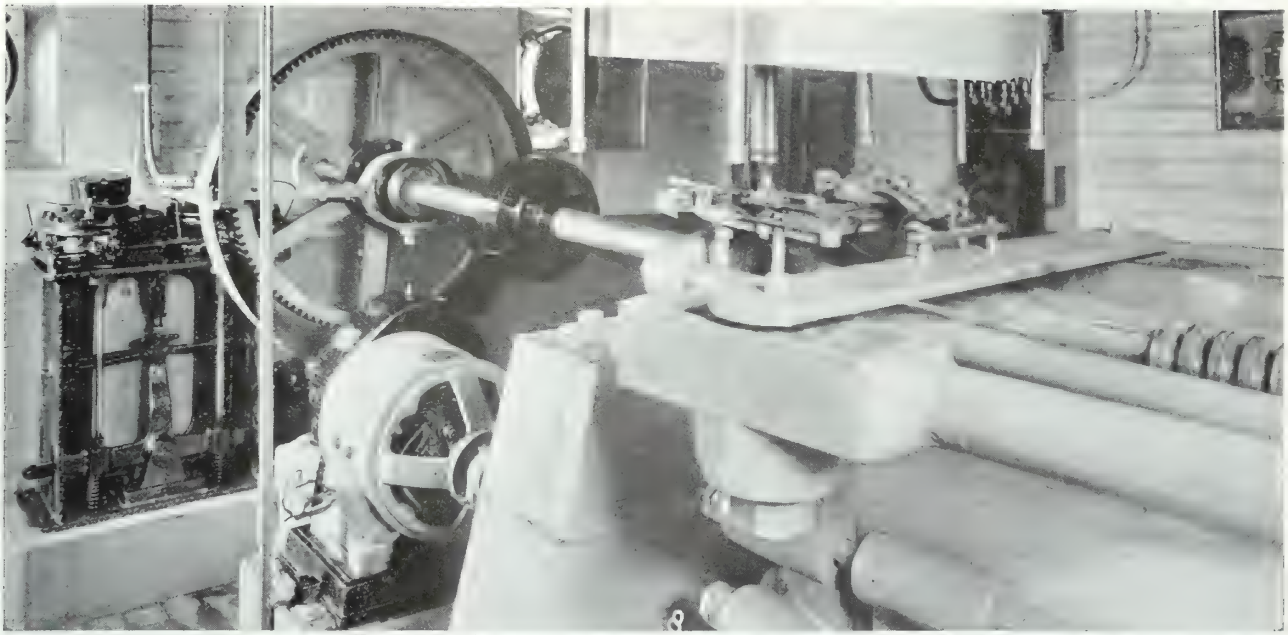
Several years ago shipowners on the Pacific Coast became keenly interested in the development of large auxiliary schooners fitted with internal combustion engines as auxiliary power. The steering of these large vessels, some of which carried over 2,000,000 feet of lumber, was a serious matter with the ordinary hand gear. At sea in fair weather the task was comparatively easy, but crossing bars at the lumber ports and running crooked river channels was found to be an entirely different matter, and as a generating set was always a part of the power equipment of these vessels, the use of electric power was naturally turned to in solving the problem.

Herzog Gear Designed

At the request of and in conjunction with the engineers of the Charles R. McCormick Company of San Francisco, owners and operators of several large auxiliary motorships, the Herzog Electric &

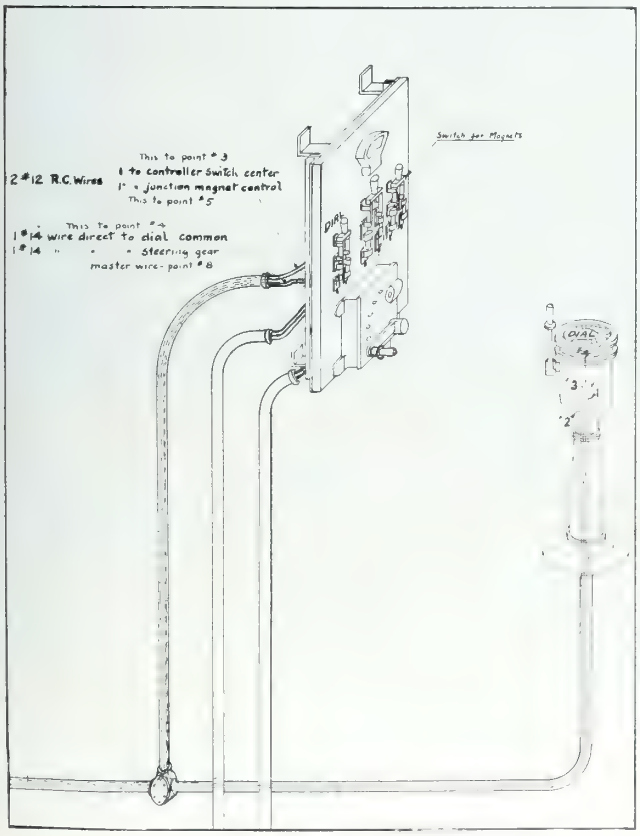

1 # 14 wire - master for helm indicator
4 # 12 wires - magnet control
17 # 16 wires - indicating lamps
17 # 16 wires for indicator lamps on dial
1 # 14 master wire from switch board (dial)
This to point # 8
This wire to switch board (dial) # 14 wire
This wire to point #2 on indicator dial # 12 wire
This to magnet #2 - # 12 wire - point # 6
STARBOARD
PORT
3 - # 12 wires
1 # 12 Wire
Point # 7
Magnet # 1
Port Magnet
Junction point # 5
Point # 6
Magnet # 2
Starboard Magnet
This wire to point #1 on indicator dial # 12 wire
This to magnet #1 # 12 wire Point #
PORT
STARBOARD

Outline arrangement of Herzog electric steering gear with electro-magnetic remote control



Herzog electric steering gear on the motorship James Timpson

Engineering Company of San Francisco took up the problem of steering gears for vessels of this particular class. The first problem was solved by installing a motor with a rope drive over the steering wheel. This motor took current from the electric lighting set of the vessel and was utilized whenever hand steering became unpleasantly difficult. This arrangement was placed on board the big auxiliary motorship, five-masted schooner S. I. Allard and was such a pronounced success in efficiency, economy and freedom from trouble of all sorts that the Herzog Electric & Engineering Company was encouraged to follow up its original success with what might have been termed first aid to hand steering gears, by the perfection of an entire electric steering system, a brief account of which follows:



Remote control for Herzog electric steering gear shown opposite

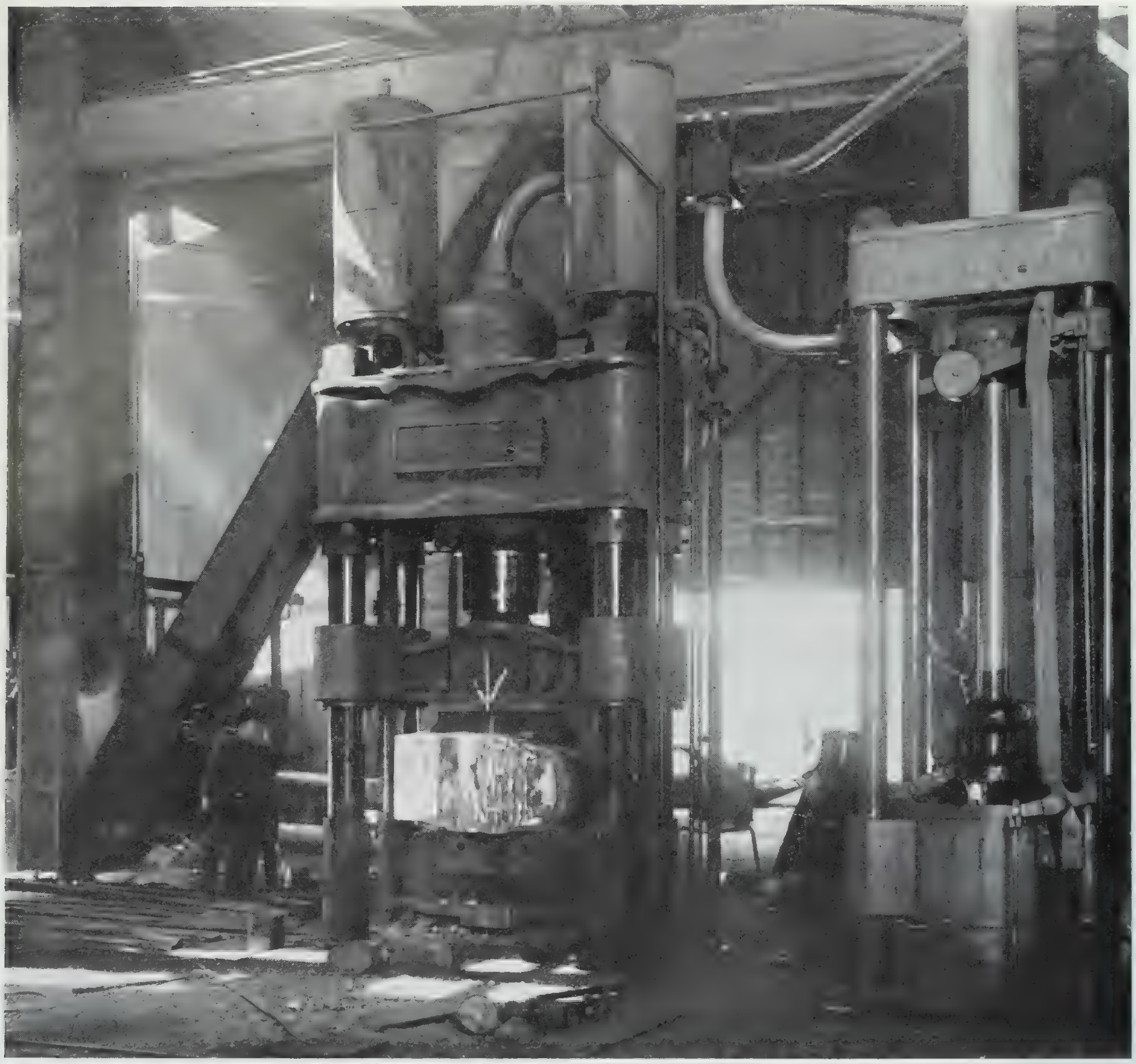
Rudder Actuated by Right and Left Screw

As shown in the diagram, the rudder stock is actuated by a right and left screw working two guided nuts so that when the screw is turned these nuts travel in opposite directions along their guides. The motion of the nut is communicated to the rudder stock through connecting rods pivoted to opposite sides of a specially designed clamp. The stem of the screw is driven by an electric motor through a train of gearing. The direction of rotation of the motor is controlled through a pair of magnets, which are worked from the pilot house or any other remote station by a small hand-lever on the side of the indicator stand. Throw this lever to port and the rudder will be turned to port, the motor keeping up its work until the lever is returned to the upright position. Lamps in the indicator show the rudder position. The power consumption of course varies very considerably with the conditions of weather and of the ship. With the installation of the S. I. Allard mentioned above, as much as two horsepower was needed at times, but in normal running in a smooth sea the power required was practically a negligible quantity.

STATES HAVE ONE-FIFTH OF TONNAGE

A SHIPPING Board announcement states that the American merchant marine now represents nearly one-fifth of the entire sea-going tonnage of the world, and comprises 46 per cent of all ships clearing from the United States ports, as compared with 9.7 per cent prior to the commencement of the war in 1914.

The fleet now engaged in overseas commerce consists of 351 freighters, 84 freight and passenger vessels, 71 oil tankers, 230 sailing vessels and 16 miscellaneous ships, aggregating 1,961,239 gross tons. Of this total 406,528 gross tons were employed in transatlantic trade, 315,925 tons in transpacific trade, 402,721 tons in South American trade, 761,252 tons in Caribbean and Mexican trade, and 76,014 tons in Alaskan and Canadian trade.



The Edwin Forrest Forge Company's 1200-ton hydraulic press

Forgings from Forty-eight-inch Ingots

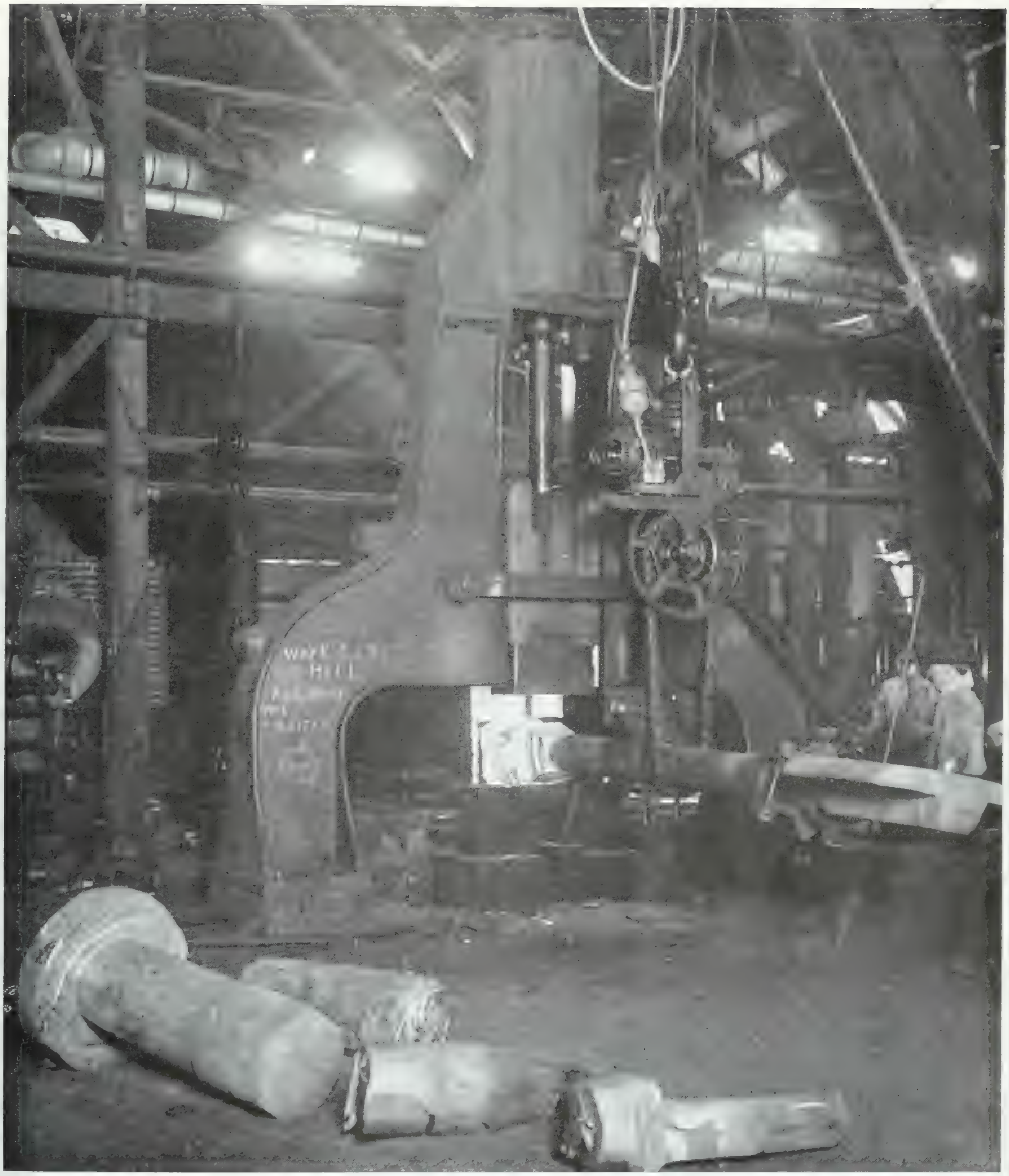
ONE of the largest steam hammers on the Pacific Coast is in daily operation at the modern forge shop of the Edwin Forrest Forge Company, located at East Oakland near the Twenty-third Avenue bridge over the Oakland estuary. This powerful hammer, which is of the Bement double frame type, is capable of delivering a blow of approximately 150,00 pounds. The weight of the falling parts alone is 8512 pounds, and, with a steam pressure of 135 pounds on a twenty-four-inch cylinder, which has a stroke of sixty inches, this tremendous hammer in the hands of skilled operators has been an important factor in the great output of steel forgings which the Forrest plant has to its credit. The hammer is twenty feet high, with a floor base of 17 feet by 14 feet. The face of the die and anvil measures 17 inches by 28 inches.

1,326,000 Pounds of Forgings

The fact that the Edwin Forrest Forge Company during the month of January turned out 1,326,000 pounds of steel forgings will give one an idea as to the capacity of this great forging plant.

The United forging press, a photograph of which is reproduced, is a monument to the acumen and resourcefulness of Edwin Forrest. When Mr. Forrest planned the great expansion of the small forge shop which had been in operation in San Francisco for many years, a number of his friends believed that he was contemplating a wildly extravagant idea in purchasing equipment of this nature.

The Pacific Coast never had possessed a forge shop equipped with a 1200-ton press and doubts were expressed as to the need of such a tool to care for Western requirements. This press alone represents an investment of more than $100,000 and has a capacity for handling a steel ingot forty-eight inches in diameter. The fact that this great forging press has been taxed to its capacity practically every day since its installation is proof of the wise foresight on the part of the men who have planned the Forrest plant. The largest ship-forging ever made in the West was pressed out by this hydraulic tool. This was the upper rudder-stock for the Standard Oil Company's tank steamer Richmond.



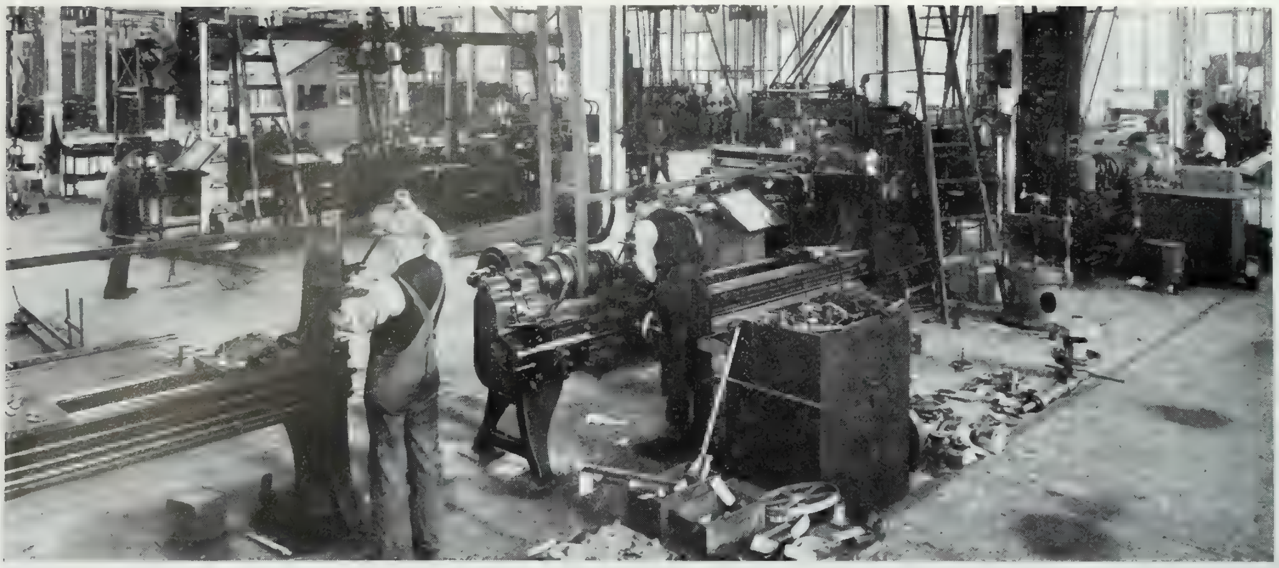
Double-arch Bement steam hammer at the Edwin Forrest Forge Company

A few years ago it would have been impossible to handle this immense forging in the West and the shipowners would have been obliged to re-design the rudder construction or else have waited six weeks or longer to receive the forging from the East. Instead of delays to the owners of the Richmond, the forged rudder-stock was delivered in a few days after the Forrest Company received the order.

Nine Smaller Hammers

It is worthy of note that one of the first jobs put under this United press was the steel ingot which later was made into the rudder-stock for the Standard Oil tanker. This ingot was forty-eight inches in diameter. During the first "heat" this forty-eight-inch diameter was drawn to a fifteen-inch stem.

In addition to these two great forging tools, the Forrest plant is equipped with nine other smaller hammers, which enable the Forrest plant to handle quantity production of small forgings, such as gear blanks, engine and automobile parts, and an endless variety of forgings necessary in shipbuilding.



In the shop, Axelson Machine Company

The Axelson Machine Company

THE reason that Pacific Coast industries have not developed more rapidly has been largely the fact that we have not appreciated our own capacity as we should. Coast industry needs to educate itself up to the fact that right here on the Coast we can secure almost every essential manufactured product we require.

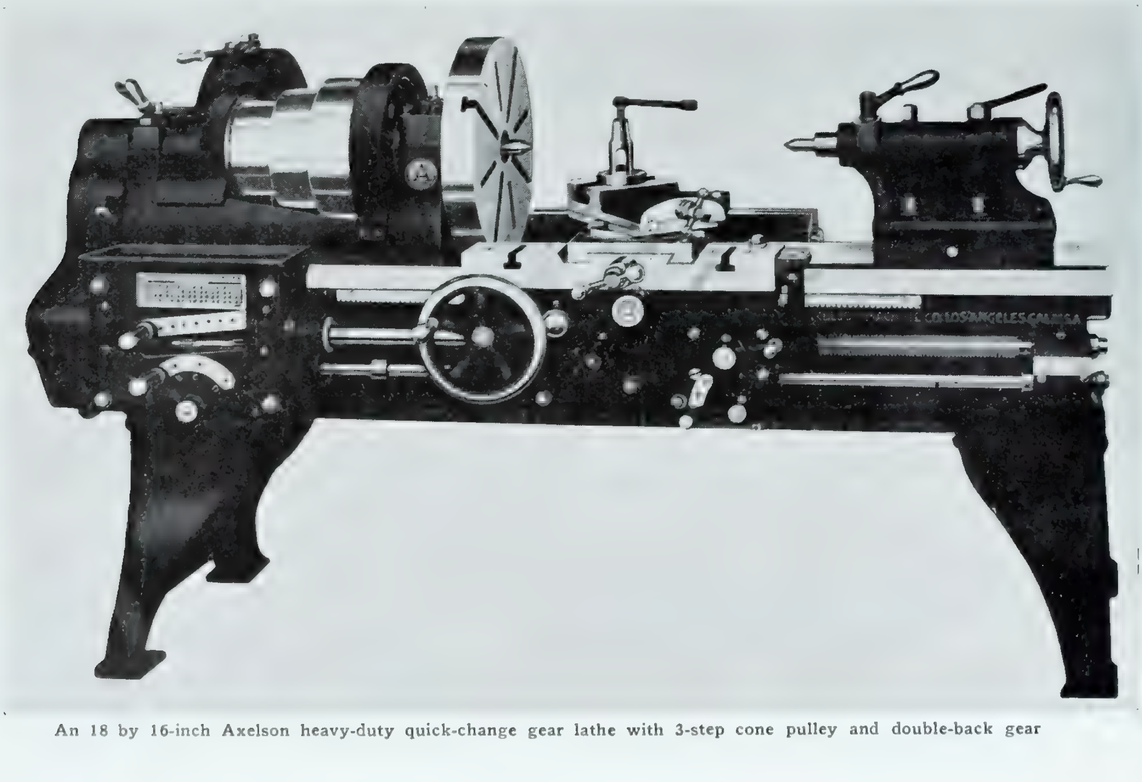
Take shipbuilding, for instance. Practically all the material and equipment is now manufactured on the Coast. There is little need for seeking outside assistance. Consider machinery, also. We have on the Coast some of the finest factories in the country. Although many of them are, of course, not so large as the well-known Eastern concerns, this does not cast any reflection whatsoever upon the merit of the products. As a matter of fact, the average Pacific Coast product is of a higher quality than the majority of Eastern products, because the Pacific Coast manufacturer realizes that in order to gain preference he must put more quality into his goods.

Need Not Go to East

One leading Coast manufacturer declares that 50 per cent of the articles now purchased in the Eastern markets, two, three and four thousand miles from the consuming points, could be supplied by manufacturers who are already established on the Pacific Coast.

It is vitally essential that we patronize our neighbors and serve each others' needs as far as possible. This will go far toward maintaining a permanent solution to the labor problem and will relieve the railroads of a large portion of burden in the transportation of immense tonnage across the continent.

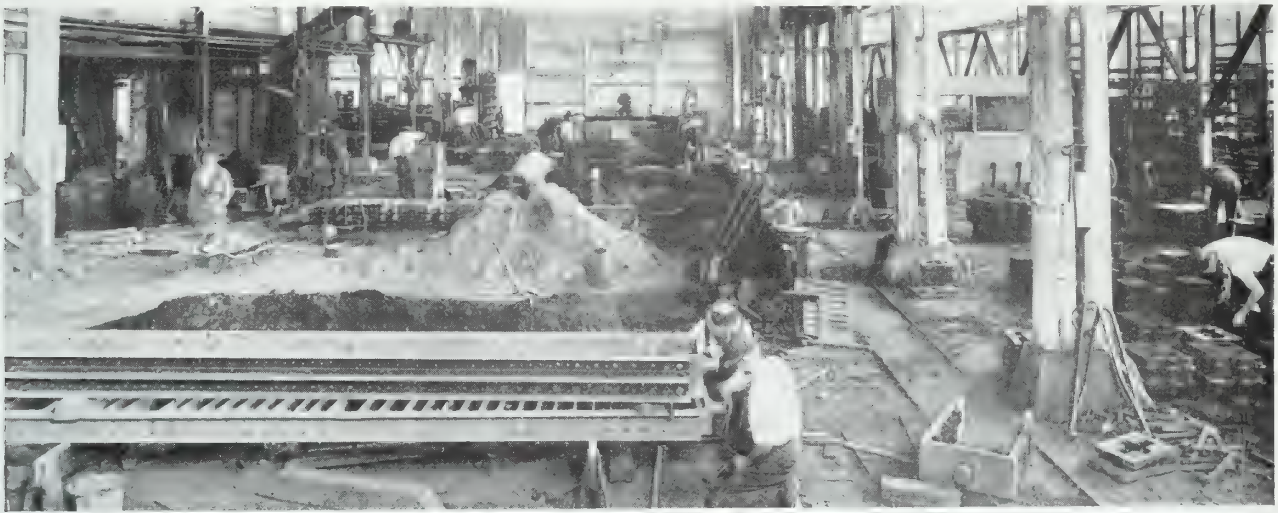
The writer not long ago had the pleasure of vis-



An 18 by 16-inch Axelson heavy-duty quick-change gear lathe with 3-step cone pulley and double-back gear iting various manufacturing plants in Southern California, and one of the most interesting trips was through the shops of the Axelson Machine Company at the southeastern limits of Los Angeles. An atmosphere of systematized procedure is evident everywhere in the plant. The shops have been enlarged to such an extent as to permit production sufficient to supply the Coast and foreign fields. The men behind the organization have looked into the future with a broad vision and have laid plans which will permit a production of lathes that can be rapidly increased on short notice.

Modern Factory Buildings

Not a stone has been left unturned to permit the highest efficiency in manufacture. The buildings have been constructed of steel and brick and cover more than six acres. High ceilings with glass vents allow a flood of daylight to enter. The employes are provided with every modern convenience, including sanitary washrooms, drinking fountains, etc.


The foundry, Axelson Machine Company

The equipment was selected for the plant with the same systematic precision as is noted in the manufacture of the Axelson products. The machines used are of the very latest design, many being of special construction to meet the particular requirements of the Axelson shops.

The most important products of the Axelson shops are the sixteen-inch, eighteen-inch and twenty-four-inch screw cutting engine lathes, which can now be seen in almost every well-equipped machine shop west of Denver. These lathes are built with any length of bed and furnished with many modern extra attachments to meet every special demand. Every pound of Allegheny soft gray iron used is mixed to analysis in the large, modern foundry where all the cast parts are produced. The bed casting is semi-steel and the carriage is of a pure, close-grained, gray iron.

All Bearings Heat-Treated

Every bearing, when possible or practicable, is heat-treated in special ovens and then ground. All screws are milled; all gears are of heavy pitch, stub-tooth design, and heat-treated. The lathes are not merely assembled, but every detailed part or piece is made from the raw material at the Axelson shops. The design is such that it allows the correct distribution of all metals throughout the tool, thus assuring the mechanic of perfect rigidity to withstand the maximum duty.

The greatest care is exercised in giving each and every part of the lathe a thorough inspection to gauge, as it leaves the various machines, and again before going to the parts stock room. When placed on the assembly floor only skilled workmen with the most accurate knowledge are employed, as each part is given a most rigid inspection before being assembled. When completely assembled and passed upon, the lathe then passes to an inspector of great precision ability, who, with the very latest and most modern testing instruments, goes through every possible lathe operation, looking for some chance defect. After passing a perfect score (as it must) it is finally delivered to the shipping room—a tool of accuracy.

"Thirty years have passed since the beginning of the Axelson Machine Company," said J. C. Axelson, general manager. "Three decades ago C. F. and G. A. Axelson decided to pioneer the manufacture of machine products so that it would be unnecessary for Coast shops to look to Eastern manufacturers for supplying high-grade equipment. During these thirty years the reputation of Axelson products has spread to the four corners of the world. They can be found in almost every large shop on the Coast.

"Our location enables us to make delivery to the furthermost point on the Coast in a few days, whereas Eastern manufacturers require delivery time frequently extending from six to eight weeks. We are able to save the purchasers considerable in freight and offer closer co-operation. In supplying parts no delay occurs."

A visit to the Axelson shops will break anyone's belief that he must purchase lathes from Eastern markets. At the Pacific Coast's very door is a manufacturer who can give a product that will meet the strongest competition.

TO BUILD TOPMAST SCHOONER

Lyng & Rix of Portland have interested business men in the construction of a four-masted topmast schooner, which is to be laid down at the Columbia City plant of the International Shipbuilding Company, at the head of which is George M. McBride. It is estimated the vessel will cost $175,000 and will have a lumber capacity of 1,250,000 feet. She will be 190 feet long, 40 feet beam and 19 feet deep.

The Future American Mercantile Marine

By Captain J. S. Marshall

I HAVE been very much interested in the articles appearing in Pacific Marine Review regarding the future American mercantile marine, and, as one who is familiar with the Pacific trade to Japan, China and the Philippines, I would like to make a few suggestions that may be of interest to merchants, shipowners and others interested on the Pacific Coast.

Three-fourths of the freight trade—I am almost safe in saying 90 per cent—and at least 80 per cent of the passenger business on the Pacific, comes from America, and why this business is not carried in American ships is owing to the lack of American tonnage.

Oriental Business Under Foreign Flags

When the war broke out, tourists who usually went to the continent of Europe had to turn to the Pacific, and thousands who had never been to Japan or China went there and were greatly surprised at what they saw in these countries and the possibilities of trade. Quite a large number got interested and entered into business with these countries and now a large trade is done that previously was not thought of. This trade is practically carried in ships flying other than the American flag, and Americans are paying hundreds of thousands of dollars yearly to foreign shipowners. This is demonstrated clearly by the fact that Japanese shipowners have considerably augmented their fleets in the past few years and have placed themselves in a position to secure the lion's share of the business, and are now carrying capacity loads. The trade has been increasing yearly, owing to the energy and efficiency of the Japanese in placing some of the finest ships afloat in that business.

The possibilities of the Pacific are very great, and trade, now that the war is over, naturally will increase as men turn their minds from destruction to production. China is the market of the world, with unlimited resources, and no one can guess the possibilities of this vast country so thickly populated. The passenger and freight traffic on the Pacific has increased so much recently, and is still increasing, that there is a splendid opening for both freight and passenger vessels.

Should Build Fast Fleet

I would suggest: First—That a fleet of fast passenger steamers be built specially for this trade of not less than eighteen knots sea speed, in loaded condition in ordinary weather, with accommodation for 200 first-class, 100 second-class and 500 third-class or steerage passengers, and to carry not less than 5000 tons deadweight cargo—this would mean about 7000 tons measurement. Vessels of this type would be about 600 feet long by 70 feet beam and about 29 feet loaded draught. They would displace about 25,000 tons. Ample deck space for promenade and shelter would be required, and cold and hot air ventilating systems installed, as both cold and hot weather is experienced in this trade. Sufficient ballasting arrangements should be provided, so that the return voyage with light cargoes would give a metacentric height of three feet and make the stability of the vessels sure when in this condition, and be more comfortable and enjoyable from a passenger's point of view.

The propelling machinery of these vessels should be either four high-speed turbines, or two reciprocating engines and one center turbine. Oil should be the fuel used, as it is cleaner, more efficient and economical than coal. For fast handling of freight a sufficient number of silent steam winches should be installed. Electric winches have not proved the success anticipated, owing to their frequent breakdowns and smashing of cargo when heaving up from the holds.

These vessels should be built with deep plates and widely-spaced frames and on the pillar-and-girder principle. This is the strongest that has been devised yet, and can stand the enormous strains that are experienced when driving into a head sea. Fast passenger steamers are a necessity and eighteen knots sea speed in loaded condition is the least that should be attempted, with a possible twenty knots if required.

Fleet of Cargo Ships

Second—A fleet of cargo steamers, built on the same principle as the passenger vessels, of not less than 8000 tons deadweight cargo capacity, with a speed of not less than fourteen knots. The ten-knot cargo steamer is out of date, especially in the Pacific trade. These vessels should have accommodations for about fifty one-class passengers and should be at lower rates than the faster steamers. There are passengers that cannot pay first-class rates and do not like to travel second class, but would travel by these steamers.

The American law as to manning of all these steamers would require to be altered so that they would have an equal chance with all other nations sailing on the Pacific Ocean. I would suggest that, to begin with, experienced captains and senior officers, preferably American or British, middle-aged or not under thirty-five, who know the trade thoroughly, be put in charge with younger junior officers from American ships to learn and acquire a knowledge of the trade. Young men in charge of such steamers, valued at anything from $3,000,000 to $5,000,000, to say nothing of the valuable lives entrusted to their care, have not the stability that is necessary, and it is only men of long years of experience that should be given such positions. This has been demonstrated time and again. Discipline must be carried out, and it is only in this way that ships can be run on a proper business footing.

Good Quarters Necessary

The accommodations for captains, officers and engineers should be of the very best and large enough to be comfortable, as the general practice is to have very small rooms, poorly furnished and little comfort. Men stay for years in the same ship or company when some consideration is given them in the matter of accommodation. Constant change of men is detrimental to any ship and does not enhance the standing or reputation of a line or company.

Third—I would suggest that sailings from Seattle be once a month for the faster steamers and once a month for the slower vessels alternately. That would be two sailings a month. These steamers should take the northern route to Japan and

China, calling at Yokohama, Kobe, Shanghai, Manila and Hongkong. Fueling arrangements could be made at Hongkong with any of the oil companies located there. From San Francisco the same sailings, only these would go by the southern route, calling at Honolulu on the outward voyage but omitting it on the return voyage.

The distance from Seattle to Yokohama is about 4300 miles; San Francisco to Honolulu, 2100 miles; Honolulu to Yokohama, 3380 miles; Yokohama to San Francisco, direct, 4520 miles; Yokohama to San Francisco on the parallel of 37 degrees north latitude, 4770 miles. The round voyage, calling at all the ports mentioned, is about 13,500 miles. Time on the round voyage, including all stops and eight or ten days at Hongkong for the northern route, by the fast steamers would be about forty-five days; for the southern route, about fifty-two days.

The weather experienced on the southern route is much warmer than the northern route, but the northern is the quicker and preferred by many as ships can be made so comfortable nowadays with hot-air heating.

Electric and Oxyacetylene Repairs

THE British Board of Trade has now published for official use instructions to surveyors of vessels on the subject of making repairs to the boilers of passenger steamers by the electric or oxyacetylene processes. The instructions follow:

The repairing of the boilers of passenger steamers by the above processes has been tentatively in operation for a considerable period, and, in view of the experience gained, the surveyors are informed that, provided the work is carried out to their satisfaction by experienced workmen, these processes may be employed, within limits, for repairing cracks in furnaces, combustion chambers, and end plates of boilers, and in the same parts for reinforcing the landing edges of leaky riveted seams which have become reduced by repeated chipping and calking.

Cracks Near Welded Parts

In some old furnaces which have been repaired by the above processes it has been found that, after a few months' working, cracks have again developed at parts adjacent to those welded; probably owing to the original material of the furnace having become fatigued and worn out by long and severe usage. In dealing with old furnaces, therefore, this fact should be taken into consideration.

It has also been brought to the notice of the board of trade that a shell plate of a cylindrical marine boiler cracked recently through a solid part where some surface welding had been done by the electrical process two years ago. The welding had extended for a length of about 12 inches along the outside calking edge of one of the middle circumferential seams at the bottom of the boiler, the leaky edge of the seam and the adjoining shell plate having been covered (soldered) by metal deposited by this process in the usual way. The shell plate was one and five-thirty-seconds inches thick and the crack, which followed the line of surface welding, extended in a circumferential direction for a distance of two feet nine inches, the welded part being situated midway along the crack.

No Welding Under Tension

For the present it is not proposed to prohibit, within limits, the reinforcement of the circumferential seams of boiler shells if the end plates are well stayed, but no welding should be done to these parts by any process which may cause local heating over an appreciable area of the plate, such as the oxyacetylene, oxyhydrogen, or other similar methods.

In no circumstance should any part of a boiler of a passenger vessel be welded if wholly in tension under working conditions, such as a stay or the shell plate at a longitudinal seam, the failure of which by cracking at the welded part might lead to disastrous results.

In any case in which the proposed repairs to the boilers of passenger vessels by either of the above processes are of an uncommon or unusually extensive character, the particulars should be submitted for the board's consideration and approval.

After repairs by welding have been completed, the parts at or adjacent to the welds should in all cases be well hammer tested; and, unless the welding is of a trifling character, a hydraulic test of not less than one and a half times the working pressure should be applied to the boiler after the hammer testing has been effected.

This supersedes Circular 1532, dated April, 1913, which is hereby canceled.

AUTOMATIC SPRINKLERS FOR SHIPS

AN improved Grinnel automatic sprinkler system for use on board ships has been devised with the aim of meeting certain objections to the use of automatic sprinklers on vessels. Ship owners and designers have opposed the installation of sprinklers because of the greater probability of discharge in case of collision, while loading and discharging cargo, while the vessel was rolling and pitching at sea and because of the lack of head space and constant strain on the piping. They had held that the danger of premature discharge of water more than counterbalanced the advantages.

The new sprinkler was intended, therefore, to solve the problem of "a sprinkler system automatically discharging water in case of fire, but not so discharging water in case of injured sprinkler heads, broken piping or ruptured joints." As regards spacing, pipe sizes and general installation the sprinkler follows the general design and would be supplied from a steam fire pump working automatically, but there is no water in the system and no dry pipe valve. A thermostat automatically controls the admission of water into the system proper, and, even though pipes were ruptured, there would be no discharge without the action of the thermostat.

No data are available regarding the operation of such a system on board ship.

World's Shipbuilding Program

(Nautical Magazine)

EVEN Switzerland has decided to have a fleet of merchant ships flying the national colors. At Berne a shipping company has been formed with a capital of 100,000,000 francs, and the Swiss government has guaranteed half of this amount. Possibly the Swiss may want a navy to protect their mercantile marine, and then a national port—a pretty problem for the League of Nations. Australia is building and buying merchant ships, and operating them as a national enterprise. Canada, whose shipping interests before the war were of little importance, now has a ship construction capacity of 250,000 tons per year, and the Canadian government has decided to build a large fleet of cargo boats and operate them, in conjunction with the national railways, on the Atlantic and Pacific. In full war, with its soil under the heel of the Hun, the government of little Belgium fostered plans for the creation of a mercantile fleet aggregating 1,000,000 tons—nearly four times its pre-war tonnage. France has established new shipbuilding plants during the war—though it could not obtain raw material to keep its old yards in operation—and now that the Hun has been driven from the Briey Basin and also from Alsace and Lorraine, may soon be embarking on a shipbuilding program of at least 300,000 tons a year. The Italian government is paying big bonuses to shipbuilders and making extraordinary concessions to shipowners with a view to encouraging its shipping industry, and when raw materials are available Italy will probably soon be building all the ships she needs. Japan is now reported to have a ship construction capacity of over 500,000 tons a year, and is making great efforts to capture the traffic of the East. Norway, Sweden, Denmark, Holland and Spain have largely increased their shipbuilding plants, and their governments are doing everything possible to encourage shipowning. Even China is building steel ships.

On National Lines

Apart from Germany, Austria and Russia, the world's shipping problem is in the way of being solved on national lines, and Great Britain can hardly hope to regain her relative position either as shipbuilder or ocean carrier. Before the war the world's shipping was in excess of rational economic needs—a circumstance which no doubt served the Allies in good stead. During the war, according to a statement of Admiral Bienaime to the French Chamber of Deputies on November 26, 1918, the losses of all nations arising from war risks amounted to 12,500,000 gross tons, France's loss being 970,000 tons. According to a table recently published in Britain, the Allies and neutrals lost by enemy action 11,661,000 tons; Britain 7,637,000 tons. When we add the losses due to marine risk, aggravated by the abnormal conditions of navigation in war time, we get, according to competent estimates, a total loss of world shipping aggregating 14,500,000 gross tons, Britain's loss being 9,000,000 tons.

Accepting these figures as substantially correct, how does the account stand? Germany's pre-war merchant fleet amounted to 5,000,000 tons. Of this total the Allies seized about 2,500,000 tons as prizes of war. Of her original fleet, Germany now has little more than 2,000,000 tons of effective shipping, since she has had quite a number of ships sunk, and her ships immobolized in home waters, Spain or the Dutch East Indies must have deteriorated considerably. Before the war Germany was working on an extensive shipbuilding program. Her shipping in construction increased from 556,345 tons in 1910 to 1,345,877 tons in 1913. In July, 1914, she had in course of construction about 800,000 tons, undoubtedly much of the new construction on the program for 1914 and 1915 was not laid down; doubtless, too, there was exaggeration in the reports of the German papers as to the extraordinary activity of the shipyards during 1916 and 1917. Still it is probable that Germany during the war has completed 1,000,000 tons.

Don't Let Germany Build

To meet the claims of the Allies for reparation Germany has a little over 3,000,000 tons of shipping; as it is hardly likely that the seized or captured tonnage, being prizes of war, will be taken into consideration in the final reckoning. By working her shipyards at full capacity, Germany could deliver well over 1,000,000 tons a year. But will Germany be told to get busy building ships for the Allies? Italy and France are anxious to develop their own shipbuilding industries. The United States and Japan, having made large capital outlays on new plants, will desire to keep them at work. In Great Britain shipbuilding is the mainstay of a considerable working population. If there is one industry more than another the Allies ought to suppress in Germany it is that of shipbuilding; that would be a fitting punishment for her policy of frightfulness upon the seas. If Britain had to wait till Germany was able to restore ton for ton in kind—well, by that time ships might have become a drug on the market. Compensation in other forms may very well be required.

Only 3,500,000 Tons Needed

A consideration of some importance here arises: In how far are the shipbuilding programs upon which the Allies and neutrals are now working calculated to meet the world's needs? Against the merchant ship losses due to the war America has constructed approximately 4,000,000 tons, Great Britain 3,000,000 tons, Japan 1,000,000 tons, and Germany 1,000,000 tons—a total of 9,000,000 tons. Against the losses due to marine risks we may place the new construction of France, Italy, Australia, Canada, China, and all the neutrals—a very considerable tonnage, especially if wooden and concrete ships are included. Then Britain alone during the war has salved over 400 ships, a saving of probably well over 1,000,000 tons. Moreover, Britain's naval tonnage has, it is reported, increased from 2,500,000 to about 8,000,000 tons, much of ping, as it is hardly likely that the seized or cap- this increased tonnage being constructed of a kind that can be converted to commercial or fishing purposes.

It would appear, then, that the world, to attain its pre-war scale of tonnage, needs a matter of 3,500,000 tons of new construction.

New York Shipbuilding Company Launching

Photographs by New York Shipbuilding Company.

Launching of the steamship Gulf Queen, built by the New York Shipbuilding Company for the Gulf Refining Company of Pittsburgh. Her keel was laid June 27, 1918, and she took the water February 27, 1919. She is a bulk oil steamer of a capacity of 63,000 42-gallon barrels; her length over-all is 435 feet 6 inches; beam, 56 feet 3 inches, and her displacement is 13,770 tons. She was built to Lloyds' rules, 100 A1. She is built on the longitudinal system and is single screw. The sponsor was Mrs. William H. McGrann, wife of Commander McGrann.

S-S-SAFETY AT S-S-SEA

Included among the passengers on board a ship crossing the Atlantic recently was a man who stuttered. One day he went up to the captain of the ship to speak to him.

"S-s-s-s-s," stuttered the man.

"Oh, I can't be bothered," said the captain, angrily; "go to somebody else."

The man tried to speak to everybody on board the ship, but none could wait to hear what he had to say. At last he came to the captain again.

"Look here," said the captain, "I can tell you what to do when you want to say anything; you should sing it."

Then suddenly, in a tragic voice, the man commenced to sing:

"Should auld acquaintance be forgot and never
brought to mind?
The blooming cook's fell overboard and is
twenty miles behind."

PANAMA

By Special Correspondent

THE United States Coast Guard cutter Manhattan, the first ocean-going vessel completed in all respects, ready for sea, from start to finish, by the mechanical division of the Panama Canal, went under her own steam to New York. The vessel was constructed for the manifold use of ice-breaking and wrecking and can be used as a fire-boat. She is equipped with wireless apparatus and a motor launch, and is seaworthy for long trips at sea. Accommodations have been provided for two commissioned officers, four warrant officers and twenty-six petty officers and men.

General Description of Manhattan

The following is a general description of the Manhattan:

Length over all, 120 feet 3 inches.

Length on water line, 110 feet.

Beam, molded, 24 feet.

Depth at side, top of keel to lowest point of main deck sheer, 13 feet 6 inches.

Displacement at 10 feet 6 inches mean draft, saltwater, with 11,100 gallons of fuel oil, 3600 gallons fresh water, 6 tons of ship's stores, and 13 tons of salt water in peak tanks, about 379 tons.

Main engine, triple expansion, 13 by 21 by 34 by 26-inch stroke.

Indicated horsepower, estimated, 600.

Boiler, water tube, 200 pounds working pressure.

The Manhattan is the first and probably will be the last vessel constructed from keel up by the marine shops of the Panama Canal, as it is likely that all force and facilities will be required in the future to attend to the repairs of ships using the Canal.

Ten Feet of Water in Hold

There have been so few accidents to vessels passing through the Panama Canal since the beginning of operations that they are too negligible to mention. However, the first accident occurring in months was the most unusual in the history of the operation of the Canal to date. Recently the steamship Zuideaerjk was on her way through the Canal and, when in the vicinity of Paraiso, near the entrance to Gailliard Cut, she came into contact with a submerged rock, stoving a hole in her side and immediately began taking a considerable amount of water. The rush of water was so rapid that at one time it reached a height of ten feet in her hold; however, the quick action of the captain and crew and timely assistance of the Canal officials saved her from sustaining any serious damage. The vessel was returned to Balboa, where she was placed in the drydock and necessary repairs made.

Shaft Repaired Under Water

To replace a propeller shaft twelve feet under water is a feat which has never been done before in Canal Zone waters, and perhaps never has been attempted anywhere else; yet a diver employed by the Panama Canal successfully did it recently, and did it in record time.

The steamship Belfort, belonging to the French government and on her maiden voyage from Portland, Oregon, to Galveston, Texas, passed through the Canal and and, when 200 miles out from Cristobal, the second intermediate propeller shaft broke. She returned to Cristobal the next day with one engine working. It happened luckily that there was another French ship at Balboa of the same size and type that had a spare propeller shaft, which was rushed over to Cristobal. Then the question of placing it in the shortest possible time came up. This would be no difficult matter if the ship were in drydock, but to return her through the Canal, unload her cargo, place her in the drydock, make the repairs and then reload the cargo, meant a great loss of both time and money.

M. Rogers, an expert diver employed by the Canal, volunteered to attempt the job. In less than a week the job was completed satisfactorily and the ship was on her way. The chief difficulty of Mr. Rogers was to break the coupling and put it together and disconnect the coupling under water where it was not too easy for him to see. He had to use a twenty-pound sledge hammer and other heavy tools under water in order to accomplish his task.

The Belfort is a fine wooden ship of 1822 tons gross tonnage and she made the trip from Portland to Balboa in thirty days, which is record-breaking time for a vessel of her class. She was built by the Foundation Shipbuilding Company of Portland, Oregon.

Asia Coaled in Record Time

The British troopship Empress of Asia was the first ship to pass through the Canal carrying Canadian troops returning from the war. She had on board besides her crew about fifteen hundred sons of Canada who had been fighting the Huns for four years.

The Empress of Asia was coaled at the Cristobal plant, which is no doubt the most modern in the world, and it lived up to its reputation by a record-breaking coaling of the troopship. The last time this ship passed through the Canal it took forty-one hours to coal her and this time the same work was done in nineteen hours, saving the ship exactly twenty-two hours of valuable time. This trip the ship was coaled at the rate of more than 115 tons an hour, as compared with approximately fifty-eight and one-half tons an hour at the previous coaling. With the addition of equipment, which is expected soon, the Cristobal plant will be able to handle a ship like the Empress of Asia in even faster time. The employes operating the plant at Cristobal take a personal pride in their work and are making it the very last word in efficiency and the swiftest in the world.

Commander C. D. Gatewood, naval constructor, was relieved from duty as superintendent of the marine mechanical division of the Panama Canal, effective February 22, 1919, and ordered to report at the navy yard at Philadelphia. Commander Gatewood has made an excellent record during his service with the Panama Canal and has placed the mechanical division on a highly efficient operating basis. He is going to Philadelphia to superintend the construction of two large battleships. Commander Gatewood was succeeded as superintendent of the mechanical division by Commander Edwin G. Kintner, U. S. N.

Vessels of Eighteen Nations

The total number of ships passing through the Panama Canal for the six-month period ending December 31, 1918, was 1049, which is a considerably larger number than has been handled in any previous period of the same length. This number comprised ships of eighteen different nationalities. One point worthy of notice is the fact that the number of American ships was almost twice that of any other nationality. There was a time when the number of British ships using the Canal exceeded the number of American. However, during this period the number of American ships using the Canal was 398, as compared with 251 British ships, which nationality stands second on the list. The increase in the number of American ships is due largely to the shipbuilding activities on the Pacific Coast of the United States. Norway ranks third with a total of eighty-five ships, followed in order by France and Denmark with sixty-two each, Japan with fifty-three, Chile with forty-eight, Peru with thirty-one, and Sweden with twenty. The other nations represented were: China, Colombia, Costa Rica, Holland, Ecuador, Greece, Mexico, Spain and Uruguay. During this period 139 vessels were drydocked at the Canal, sixty-eight at Balboa and seventy-one at Cristobal, and repairs were made in the marine shops at Balboa and Cristobal to 762 ships.

Work of Marine Shops

The nature of the work of the marine shops of the Panama Canal during the war is well shown in the following excerpts from a special report of Governor Chester Harding, U. S. A., to the secretary of war:

"Work of greater or less extent has been performed from time to time on fifty-five vessels of the United States Navy and fifty vessels of the Shipping Board.

"About September 10, 1918, there arrived from Peru two large ex-German merchant vessels, and about November 10, 1918, three more similar vessels arrived. These vessels had been badly damaged in the engine and boiler departments and required a very extensive overhauling. The total estimated cost of the work on these vessels is $1,500,000. The work will involve the removal of all boilers and the repair or renewal of these boilers in all vessels, the new boilers to be purchased in the United States. Practically all the main engines and cylinders were severely damaged and the auxiliary machinery of these ships was damaged or destroyed. This work is proceeding very satisfactorily and, when completed, will result in the addition of over 40,000 tons' displacement tonnage to the fleet of the Shipping Board.

United States Coast Guard cutter Manhattan, first ocean-going vessel completed by the mechanical division, Panama Canal

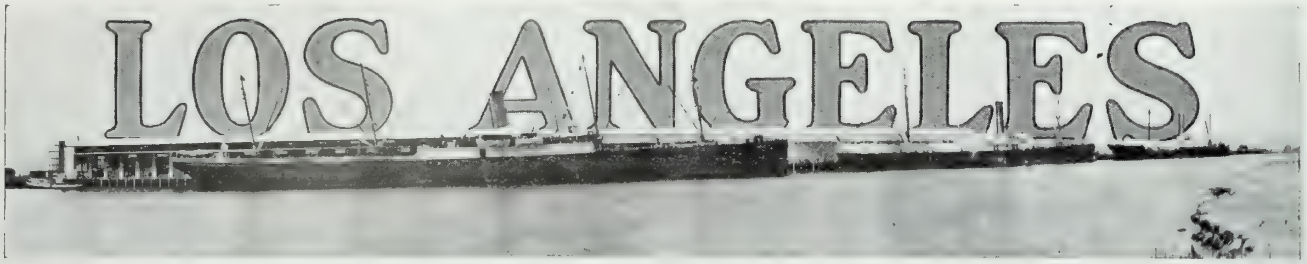
"The transport Von Steuben arrived at the shops on December 30, 1917, with a badly damaged bow, and also serious damage to the stern. This damage was completely repaired and extensive changes and alterations effected throughout this vessel. All the work was completed by the evening of January 19.

"There were manufactured and completed during the fiscal year ended June 30, 1918, a total of 578 anchors for the new destroyers building for the navy, these anchors weighing 1,800 pounds each. The Canal shops were able to quote the navy a price of seven cents per pound less on this contract than could be obtained in the States.

"There were manufactured for the navy department a total of about 84,000 pounds of steel castings for use in connection with the boat cranes of the new battleships.

"On account of the high prices of lumber from the States and the difficulty of arranging transportation, the native lumber field has been developed and approximately 4,000,000 feet of lumber has been obtained from the jungles, a considerable proportion of which has been used on the jobs mentioned herein."

Empress of Asia being lowered to level of the Pacific, Miraflores locks. She carried about 1500 Canadian soldiers home



LOS ANGELES

By Special Correspondent

IN the last few weeks Balfour, Guthrie & Company have had agents in Los Angeles seeking warehouse accommodations for the cargoes which their representatives have found in Southern California. Imperial Valley cotton and cotton from the Palo Verde Valley is nearly ready for shipment and representatives of the growers have been seeking bottoms for several weeks. Balfour, Guthrie & Company have become interested in the Ventura bean crop. Recently the firm enlarged its Los Angeles office by the transfer of many clerks from San Francisco.

Agents of Balfour, Guthrie & Company have been negotiating in several places for adequate facilities for handling cargoes, with the Outer Harbor Dock & Wharf Company, among others.

Others Seek Accomodations

Other shipping companies also are seeking accommodations. In the last month stockholders of the Outer Harbor Dock & Wharf Company were approached by representatives of several different shipping companies with offers to dispose of their holdings. One stockholder said that at a meeting held in the early part of the month the dock company had refused an offer of $4,000,000 for its holdings in the outer harbor.

Among the biggest shipping changes recently is the decision of the McCormick company to enter the general cargo carrying trade on a larger scale. The company has procured space in municipal transit shed No. 1 in the outer harbor and will occupy the space as soon as the remainder of the United States Naval Reserve training station is removed. Captain Chauncey Shackford, commanding officer of the training station, has been requested to vacate the shed which the station has occupied since June, 1917, and is removing the naval property. There was $1,800,000 worth of small stores on hand when the armistice was signed.

Loads Flour Cargo

The steamer West Amargosa loaded flour from Pier A in the inner harbor during the month. She loaded some 2000 tons which had accumulated there in 1918 and which the government now wishes to send East.

Probably the most interesting election held in the harbor district in years took place in the yards of the Southwestern Shipbuilding Company, March 12, when the employes of the yard elected one of the young women employed in the cost department as the sponsor for the West Cavanal, which was launched several days later.

More than 6000 male employes of the yards took part in the election, which was supervised by the officers of the company. Campaigning began as soon as the announcement of the method of selection was made and lasted until the last ballot was counted. Interest ran so high that several thousands of dollars changed hands on the result. There was a primary one week in which all except the four highest were eliminated from the race. These four then ran for the honor in the regular election. The four candidates were Miss Thelma Hathaway, Miss Thelma Alvord, Miss Cecilia Orenstein and Mrs. Anabel Shippen. Miss Hathaway won the election by more than 200 majority.

A strike of blacksmiths in the yards of the Southwestern Shipbuilding Company was settled quickly by the intervention of United States Shipping Board representatives, who acted as arbitrators. The strike was due to the alleged failure of one man to receive his back pay, said to be due under the Macy award, and his discharge when he requested his pay. Other blacksmiths then struck in sympathy.

Vessels Assigned to Company

The steamer West Cajoot is the first vessel built in Los Angeles assigned to the Los Angeles Pacific Navigation Company, the new steamship company recently organized by Los Angeles men with the object of procuring the use of Emergency Fleet Corporation vessels. The steamship company has opened offices in Los Angeles and is seeking freight. Sufficient space has been taken to insure a cargo for the first vessel.

The steamer Broncho sailed for New York after loading a full cargo. She is the first steamer to sail direct for the East via the Panama Canal since the outbreak of the war.

Other Launchings and Deliveries

Two vessels were launched from the yards of the Los Angeles Shipbuilding Company since February 15. The first was the West Lingo and the second the West Montop. Keels were laid for two more and two steamers were delivered.

There was one launching and one delivery from the yards of the Long Beach Shipbuilding Company in the same time. The launching was that of the West Kasson, the first 8800-ton vessel from the ways of this yard, other launchings having been of vessels of smaller tonnage. The Wallingford was delivered by the Long Beach company.

There were two launchings from the yards of the Southwestern Shipbuilding Company, the West Sequana and the West Cavanal. Two keels were laid and one steamer delivered in that time. The West Caruth was delivered to the Emergency Fleet Corporation. There were no launchings and no deliveries from the two wooden yards in the last month.

By Special Correspondent

AFTER seven weeks of idleness due to the strike of the metal trades employed in Seattle's shipyards, all of the big steel plants and about half of the wood shipyards which were operating prior to January 21, the date of the walkout, have resumed operations under conditions identically the same as prevailed when the men walked out.

When the strike was called, the men affiliated with the various unions involved were led to believe that the walkout would be general along the Pacific Coast, and they were more or less enthusiastic over the movement, which was calculated materially to increase the pay of all hands, and especially the lower-paid employes. Almost before the date set for the strike it became apparent that they were not receiving the co-operation of the workers at other Pacific Coast points, except Tacoma and Aberdeen, and this resulted in dissensions in the ranks of the unions. However, the strike was called and the workers responded to the order, which, so far as results attained are concerned, proved only a loss to themselves.

Money Loss Uncertain

Just how much actual money has been lost to the workingmen employed in the Seattle shipbuilding industry is purely a matter for speculation. Were the entire seven weeks a total loss, the amount would figure into millions, but labor leaders disclaim this as a total loss, since, in their opinion, the shipbuilding program must be completed and the strike merely was a postponement of the program while the men dickered to better their conditions.

Their view may be true insofar as the steel shipyards are concerned, but in the case of the wood plant an entirely different situation has evolved from the long period of inactivity. Of the eleven plants in this city engaged in wood-ship construction prior to the walkout, only five have resumed operations, and these with materially curtailed crews of workers. Of the other six, some probably will not reopen at all.

This is due to the policy of retrenchment instituted by the United States Shipping Board relative to both wood and steel ship production. In this curtailment of the building program the wood ships have suffered the greater number of cancellations. In fact, as matters now stand, only a portion of the wood ships now on the ways in local yards are to be pushed to completion, and these with the sanction of the Shipping Board will be completed within three months.

Wood Outlook Is Not Promising

Without the permission of the Shipping Board and the government whereby these shipyards may be enabled to undertake construction work for private interests or foreign accounts, the wood shipbuilding industry in the Northwest, if not throughout the entire country, seems doomed to a state of innocuous desuetude.

Just how much of this curtailment of the wood ship program is due to the general prejudice existing against these ships is a matter of speculation. It is undoubtedly true that wood ships of the Ferris and other types are not ideal for all commercial purposes, but recent reports of the utilization of several of the Pacific Coast-built fleet in Atlantic waters seems to lift the wood ship out of the sphere of uselessness and place in a respectable position among the general utility craft.

During the past month Northwest builders, as well as Shipping Board officials, have received excellent reports of wood ships from the East Coast. Among these were the heralding of the arrival of the world's record steamship—Aberdeen—at Boston in ten days' steaming from the Panama Canal.

Stood All Seagoing Tests

This vessel, which was built at Aberdeen by the Grays Harbor Motorship Corporation in twenty-three and one-half working days, has been the subject of considerable criticism and comment. Many skeptics doubted the record in the first place, and then when confronted with figures set out to discredit the vessel as a seaworthy craft. It is true that some alterations and changes were made in the vessel before she finally put to sea in the service of the Shipping Board, but it is also true that the craft stood all seagoing tests in a good manner in her original form, and before the alterations mentioned were made.

At present the Seattle harbor, as well as the adjacent lakes, float a fleet of these wood craft in various stages of completion. Some of these vessels are being fitted for sea service to load lumber and timber products for Atlantic ports. Others are being held for offers, it being the expressed intention of the Shipping Board to dispose of the wood ships at a certain figure.

In reference to the sale of these vessels, many persons have inquired why it is that they have not been utilized in the coastwise lumber-carrying trade, a line of industry that employs a large number of steam schooners. The answer is only one, and that is that these vessels as at present constituted are too expensive of operation for that business at the present lumber rate, which is expected to be reduced further some day.

May Carry Lumber Offshore

Inasmuch as one shipping man recently estimated that the average Ferris type ship on the twelve-day run between Puget Sound and San Pedro would earn at the least possible estimate only her bare operating expenses, the reason these ships are not so utilized can easily be discerned. The figures left no room for charter premiums or earnings at all. In the offshore lumber trade, where the rate is higher, the possibility of their being utilized is not entirely obliterated, and as such some of them soon may be impressed into service.

The troubles of the wood shipbuilders, however, are not confined to the curtailing of the Shipping Board program. One of the largest of the Seattle plants engaged in this branch of construction is now involved in financial difficulties which are said to be of a serious character.

Another plant, not building for the United States Shipping Board, may not reopen, so rumor has it, all of which adds to the unsettled local conditions, as far as these plants are concerned. The net result of all this is that there is only one possibility of the wood shipbuilding industry of the Northwest being preserved, and that is the removal of the embargo against building for foreign concerns.

However, in removing this embargo from the wood plants, the government would likewise probably feel it incumbent upon it to act similarly toward the steel plants, and such action would tend to interfere materially with the production of the vessels now programmed.

Captain Blain Retires

The past month brought the announcement of the retirement of Captain John F. Blain, for the past two years the representative in various capacities of the United States Shipping Board and the Emergency Fleet Corporation in this district. Captain Blain resigns the office, effective April 1, in order to engage in the shipping business for himself. During his incumbency in the office he has seen the district prove the marvel of the shipbuilding world in the number and production of ships. At approximately the time he engaged in the duties of district officer and later as district manager, Captain Blain has seen the number of shipyards in the Northwest increase from not more than five or six plants to a number well over forty, including the wood plants of the Columbia River which, during the midst of Blain's term, were made into an individual district, thereby relieving him of a considerable part of his responsibility.

Captain Blain leaves the Shipping Board with the good-will and well wishes of practically the entire shipbuilding industry of the Northwest. He will open a suite of offices in the Colman Building and there conduct a shipping and agency business.

Captain Blain is to be succeeded by Captain W. A. Magee, recently in charge of the wood-ship construction department for the Seattle Shipping Board district. Captain Magee is a native of Marshfield, Oregon, where, as a boy, he commenced learning the shipbuilding business, since Coos Bay has long been noted for the staunch vessels turned out there.

Two Lines Resume Service

During the month Seattle shipping activities were enhanced by the resumption of steamship service to and from this port by two concerns which had been absent for long periods due to the European war. Three vessels representing these two concerns arrived here during the month. They were the steamships Cyclops and Eurypylus of the Blue Funnel Line, and the steamship Professor of the Harrison Direct Line. All three ships had been engaged in transport service in European waters during the war, and their return was welcomed with acclaim in shipping circles, since both operating concerns are recognized highly in the maritime world.

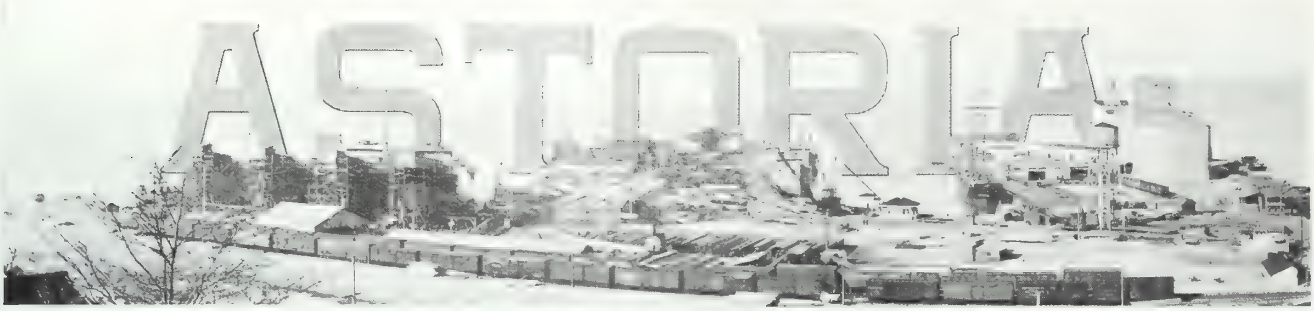
The Pacific Steamship Company announces the transfer of the steamship Senator from its Oriental service to the Nome route during the coming season in the North. The Senator, in command of Captain J. E. Guptill, soon will sail from the Orient for Seattle, and upon her arrival will be overhauled and outfitted for the opening of navigation in Bering Sea.

March was also marked by the passing of Captain Frank W. Clinger, for the last three years master of the speedy liner Alameda, of the Alaska Steamship Company's fleet. On his deathbed he requested that his body be cremated, and that his ashes be scattered over the waters of Puget Sound opposite Port Townsend, where he was born fifty-four years ago. The last request was complied with on March 17, when the steamship Alameda, in command of Captain Charles S. Davis, Clinger's successor, slowed down opposite Port Townsend, and the ashes were spread upon the waters.

H. H. FISHER

IN Pacific Marine Review for February appeared the portraits of a number of Portland's Purchasing Agents. Among these was a cut incorrectly captioned "H. H. Fisher." This was a mistake which we are now happy to correct.

Mr. Fisher was born in Davenport, Iowa, in 1883, and came to Portland in 1904. He has worked for the Peninsula Shipbuilding Company ever since, starting as a stationary engineer and working up through the various grades until in October, 1917, he was placed in charge of the purchasing department.



ASTORIA

By Special Correspondent

THE shipbuilding industry of the Lower Columbia River district is temporarily marking time. Early in March a general order was received from Emergency Fleet Corporation headquarters which suspended work on four wood hulls at the McEachern yard, three wood hulls at the Wilson yard, and two wood hulls at the Rodgers yard. At the time of the suspension of work it was expected, in accordance with latest official information, that three of the McEachern ships would be converted into barges, and that the fourth, which was quite far along, would be finished according to original Hough type specifications.

Launching Held Up

At the Wilson yard one of the ships, the Onteora, was all ready for launching March 15, but at the last minute a telegram was received from Portland headquarters ordering delay of the launching until further orders. Of the three Wilson ships, it is expected that two will be converted into lumber schooners and that the third will be converted into a lumber barge. There may be a change, however. Latest rumors among the shipyards have it that the announced government plans for the conversion of certain of the unfinished hulls into barges may be modified. It is rumored that all of the unfinished hulls will be completed as sailing vessels—lumber schooners. It is argued that there is no real demand for barges on the Pacific, since practical usage demands that barges be towed, not with tugs, but with steamers, and all steamers now on the Pacific Coast are in demand for other more useful purposes. Further, it is argued that there would be a great loss in insurance values, since a hull valued at $190,000 on the ways could be insured for only one-half this sum as a barge. If these hulls were finished as sailers, either schooners or barkentines, they would be in immediate demand on the Pacific Coast for the carrying of lumber, coastwise, to the Orient and Australia. And, on their return trips, they could bring back hardwood, copra, and other like commodities.

Astoria District Busy

Aside from the three wood shipyards, industrial activities in the Astoria district are quite vigorous. Figures compiled by the United States Government Employment Service show that, for the week ending March 15, 2321 men were employed in the Astoria industrial plants, as compared with 2537 men employed the week previous. A month before 2739 men were employed by these same plants; and the total decrease in employed men in the district since the beginning of the year was figured at 23.8 per cent.

The Astoria Marine Iron Works, as the outfitting plant for all the government wood ships of the district, still is employing approximately its normal force, about 500 men. Up to March 15 this plant had equipped for successful trial trips a total of thirteen wood ships of the Hough and the Ferris types, with fourteen additional ships yet to complete, if the original contracts were fulfilled. Work has been suspended on one vessel tied up at the Marine Iron Works, a hull recently towed up-coast from the Feney & Brenner yard at Tillamook Bay. Machinery is now on hand at the plant yards, on Pier No. 2 of the Port Docks, in almost complete units for fifteen additional hulls. It is probable, of course, that a part of this machinery will not be used as originally planned, unless uncompleted hulls should be transferred from other districts to this outfitting plant, as has been stated is possible.

Building Marine Railway

The new unit of the Astoria Marine Iron Works, the marine railway fostered by the United States Shipping Board and located at the new site on Young's Bay, is under active construction. A large force of men will be employed in rushing this much-needed improvement to completion, just as soon as materials can be procured. Final foundation tests for this modern drydock, capable of handling vessels up to 6000 tons deadweight, have been made by competent engineers and officially approved. It is planned that this marine railway shall be fully completed by August 1 of this year. In conjunction, the company plans the gradual development, at the same site, of every modern facility necessary for the overhauling and the repair, and the possible construction, of engines, boilers, wood and steel ships.

Across Young's Bay from Astoria is what is known as the "west side," the district including Warrenton and Fort Stevens, and Clatsop Plains toward Tillamook Head. This section is one of the active progressive units of the Lower Columbia River district. Here are located the great Hill and Harriman railway terminal sites. The Hill terminals have a large dock and hotel, at Flavel, which improvements have been little used during the war period, since the commandeering of the palatial Hill liners for the transportation of troops to the war zone. The Harriman terminals are not yet developed. Active developments are under way, however, within the city limits of Warrenton. The Port of Astoria dredge Natoma and three piledrivers are engaged in the dredging of the Skipanon River, and in the construction of a waterfront bulkhead. The channel will be 100 feet wide, with a depth of twenty feet, and with a large turning basin measuring 600 by 1000 feet. This involves a two-year program and the expenditure of an estimated $500,000 at least, this sum being available through the sale of municipal bonds already voted.

To Start Work on Elevator

Within the city limits also will be located the new two-million-bushel elevator of the American Society of Equity, Montana grain growers. It is planned that the Montana enterprise will be under way very soon. As a slight evidence of the seriousness of these inland wheat growers, it is announced that some 2000 members of the society will stage their annual summer picnic at the site of their new elevator at the mouth of the Columbia.

Astoria prepared herself for the visit of the House Naval Affairs Committee, coming to inspect the mouth of the Columbia as a possible future naval base. The local enthusiasts argue that the mouth of the river affords the greatest fresh-water harbor in the United States, a deeper low-water entrance than any other bar harbor of the world, a location at the foot of a water-level grade from the far interior, and the nearest Northwest port by many miles to all points in the Orient, Western Alaska, and the Panama Canal.

A. S. Mihara, former manager of the Nippon Yusen Kaisha of Japan, was a recent visitor in Astoria, accompanied by the executive secretary of the Portland Chamber of Commerce and representatives of the United States Railway Administration. "You have a fine port here," this authority on Oriental steamship lines is quoted. "This is my first visit to Astoria and I am favorably impressed. The facilities for handling traffic here are very good. I am here as a sightseer today, looking over the ground, but it is possible that my investigations may result in the establishment of new steamship lines to the Columbia."

HURLEY COMMENDS CONVENTION

THE following telegram from Edward N. Hurley, chairman United States Shipping Board, to the foreign trade department of the San Francisco Chamber of Commerce, indicates the importance of subjects to be discussed at Chicago, April 24, 25 and 26:

"The National Foreign Trade Convention to be held in Chicago, April 24 to 26, and the annual meeting of the Chamber of Commerce of the United States to be held in St. Louis, April 29 to May 1, are the two most important meetings of business men that have been held in this country for thirty years. Both conventions are going to discuss the question of the future of our merchant marine and foreign trade, the two most important problems before not only the American people but the peoples of the countries throughout the world whom we hope to be helpful in serving. It is my sincere hope that the business men of the Pacific Coast who are so vitally interested in these problems will lay aside their personal business affairs and make a contribution of their knowledge and views at these conventions, so that our country may profit by their counsel and advice."

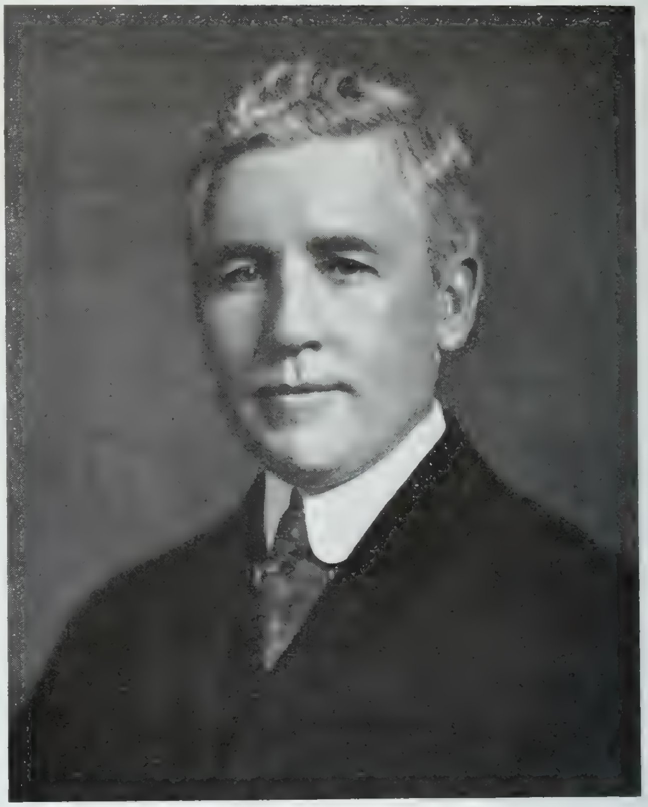
12,500-TONNER TO DOMINATE

CHAIRMAN E. N. HURLEY of the Shipping Board has said that the dominant type of Emergency Fleet vessel will be the 12,500-ton cargo carrier. He inspected preliminary plans for this larger type of ship and announced that the merchant marine fleet, now in large part cargo vessels, would be balanced with combination cargo and passenger ships.

Twenty of this latter type will be built with accommodations for forty passengers in addition to cargo. These are to be put in the South American and Australian trade and sent to other points where connections seem practicable.

To meet the requirements of the new type, the Class B 8000-ton Hog Island boats will be changed. They were originally designed to carry 100 passengers.

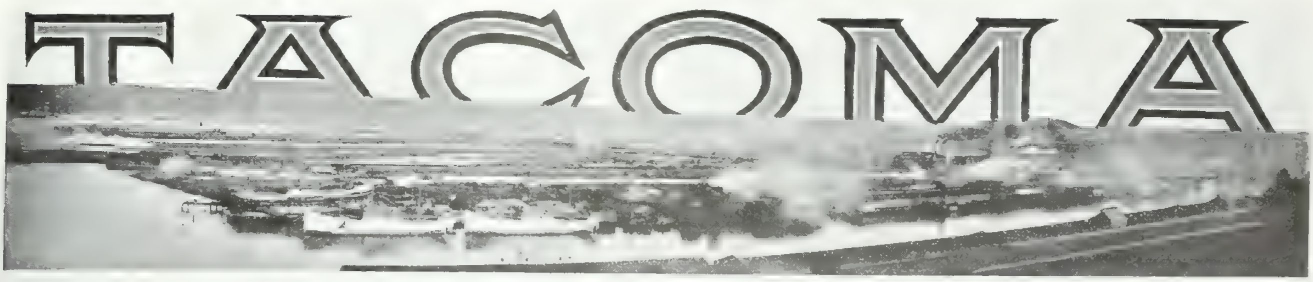
GEORGE W. BURRELL


George W. Burrell

GEORGE W. BURRELL, who recently was elected second vice-president, has been in the continuous employ of the Wellman-Seaver-Morgan Company for twenty-one years. He will have entire charge of the company's works both at Cleveland and Akron.

He was born in 1871 and attended the Cleveland public schools. Leaving school at the age of fourteen, he learned the machinist's trade and worked in machine shops for five years, during which he studied nights in preparation for college, entering the Ohio State University in 1891, where he took the three years' course in mechanical engineering.

He entered the employ of the Wellman-Seaver-Morgan Company in 1898 and has held the following positions: Draftsman, three years; inspector, six months; chief inspector, six months; assistant purchasing agent, six months; assistant secretary, six months; assistant works manager, fourteen years; manager of works, since May, 1917; elected by board of directors second vice-president, February 18, 1919.



TACOMA

By Special Correspondent

WITHIN a few hours of being out on strike for six weeks, the shipyard workers of the Puget Sound district have voted to go back to work. By this action, it is declared by conservative labor leaders at Tacoma, one of the most uncalled for walkouts in the history of the Northwest came to an end. During this time, it is estimated, the Tacoma workers lost nearly $1,500,000 in wages; have placed their union organizations in a serious plight and have gone back under the precise working conditions which they left in January. The strike at Tacoma caused the loss of twelve vessels contracted for by the government through the Todd Drydock & Construction Corporation yards and probably forced other industries away.

According to the conservative workers, if any more strike talk arises in the yards, especially the Todd yards, there will be trouble for those who attempt to foment it. There will not be another walkout in the yards for many months if there is any possible way to prevent it. Much of the trouble is laid to the poor leadership of the unions. Conservatives are outspoken in their statements that the whole strike was handled by radicals who were attempting, through the shipyard strike, to hamper the entire government. All regulations heretofore held to by the unions affiliated with the American Federation of Labor were cast aside. At first the strike was declared for the purpose of bettering the condition of the shipyard laborers, who it was declared were underpaid. In an attempt later to fix a cause, President Harley Johnson of the Tacoma Boilermakers, before one of the local clubs, declared that the strike was directed against the international officers of the trades.

Business Will Improve

It is believed that within a few days, as the result of the ending of the strike, marine business in all lines will show a decided picking-up. A number of vessels, near completion, which were due to load at Tacoma, will be finished and shifted within a few weeks.

That there is very little chance for the Foundation Shipyard at Tacoma to resume operations is the declaration of Vice-President and General Manager Bayly Hipkins. The Foundation's representatives have made every effort to secure permission to build at this yard for the French government, but so far all has been for naught. Just why the United States government will not grant permission to the Foundation Company to construct ships is unknown. This applies also to the Portland yard.

On account of the drop in the prices of copper, it is believed that the production of the Tacoma Smelter will be curtailed considerably until conditions readjust themselves. Ore receipts at the smelter have been light the last few weeks, both from Alaska and the West Coast.

Oriental Cargo Clearing

Oriental cargo which has congested the Milwaukee docks for many months is being gradually cleared up and the railway representatives are beginning to solicit freight. Two months ago there were 1400 carloads in the docks and yard.

Contracts for two of the Ferris-type wooden ships under construction by the Tacoma Shipbuilding Company have been cancelled. Construction on these vessels had not reached the point prescribed by the Shipping Board which made them available under the board rule.

Although many of the Tacoma mills have been closed down since the holidays, there has been a little movement in the off-shore and coastwise lumber trade. Some of the lumbermen declare that conditions look excellent for a very good business as soon as rates reach a point where the trade can be handled at a profit. Inquiries for lumber are reported both from Australia and the Orient, but the rates have been prohibitive.

Passenger Business Falls Off

A libel was filed against the steamer Nisqually here by the General Petroleum Company for money due on a fuel account. It is alleged in the complaint the steamer owed the company $1600.37 and that of this amount only $70.24 had been received. The libel of the Nisqually illustrates what many of the owners of passenger boats on the Sound have to contend with in the way of operating expense and no business. On a number of runs where in years gone by there was thriving trade, boats have been forced to haul off. The automobile in a large measure is responsible for this. During the summer months, when excursions were one of the profitable ventures, there is no demand now for steamer trips. It is estimated that a half-dozen of the largest steamers of the Sound are laid up with nothing in sight.

RECORD EXPECTED ON DOCHET

THE steel steamship Dochet, 7800 tons deadweight, the fifth steamship built by the Downey Shipbuilding Corporation for the Emergency Fleet Corporation, was launched successfully at the Downey shipyard, Staten Island, New York, Sunday, March 9. The percentage of completion of the Dochet when launched was unusually high: Ship riveting, 99 per cent; steel hull construction work, 95.39 per cent; machinery and piping system, 78.62 per cent; outfitting, 15 per cent. Owing to this unusually high percentage of completion before launching, the outfitting and delivery of the Dochet is expected to be done in record time.

PORTLAND

By Special Correspondent

IN the opinion of Guy M. Standifer, president of the G. M. Standifer Construction Corporation, the steel ship plant at Vancouver, Washington, will be kept going in the future. He believes that, as soon as the peace treaty is signed, the administration will lift all restrictions on the construction of steel tonnage for foreigners.

Mr. Standifer returned in March from an extended tour abroad and through the East, having been away since the early part of November. He believes that, in competition for construction of new tonnage, American yards will have to adopt the piecework system as one of the principal means of lowering costs, so that tonnage prices can be brought nearer a level with those of Great Britain.

As to comparing workmanship of American and foreign yards, Mr. Standifer said that he believed that the American shipbuilders have nothing to feel ashamed of, especially with regard to hull construction. He said that the use of power tools in this country, such as for riveting, makes a smoother job possible, the riveters abroad still clinging to hand tools. In fitting-out details he said that he found British plants were generally better equipped than those in America, yet as to standard steel ships he learned that much the same features, with which Americans were dissatisfied in their types, were criticised in England and Scotland.

Finer Lines for Hulls

The Standifer plant has launched its second 9500-ton hull, the first being a completed vessel now. It is expected that, after the tenth vessel is off the ways, she will be followed by larger types, negotiations being under way now to alter plans as favored by the Shipping Board, the officials having in mind principally giving the hulls finer lines and changing other features in the interest of more economical operation.

Three of the 100-foot concrete vessels which the Great Northern Concrete Shipbuilding Company is turning out for the Quartermaster Department of the Army are in the water at the Vancouver, Washington, plant. Although they are the first concrete vessels floated in the Willamette and Columbia River district, those cognizant with what has been accomplished elsewhere assert that in point of workmanship and finish the three will compare with any in the United States.

There is a force engaged in assembling the forms for two more of the fleet, the contract having been for five vessels, and early in June they are to be off the ways. All the hulls afloat were launched in about ten days, the last, March 6, and the work of installing twin gasoline engines is being carried on. The vessels are of 25 feet beam and 12 feet depth of hold, and the actual weight of the hulls, with the engines placed, is estimated at about 300 tons.

The "skin" of the ships is 3½ inches thick. Reinforcing steel used is half an inch in diameter and placed so that there is a mesh of about 3 by 6 inches. All of the steel for the two remaining vessels has been cut and shaped in advance and the forms and steel for the stanchions are ready as well. The first ship was poured in about thirty-six hours, work being carried on continuously, and on the second and third vessels the time was reduced by several hours.

Not Waterproofed Prior to Launching

An interesting feature of the work is that the vessels were not waterproofed prior to being launched, the government officials wishing thoroughly to test the material being used. No leaks have developed. It is understood to be the intention of the War Department to have the hulls treated with waterproofing before being placed in commission. Under the terms of the specifications the hulls must remain on the ways thirty days after the decks are poured, and that is said to be one reason work on the bulwarks is much smoother than on the main part of the hulls, for there are no restrictions as to the time the form must remain around the former and a decidedly smooth finish is possible by doing the work when the concrete is green.

The Port of Portland Commission has interested itself in concrete construction, as there is to be a new hull built for the thirty-inch dredge Columbia, both concrete and steel being under consideration. It has been proposed also that a concrete pontoon be built for the public drydock, which has five sections, but a sixth is desired so as to increase the capacity of the plant.

Joseph R. Bowles, president of the Northwest Steel Company, represented Oregon builders at a conference held in Washington, beginning March 17, attended by labor officials and employing shipbuilders, when steps were taken to devise machinery for handling wage details and working conditions, after the Macy board ended its jurisdiction, March 31.

Trying to Straighten Out Scale

E. W. Wright, vice-president and general manager of the McEachern Ship Company; George F. Rodgers, of the George F. Rodgers Shipbuilding Company, and James B. Kerr, secretary of the Peninsula Shipbuilding Company, returned during the early part of the month from Washington and Philadelphia, where they went on a mission having to do with early contract settlements. Since their return the manager of the Oregon district has begun conferences with yards individually in an effort to straighten out extras and bonus features, as well as those dealing with contracts included in the cancellation of wood ship contracts under date of November 25, 1918. It is believed that early settlements will be made with all plants.

Upon the Grant Smith-Porter Ship Company concluding its work on government wood ships it is proposed to use the property as an assembling point, gathering there all surplus material and equipment from various plants and housing the property until some disposition is made of it. The Emergency Fleet Corporation had indicated certain hulls early in March that were to be converted into barges, while work on nine hulls on the ways was stopped, but later in the month a plan for converting more ships into sailing vessels was reopened and it is intended to submit detailed plans for barkentines and schooners.

28,000,000 Feet of Ties

Assignment of five wood steamers to the Charles R. McCormick Company for transporting ties to the Atlantic Coast was followed the middle of the month by official information that fifteen additional steamers would be provided for moving the same kind of material, contracts having been closed by the United States Railroad Administration with the McCormick organization for a total of 28,000,000 feet of ties. It is estimated that the Ferris and Hough vessels will load about 1,500,000 feet of ties, more being stowed on those of the Peninsula and Ballin types. So far mills in Washington, on Grays Harbor and Puget Sound, have evinced more desire to cut ties than those in the Willamette and Columbia River districts, so that of the twenty vessels to be named perhaps not more than one-third of them will load on the river.

The Columbia River Shipbuilding Corporation has set a new mark in fitting out an 8800-ton steamer, fourteen days being the time in which the West Harcuvar was made ready for service after the launching, with a crew of fifty machinists and fifty helpers. The machinery installation consisted of setting and connecting up the 2500-horsepower engines, six lengths of line shaft, sixteen feet of tailshaft, three Scotch boilers and all auxiliaries.

Japanese Shipping Man in States

A. S. Mihara, at one time general manager of the Nippon Yusen Kaisha, and now on a special mission touring the Coast to gather general shipping information for other Japanese owners, was in Portland for a few days the middle of March, also visiting Astoria. He is gathering information as to terminal facilities, coaling, cargo prospects and the like, and it is believed that his report will determine whether more Japanese fleets will establish connections with the Northwest.

To the 4000-ton wood steamer Cresap, designed and built by the Peninsula Shipbuilding Company, has been awarded first place for speed among wood steamers as a result of her runs in the river and twenty-four-hour trial at sea the second week in March. She was seven hours and thirty minutes from Portland to Astoria, the best previous time having been made by the Benvola, of the McEachern fleet, which was seven hours and fifty minutes, and the return was made in eight hours and twenty-three minutes, against a current of about one and one-half knots. The Cotteral, also a McEachern vessel, had held the upstream record before, her time being ten hours and forty-three minutes. The distance is ninety-eight miles.

In connection with the liquidation of the interest of the French government in the Portland and Tacoma wood shipyards operated by the Foundation Company, it is announced that consideration is being accorded a proposal to load the machinery and equipment on vessels now building at Victoria, B. C., for the French, also by the Foundation Company, and send the property to France. France is said to be sadly in need of machinery since that in operation has been worked continuously during the war and there is a general shortage.

Captain William C. McNaught, surveyor of the San Francisco Board of Marine Underwriters, made a survey of six wood steamers the middle of the month with a view to passing on their adaptability for carrying flour to the East Coast, and he recommended minor work, such as whitewashing the holds, and advised that the vessels be made flour carriers. The Shipping Board is anxious to utilize them for such a purpose in order that more of the steel steamers may be assigned to permanent trade routes.

Practical wood shipbuilders won a point during the month in that the construction division of the Emergency Fleet Corporation ordered that steel rudderstocks be used and wood blades affixed thereto, in place of the all-steel rudder first proposed. Some of the vessels built in Portland have been so equipped and the use of the steel rudderstock is said to be most satisfactory.

Forty Wood Steamers Delivered

Up to March 15 forty wood steamers had been completed and delivered to the government in the Oregon district, and a number of others had been finished as far as the builders were concerned, but were awaiting changes in rudders and such work, so could not be officially delivered by the Emergency Fleet Corporation to the division of operations.

The Willamette Iron & Steel Works has raised another high mark for other boilershops in the United States to aim at in completing forty-five Scotch marine boilers in January and February—twenty-two the first month and twenty-three the second. Up to the opening of the present year the maximum capacity was twenty boilers and in March the start was much higher, being close to one boiler a day.

Assigned to Trans-Pacific Run

Not since early periods following the entrance of the United States into the war was there such interest in the launching of a new vessel as that in the West Munham, the first of four carriers to be assigned by the Shipping Board to a trans-Pacific service between Portland and the Orient. She was built by the Columbia River Shipbuilding Corporation. The West Munham also was the first vessel of the government ships built at Portland to discard the war coat of gray.

The West Munham flies the flag of the Admiral Line in the trans-Pacific trade and is to make all ports from Yokohama to Manila. The plan is for a monthly service. The schedule called for the vessel to be ready for trial April 1 and her acceptance by the government April 3, so that April 6 she would be ready to load. A month before the launching the cargo of the ship was contracted for and more was made available for the second vessel, which is to sail in May.

With the Mariners of Europe

By Special Correspondent

London.

A MATTER that has excited the greatest interest in British shipping circles during the past month has been the big standard ship deal arranged between the government and Lord Inchcape and Sir Owen Phillips, M. P., two of our shipping leaders. As the scheme stood originally, 137 standard steamers, worth about $100,000,000, were involved, and these were taken over in the Inchcape-Phillips deal. In return they offered the vessels to shipowners generally on precisely the same terms as they had been acquired from the government. It was announced that in the event of these secondary buyers not coming forward, Lord Inchcape and Sir Owen Phillips would have plenty of opportunity to employ the vessels in the various fleets under their own control, so that upon the whole their action looked very patriotic and disinterested. As long as ships were under requisition by the government on terms which offered no inducement to owners to buy tonnage, and costs of working the vessels were continually rising, and there was talk of their industry being nationalized, owners stood aloof; but the events of the past month have shown their attitude to be now changed.

The 137 standard steamers concerned in the deal were under construction at the time of the operation and no vessel is, I understand, less than 370 feet long, the gross tonnage running to from 7000 to 11,000 tons. The Inchcape-Phillips combination acquired the ships at a price which was higher than the actual costs, calculated on the basis of cost of materials, plus wages, plus a fixed sum for established charges and profit; and any shipowners who wished to buy had the option of acquiring them at this same price.

Fifty-nine Vessels Sold

There was a further safeguard for the interests of the shipbuilders. Firms with standard ships under construction were given the option until February 5 of canceling their contracts with the Ministry of Shipping. They were allowed, that is, to take over the ships as they stood on repayment of the money actually paid to them on account of the Ministry of Shipping. Having done this, they were then at liberty to sell the completed ships to the highest bidders. As a result, fifty-nine vessels have been disposed of direct, so that only seventy-eight are taken over by Lord Inchcape and Sir Owen Phillips to sell or use themselves.

It will also be understood that the commitments of the British government in standard ship construction are entirely closed by this deal. So far as I can ascertain, the Inchcape-Phillips action in assuming the government's commitments has received the hearty approval of shipowners, particularly as the scheme provided for the distribution of the available vessels to applicants in proportion to their losses by enemy action or by other causes during the war. It also provided, it should be noted, that the transfer of the vessels to individual owners should be free from intermediary profit, and that the contracts should pass to the purchasers on precisely the same terms as would have applied if the government itself had taken delivery of the ships. The ultimate purchasers were, and are, left free to make, by arrangement with the builders, any alterations in the ships they might desire.

The method adopted has provided a quick means of disposing of the contracts and has avoided the delays which might have been expected to occur if the government had retained the contracts until each ship was ready for delivery and had then tried to dispose of each contract through unaccustomed channels.

Standard Ship Work Suspended

One of the first important actions of the controller-general of merchant shipbuilding after the conclusion of the armistice, a shipping writer in the London Times reminds us, was to telegraph to builders throughout the country instructions to suspend work in connection with standard ships the keels of which had not been laid, although the contracts had been accepted. There were, however, a large number of standard ships on the stocks, while a smaller number were then being fitted with engines. The arrangement entered into by the government with Lord Inchcape and Sir Owen Phillips was in respect of these ships actually under construction, as mentioned above.

The insurance of vessels at current values during the war protected owners, to a great extent, against the risk of loss of capital through enemy action; but the substitution of cash, which was often invested in war loan, for a lost vessel and her earning capacity, left the owner dormant, so far as the management of one unit of the fleet was concerned. The owner could not replace by another the ship which was sunk by an enemy submarine, totally wrecked in consequence of the greatly increased difficulties of navigation under war conditions, or was lost through any other cause. While this payment could not be employed at the time in the acquisition of new tonnage, owing to the limitation of shipyards to government work, the cost of construction was mounting. For instance, the insurance value eighteen months ago of an 8000-ton ship of standard type would, as a rule, scarcely be sufficient for the building of such a ship today. The present opportunity, therefore, of investing insurance money in tonnage already in course of construction is, it is understood, being seized by many owners. In fact, it is believed that twice the amount of tonnage now offered could have been disposed of to British owners had such an amount been available.

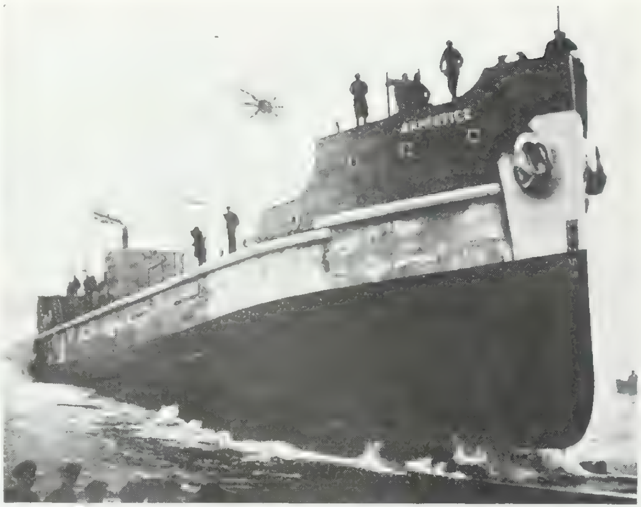
A condition of the present transaction is that the ships shall remain in British ownership and under the British flag for four years from the date of their completion, unless their sale to foreign owners is authorized by the British Board of Trade.

Shipping Prospects

There is no doubt that British shipbuilders are keenly concerned about the big shipbuilding movement in America, all the facts of which have been well placed before them and very big programs sketched out. We have had some pessimists here, as, for example, T. H. Harper, chairman of the Liverpool Underwriters' Association, who declared that he feared it would be quite impossible to enter into a shipbuilding competition with America and Japan and suggested that the government should enter into a friendly working arrangement with America. Other men concerned with the business take a more hopeful outlook and do not regard the British shipbuilding industry as by any means outclassed. Figures show that on September 30 last there were under construction in this country nearly one and three-quarter million gross tons of merchant ships and, with the exception of one or two large ships in hand at Belfast, Ireland, none of the large liner class had been laid down, the vast bulk of the tonnage in hand being within the limits of the old standard ship program.

Wooden Ship an Anachronism

There is a tendency here also to regard the wooden ship, upon which it is said a large amount of United States effort is concentrated, as an anachronism. The concrete ship, if not in the same class, is also regarded as at the best a war-time expedient in certain quarters. The aim of these views is, of course, to concentrate attention upon the output of steel ships, where the figures are more encouraging for Great Britain. It is, of course, recognized that rapidity of delivery is the big question of the moment, and American industry must find a big opportunity here of making a bid for foreign trade. As typical of a wide British view of this matter, the following might be quoted from another writer in the London Times, who says that the organization of output on lines resembling those adopted for motor car construction should enable a large output of fabricated ships to be made in a comparatively short space of time. This tonnage will be a welcome addition to depleted fleets, and may admirably serve immediate requirements, but it will not give America the large mercantile marine of the right class, which she must possess if the shipbuilding industry is to be established on a permanent basis. The wholesale adoption of standardized designs may bring about a reduction of manufacturing cost, but even this expedient may not bring the figures down to the level which must be reached if foreign trade is to be held by the United States under ordinary competitive conditions. The situation is as difficult for the young industry in America as it is for British shipbuilders. It should not be forgotten that in output of the class required by shipowners (and not emergency tonnage), British yards, assuming a fairly long release from warship building, ought to be capable of producing about 3,000,000 tons a year. There is also the fact that the expansion of this country's productive capacity both in old and new establishments has had the effect of modernizing plant and equipment to a degree which could not have been justified on purely commercial grounds. Definite conclusions have been reached, too, as to the point at which standardization ceases to be an advantage. Steel shipbuilding in the United Kingdom (the concrete ship is still on trial) has been put on a basis which makes not merely for efficiency, but for comparatively low costs of construction. For a considerable time yet to come the main energies will be devoted to the rebuilding of the British merchant fleet, although it is proposed at the same time to maintain a hold on foreign trade; but, when the industry is again subject to ordinary commercial considerations, Great Britain ought to be able to compete successfully with any other shipbuilding nation.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The Armistice, first ocean-going concrete cargo steamer built in England. She was launched at Barrow-in-Furness. Her dimensions are: Length, 205 feet; beam, 32 feet; depth, 19 feet 6 inches. Her displacement is 2415 tons.

The Fall in Freights

Sir Alfred Booth, chairman of the Cunard Line, has constituted himself the leader of that shipping opinion in this country which believes in a rapid further fall in freights, although whether this is to mean an actual slump in the end does not appear. There is no doubt that, in the interests of the nation generally, a reduction of freights is necessary before the period of peace reconstruction can start. At present industry generally in this country is adopting a waiting policy. The number of unemployed workers and the amount of unemployed capital are increasing every week, and, although these things at the present time do not constitute a menace, they might very well do so if no way out can be seen in the near future. At the same time, it does not appear that the fall in freights will proceed too rapidly, although it may be substantial. For example, it will be several months before the return movement of troops is completed, and shipping for commercial purposes cannot be plentiful until that has been done. When the war demand finally ceases and ships now in course of construction are completed, it will be possible to develop oversea trades which have now to be neglected and at the same time give a fillip to our manufacturing industry. Of late, shipping has had to be, to a large extent, concentrated on short distance traffic, with preference given to the most essential things. This position should change soon.

Relaxing Shipping Control

By a special notice issued on February 10, considerable relaxation of government shipping control is indicated. For one thing, ship licenses are no longer required for steamers of less than 500 tons gross, or any steamers working the coasting trade, or any sailing ships. The shipping license system which is now abolished partially was established in 1916 and originally was confined to vessels in the oversea trade.

SAN FRANCISCO

PACIFIC COAST export rail rates have been reduced by the Railroad Administration, following upon representations of the San Francisco Chamber of Commerce, and most of the other commercial bodies of the Coast, that the export trade of the Pacific States was threatened by their inability to compete with New York and other Atlantic seaboard cities under existing rates. The rates will be put into effect as soon as the tariffs can be prepared and filed.

It would be difficult to express the reductions in percentage, but, roughly speaking, the new rates are 25 to 35 per cent less than the former rates, but about 50 per cent more than the so-called "pre-war" rates, although in some cases the new rates are less than the "pre-war" rates.

The rail reductions will permit competition with the Atlantic seaboard. It is expected now that oversea rates also will be cut by the Shipping Board to the degree necessary to permit competition with Europe.

To Missouri River and East

The reductions apply to Missouri River territory and eastward. The situation west of the Missouri River will take care of itself, it is said. An encouraging feature is seen in the pig iron rate, which is fixed at 55 cents a hundred pounds, as indicating the desire of the Railroad Administration to make such reductions as are necessary.

The following telegram from the Railroad Administration was received by the foreign trade department of the San Francisco Chamber of Commerce:

"Director-general today (March 24) approved Pacific Coast export rates prepared by division of traffic. Most of these rates are figured on basis of equalizing through Pacific Coast ports the through charges obtaining through Atlantic Coast. On a few commodities carrying a very low value rates have been made arbitrarily to meet foreign competition. Division of traffic now working on import rates, which will shortly be announced."

In addition the foreign trade department received the following telegram from its Washington representative:

"Walker Hines, director-general, today announced the purpose of the Railroad Administration to put into effect as soon as the tariffs can be prepared and filed new rates on export traffic to China, Japan, Australia and Philippine Islands applying from territory Missouri River and east through Pacific Coast ports."

Old and New Rates Compared

The traffic bureau of the San Francisco Chamber of Commerce has prepared a tabulation of the old and new rates, which are shown in the following order:

First column, rates as in effect on June 24, 1918; second column, rates now in effect; third column, rates proposed by the Railroad Administration. As a matter of convenience columns 1 and 2 show only the rates applying from territory Buffalo, Pittsburgh and east.

All rates are in cents a hundred pounds.

	1	2	3
Articles described in Item 5, Trans-Continental Tariff 29-B	150	200	175
Agricultural implements	65	125	100
Iron articles—general mixture	40	85	60
Car wheels and axles attached	40	85	60
Boiler iron	45	85	60
Cast iron pipe	45	85	60
Wrought iron pipe	45	85	60
Roofing iron	45	85	60
Machinery, including grading and road machinery	55	125	100
Sewing machines	65	125	110
Lubricating oil	55	125	90
Oil well supplies	55	125	100
Railway equipment (axles, beams, couplers, etc., comb.)	50	125	75
Railway equipment, passenger and freight cars	50	125	75
Railway equipment, locomotives, etc.	80	125	75
Tobacco, manufactured	85	156½	135
Tobacco, unmanufactured	...	156½	140
Automobiles and parts, passenger	225	412½	375
Automobiles, freight	225	350	300
Canned goods	75	137½	100
Chocolate	200	200	150
Cotton piece goods	53	156½	120
Glass, window, etc.	70	156½	110
Glass plate (no limit as to measurement not exceeding 120 united inches)	100	244	140
Iron, pig	40	75	55
Iron castings	110	137½	70
Lime, acetate of	50	144	65
Milk, condensed	75	137½	100
Paint, etc.	65	137½	70
Paper, etc.	65	137½	90
Pig lead	50	94	75
Plumbers' goods	100	212½	150
Roofing, etc.	65	144	90
Wire rope	55	137½	70
Soap	60	144	100
Soda ash, caustic soda, etc.	45	137½	60
Spelter	50	137½	75
Starch	50	150	90
Steam or hot-water heating apparatus	75	244	125
Wheelbarrows	75	169	110
Wood pulp and wood pulp board	55	125	75
Zinc plates and sheets	70	170	80
Vehicles	85	214	140
Wax, paraffin	45	79½	90

Hurley Promises Ships

In addition the foreign trade department sent the following message to Chairman Hurley on the twenty-first:

"Foreign commerce on the Pacific Coast is practically suspended owing to lack of bottoms and adverse trans-continental rail rates, in consequence of which foreign bottoms are attracting tonnage to Atlantic seaports. We are advised the Railroad Administration on Monday or Tuesday will publish readjustment of import and export rates which will reattract commerce to this Coast, but ships are as necessary as rates; therefore would highly appreciate any statement from you to publish concurrently with notice of change in rates as to the policy of your board to supply the necessary bottoms. Are extremely grateful for your telegram regarding Foreign Trade Convention."

The following reply has been received:

"Washington, March 24, 1919.

"Foreign Trade Department,
"San Francisco Chamber of Commerce.

"My absence from city has delayed reply to your telegram of 21st. I congratulate you upon the re-establishment by Railroad Administration of trans-continental export rates through Pacific Coast ports, which will undoubtedly result in great benefit to our national foreign trade. Shipping Board fully realize that it is not only necessary to have ships available for cargo offering at Pacific Coast ports, but also to have regular and dependable schedules of ships in the various trades with definite dates of sailing announced well in advance. It is our purpose to provide adequate Shipping Board tonnage to handle Pacific Coast commerce and to establish such regular lines of trade as rapidly as conditions will permit.

"EDWARD N. HURLEY,
"Chairman, United States Shipping Board."

SCHAW-BATCHER SPEEDING UP

THE Schaw-Batcher yard, South San Francisco, which has been launching one vessel a month for the last four months, is speeding up its production and has set as its immediate objective the launching of a vessel within sixty days after the laying of the keel. The steamship West Alcoz was launched February 26 and the keel of a new hull was laid February 28. It is this vessel which the yard will try to launch within sixty days. The yard launched the West Aleta March 15, and the West Vaca made her trial trip the same day.

ENLARGE SHIPOWNERS' ASSOCIATION

PLANS for enlarging the scope and membership of the present Shipowners' Association of the Pacific Coast are nearing maturity. An informal meeting was held March 10 and a general meeting was called for April 7, which should be attended by owners and operators of vessels not included in the present association. At the present time, off-shore ocean carriers and coastwise passenger and freight steamer interests are not represented. The meeting April 7 was set for two o'clock in the afternoon, in Room 237, Merchants' Exchange Building, San Francisco.

At the meeting March 10 the following directors of the Shipowners' Association of the Pacific Coast were present: Charles R. McCormick, of Charles R. McCormick & Company; J. C. Rohlfs, marine manager of the Standard Oil Company; A. A. Moran, of the Dollar Steamship Company; Fred Linderman, steam schooner owner; and C. A. Thayer, of the E. K. Wood Lumber Company. In addition there were: Captain Andrew Dixon, of Struthers & Dixon; Captain Saunders, of the Matson Navigation Company; F. A. Hooper, of the American-Hawaiian Steamship Company; Daulton Mann and Captain Rinder, of the Pacific Mail Steamship Company and W. R. Grace & Company; and F. M. Barry, of the Pacific Steamship Company.

Would Include All Classes

The object of the meeting was to discuss the advisability and feasibility of enlarging the assocation to include in its membership all types, and every owner and operator of each type, of water carrier, both cargo and passenger, operating out of Pacific ports under the American flag; and also water carriers operating on the sounds, bays, harbors and rivers of the Pacific Coast.

This proposition met with the ready approval of all present at the meeting, but it was the sense of all present that the general meeting should be called to which all owners and operators of vessels on the Pacific Coast, of the classes enumerated, should be invited in order that a thorough discussion of the objects, aims, benefits and possible accomplishments of such an enlarged association might be had and methods devised for the future conduct of this association, if it should be enlarged as contemplated.

Individual Attendance Preferred

The secretary of the association was, therefore, instructed to write the various owners and operators of vessels in the classes enumerated, inviting them to be present at the general meeting.

It was suggested that it might not be possible for all those invited from any one port (Seattle or Portland, for instance) to attend the coming meeting. It might be possible for a representative committee from such port to attend, armed with instructions and powers by their constituents, but a full individual attendance naturally is preferred.

CAPTAIN FRANK E. FERRIS

CAPTAIN Frank E. Ferris, recently appointed managing agent, division of operations of the Shipping Board, with headquarters at the customhouse, New York, formerly was a well known San Francisco shipping man. He served in San Francisco several years ago as a superintendent of the Pacific Steamship Company and as marine superintendent of the Union Oil Company of California. His new Shipping Board position follows other government service in the navy and in the construction and repairs department of the Shipping Board.

Captain Ferris went to sea in 1891 at the age of thirteen in the Thermopylae, one of the famous old White Star-Aberdeen tea clippers, in which he served his four-year apprenticeship, sailing between Puget Sound and the Orient. At twenty-one he was in command of a steamship. In 1906 he became superintendent of the Pacific Steamship Company in San Francisco; and was with that company and marine superintendent of the Union Oil until 1915, when he served on the jury of awards, Panama-Pacific Exposition, being chairman of the group jury of transportation, chairman of the department jury and a member of various sub-committees.

In 1916 Captain Ferris went to Honolulu to take charge of transportation for the Fanning Island estate. When the United States entered the war he joined the United States Naval Reserve and was censor of cables at Honolulu under Commodore Dennis H. Mahan. He was placed in command of the Dutch steamship Ophir when she was seized by the United States, and took her to New York. After transporting troops overseas, Captain Ferris was appointed commander of convoy. The average number of vessels to the convoy was forty. Captain Ferris was in mid-Atlantic with the last convoy when the armistice was signed.

Upon leaving the naval service he was appointed chief inspector of construction and repairs, operations division, Shipping Board, for the South Atlantic district, with headquarters at Jacksonville, Florida, which he held until promoted to managing agent at New York.

LABOR DURING THE MONTH

THE most important development in labor circles about San Francisco Bay during the month was the discharge of several thousand machinists and riggers by the various yards. In spite of the warnings from the employers, the men took the Saturday half-holiday March 1, and they were discharged individually when they returned to work Monday morning, March 3. About 10,000 men were involved. The employers asserted that the half-holiday had been taken for months in violation of agreements, and they finally brought the question to a crisis. There had been no "showdown" before, probably because the employers had perfected no means of acting in unison, but they did wish to act before the expiration of the Macy agreement, March 31, and the drafting of a new agreement. At different meetings the men reiterated their determination to remain out until the half-holiday on Saturday was granted.

REPORT OF PACIFIC MAIL

THE net income of the Pacific Mail Steamship Company during the year ending December 31, 1918, was $1,686,249, as compared with $2,454,631 in 1917, according to the annual report, made public during the month. The reserve set aside from the 1918 total was $800,000, as compared with $900,000 for 1917. The Panama line's operating revenues were $2,235,771, as compared with $3,479,531 in 1917, and the trans-Pacific line's were $1,908,834, as compared with $3,473,278. The operating income from the lines was $1,504,226. In 1917 it was $2,501,227.

The following explanation of the decrease in revenues was made:

"Although the actual operating revenues for the past year were much in excess of those obtained during 1917, our income account does not reflect this increase, as in the case of all of our vessels, with the exception of the steamers San Juan [illegible] San Jose, the earnings accruing to the company have been determined entirely by the charter rates allowed by the United States Shipping Board under the terms of United States government requisition charter.

"Included in earnings are amounts entered as commission returns for the operation of our requisitioned vessels for the account of the United States government, calculated upon the basis of rates for this service as published by the United States Shipping Board. Your company has not agreed, however, to this basis of commissions, as they are considered very inadequate for the services rendered and obligations assumed. We look forward with confidence to an equitable adjustment of this question with the Shipping Board."

"Conditions have not as yet permitted our placing larger and faster steamers in the service," says the report of the trans-Pacific line, "but this will be definitely considered as soon as the government has announced a clearly-defined shipping policy under which such a development would be possible.

"The axiom that trade follows the flag has been strongly evidenced in the results from the estabment on the Manila-East India line. On the initial departure inaugurating this service, in order to assure a full cargo, it was necessary to load for ports other than those in the regular itinerary, while at the close of this year we find our tonnage, even though supplemented by United States Shipping Board vessels, entirely inadequate to take care of the business offered. This line has developed a new export business that should have further assistance now that the war is over."

CORY FIRM OPENS OFFICES

ON account of the extensive growth of the shipbuilding industries and the great demand for "ships and more ships" and the corresponding accessories which are required, the firm of Charles Cory & Son, Inc., main office at 290 Hudson street, New York, manufacturers and installers of marine mechanical and electrical devices, have opened an office and salesroom at 585 Mission street, San Francisco, California, and also have established an agency with the W. S. De Pierris Company at 515 Hoge Building, Seattle, Washington, in order that their Western trade may be handled more expeditiously.

Exterior of the up-to-date new hospital at the Schaw-Batcher shipyard

On the Shores of Grays Harbor

By Special Correspondent

THREE wooden steamers, built at the Grays Harbor Motorship Yard in Aberdeen for the United States Shipping Board, will arrive early in April in European ports, according to marine dispatches received on Grays Harbor from the East Coast. The steamer Aberdeen completed a voyage from San Francisco to Boston in thirty days, and arrived in such good condition that it was decided to send her across the Atlantic to England, carrying cargo for the Shipping Board. The steamer Kaskaskia will carry cargo to Gothenburg, Sweden, and the Wishkah will go to Greece. All three vessels are Ward type, 4000 tons.

That members of the various unions affiliated with the Grays Harbor Metal Trades Council simply worked themselves out of employment in the recent shipyard strike seems apparent. When the walk-out occurred January 15, part of the work being done by metal trades unionists reverted to other crafts, a few refused to go out on strike, and the two government yards at Aberdeen continued to operate. Work was hampered by reason of the smaller crews, but as construction advanced on the government hulls there was less to be done and fewer men were needed. At the Matthews yard in Hoquiam work was at a standstill, as construction was at a stage where the carpenters could not continue.

Only Those Needed Employed

When the metal trades men returned to the two government yards, March 10, only as many as were needed were employed, according to the yard managements, and, not being admitted in a body, the men declared the situation a lock-out. Henry McBride, former governor and district representative of the Emergency Fleet Corporation, is to present the facts to Dr. R. C. Marshall, Federal representative of the Shipping Board, in an effort to obtain a decision.

Nearly 4,000,000,000 feet of lumber have been shipped from Grays Harbor by water during the last ten years, according to figures recently compiled by Hugh Delanty, manager of the Grays Harbor Stevedore Company. The figures, as tabulated, are:

Year	Vessels	Tonnage	Cargo
1909	618	287,747	457,415,000
1910	593	291,513	443,124,000
1911	618	292,747	456,186,000
1912	638	313,622	486,313,000
1913	542	283,758	425,439,000
1914	504	294,073	437,729,000
1915	412	189,283	305,166,000
1916	399	180,850	300,043,000
1917	378	177,695	293,324,000
1918	320	149,752	262,716,000
	5022	2,461,040	3,867,455,000

The Pacific Coast Whaling Company's steamers will put out for their first whale hunts between April 1 and 15, according to plants at the Bay City station, located just within the entrance to Grays Harbor. The plant is being overhauled for deep-sea hunting. No heavy catches are expected before June. Last season's whale catch was about 200, which was not up to former years.

The steamer Abilla, the twelfth vessel for the United States Shipping Board sent down the ways at the Aberdeen yard of the Grant Smith-Porter Company, was launched March 5. This is the first government vessel to be launched since New Year's at the yard, and the second on Grays Harbor, the Grays Harbor Motorship plant having had a launching early in January. A total of more than 100,000 tons of shipping for the Emergency Fleet Corporation has been launched in Aberdeen. The twelve vessels at the Grant Smith-Porter plant give an aggregate of 42,000 tons, and the fifteen vessels of the Motorship plant total 60,000 tons.

Belgian Vessel Libeled

A written apology is being demanded of County Assessor R. A. Wiley by Captain J. Muyllaert, of the Belgian schooner Gaby, now in Hoquiam, as a result of Wiley's libeling of that ship for $1700 tax said to be due Grays Harbor county. If the apology is not forthcoming Captain Muyllaert threatens to appeal to the Belgian minister at Washington, asking that the state department explain Wiley's action in libeling the Gaby.

The county has posted notice the vessel will be sold unless the tax is paid, and Captain Muyllaert says that if the ship is sold he will sue the Federal government for reparation. It is declared that under the maritime law no one but a naval officer or United States marshal has authority to go aboard a foreign ship. Wiley is declared to have acted outside his authority in going aboard the Gaby, levying a tax and later libeling the vessel.

The Gaby captain not only demands an apology but also insists that the county reimburse him for expenses aggregating probably $100 incurred in consulting attorneys and the Chilean consul concerning the right of a foreign ship. He has been told he is clearly within his rights in "sitting tight" and even refusing to show ship papers to anyone not a Federal official.

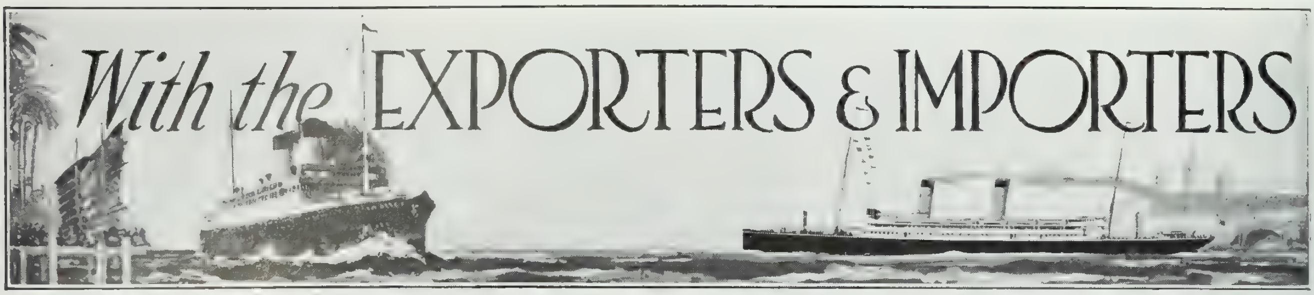
Libel Notice Still Posted

Wiley originally had a deputy sheriff placed aboard the Gaby after she had been libeled, but this deputy sheriff has been removed, although the notice libeling the vessel still remains posted. The Gaby is owned by the Compagnie de Belgic of Antwerp, and Captain Muyllaert says he pays taxes in Antwerp and not in Grays Harbor. The vessel was launched several months ago at the Chilman yards in Hoquiam.

The government bar dredge Michie is not to come to Grays Harbor for dredging until about July, according to advices received by W. L. Carpenter, resident engineer, from the district offices of the United States engineers at Seattle.

APPOINTED CONSULTING ENGINEER

W. T. DONNELLY, of 17 Battery Place, New York, during the war has designed and constructed many many floating drydocks for Atlantic and Gulf ports. His work in this line is receiving much favorable notice and his many friends will be much gratified to learn that he has just been appointed consulting engineer by the State Harbor Board of Alabama.



AUSTRALIAN FREIGHT REPORT

Sydney, February 8.

FOLLOWING up our letter of January, we have pleasure in advising you that the shipping position as it has existed here for the past few weeks, and is likely to exist for some time, in regard to obtaining cargo for sailers, motor schooners and wooden steamers, is somewhat as follows:

There have been several sailing vessels available for loading for ports ranging from Vancouver to San Francisco, but notwithstanding that every effort has been made to secure cargo, no success has been met with. On approaching shippers and asking for cargo for sailing vessels or motor schooners, we have found:

First—That there is a very limited market at the present, which has been created by prices in America being very much lower than United Kingdom prices and the prices shippers expect to secure on the Continent shortly.

Second—The steam tonnage during the last few weeks, and during the next month or two, will also be in excess of cargo requirements, which renders it difficult—in fact, almost impossible—to secure cargo for sailers and/or motor schooners.

Third—Shippers of perishable cargo by sailers and motor schooners in the past have had a very disastrous experience, and now that there are prospects of more steam tonnage becoming available, they are inclined to wait rather than take the risks of forwarding by sailers.

Insurance Is Great Difficulty

The great difficulty is the matter of insurance. The difference in the rate of insurance in sailer and motor schooner is approximately as follows, the rate varying with the class of sailer or motor schooner or steamer:

For sailer or motor schooner		Steamer	
F. P. A.	W. P. A.	F. P. A.	W.P.A.
From 4% to 8%	Practically unobtainable	11/6%	14/9%
		13/6%	16/3%

Exclusive of war risk, which is: 2/6 per cent steamer; 5 per cent sailer or motorship.

This in itself practically precludes business, but even if a shipper intends to ship by sailer, he finds he cannot get a W.P.A. policy, but only an F.P.A. policy, for a very limited amount with each company, and the shipper who is late in the field finds that each insurance company has reached its limit in a certain sailer or motor schooner, and consequently is unable to secure even an F.P.A. policy. Shippers have cabled to America and the United Kingdom, but have been unable to do any better. In the past some shippers have been inclined to carry the risk entailed under an F.P.A. policy—in fact, some have carried all the risks when the trade margins warranted a gamble, but the results have in some instances been disastrous and on the whole the result is that shippers will ship only by steamer and if steam tonnage is not available at the moment will wait until it is availabe.

Influenza Cuts Copra Crop

The position is likely to remain unless the following occurs:

1. Cargo greatly exceeds the steam tonnage available.
2. Insurance rates for sailer and motor schooner reduced.
3. Market in America becomes better than in United Kingdom or Continent.

In the past, sailing vessels and motor schooners for America have had to rely on either full cargoes of copra or coal. As regards copra (at the moment there is a dearth of supplies owing to the influenza epidemic and the hurricane season in the islands), the epidemic has affected the supplies to such an extent that charterers have not been able to secure sufficient copra to fulfill the charters they entered into some few months ago, and this further explains the reason for so many sailers being available for loading general cargo on the berth, which unfortunately they have not been able to secure. The only other cargo available has been coal, for which some sailers have been fixed for Honolulu and the West Coast of South America. This appears to be the only business available—the present rate for Honolulu being 50/ to 55/ and the rate for the West Coast of America 70/, but these rates are not likely to be maintained if additional steam tonnage is offering.

Continued Shortage Likely

The copra shortage is likely to exist for another two to three months, as we are informed that there are several sailing vessels now in the islands awaiting copra, and until their requirements are fulfilled additional stocks will not come forward to Sydney. We know that some copra shippers are holding the copra at Sydney in anticipation of space becoming available for the United Kingdom and the Continent shortly.

BIRT & COMPANY, LTD.

ALASKA'S TRADE TOTALS

ALASKA'S imports and exports for the year 1918, according to the annual report of the collector of customs, totaled $127,049,132. The year's total of imports increased over the total for 1917 by more than seven million dollars, and the decrease in exports amounted to more than eleven millions. Imports last year were $11,625,564, as against $4,431,600 for 1917. Exports for 1918 were $85,523,568 as against $96,693,862 for the year previous.

HONOLULU FOREIGN TRADE

FOLLOWING are the principal items of export and import of Honolulu, value of imports, value of exports, and tonnage clearing, foreign and domestic, tabulated for the years 1917 and 1918:

Principal Articles of Domestic Produce Shipped to United States for the Years 1917 and 1918

Articles	1917—Value	—1918
Sugar, raw	$60,137,962	$62,076,956
Sugar, refined	2,603,202	2,032,811
Coffee, raw	297,972	466,736
Rice	165,779	84,813
Fibers, sisal	89,543	127,987
Fruits—		
Fresh bananas	178,675	109,637
Fresh pineapples	23,546	10,236
Canned pineapples	7,970,522	8,394,307
All other	5,393	10,892
Pineapple juice	36,520	2,604
Beeswax	7,497	8,708
Honey	62,462	161,930
Molasses	392,110	634,671
Hides and skins	295,216	398,719
Wool, raw	93,992	81,805
Timber, lumber and unmnfrd. wood	3,037	175
Fruits and nuts, foreign	....	115,162

Hawaiian Imports and Exports, 1917-1918

	Imports to June 30		Exports to March 31	
Countries	1917	1918	1917	1918
Australia	$ 164,571	$ 118,443	$ 8,684	$ 20,284
Br. Oceania	70,166	71,974	76,194	161,923
Br. India	1,130,449	834,512	453	....
Canada	28,405	345,340	159,707	88,856
Chile	899,358	1,001,069	40	....
England	60,583	59,090	7,744	196
France	7,902	4,304	....	....
Germany	2,507	6,064	....	....
Hongkong	428,126	385,011	5,348	11,125
Japan	3,405,571	3,672,468	203,752	626,624
Scotland	26,079	9,901	....	....
Other	258,234	288,852	173,942	242,210
United States	39,876,390	45,004,156	74,480,119	79,395,388
Totals	$46,358,341	$51,801,184	$75,115,983	$80,556,606

Principal Import Values from United States, Comparative, for Fiscal Years Ending June, 1917, and 1918

	Domestic 1917	Merchdse. 1918
Automobiles and parts of	$ 2,111,997	$ 1,836,458
Books, maps, engravings, etc.	524,453	372,181
Boots and shoes	875,101	652,644
Breadstuffs	3,142,022	3,039,729
Cement	538,235	523,030
Chemicals, drugs, dyes, etc.	649,878	670,451
Cotton manufactures of and clothing	3,416,098	2,895,748
Electrical machinery and instruments	1,004,966	1,049,174
Explosives	422,973	184,344
Fertilizers	2,127,381	2,035,300
Fruits and nuts	548,693	566,073
Hay	376,049	326,505
India rubber, manufactures of	1,105,487	1,494,689
Iron and steel and manufactures of	347,968	413,173
Iron sheets and plates, etc.	348,245	328,368
Builders' hardware, etc.	731,660	472,837
Machinery, machines, parts of	1,587,687	1,557,405
Nails, spikes, pipes, etc.	3,819,117	2,791,816
Leather and manufactures of	457,279	240,772
Oils, mineral, crude	1,586,373	2,176,174
Oils, refined, etc.	1,654,499	1,913,753
Paints, pigments and colors	488,198	409,435
Paper and manufactures of	791,671	567,129
Hog and other meat products	963,792	698,048
Dairy products	878,816	678,447
Rice	267,423	594,689
Silk and manufactures of	263,914	226,108
Soap, toilet and other	321,454	350,835
Spirits, etc., malt liquors	249,676	194,316
Spirits, distilled	209,037	197,489
Wines	291,653	342,723
Fish	473,566	654,863
Tin and manufactures of	1,287,624	2,177,513
Tobacco, manufactures of	978,773	1,065,689
Vegetables	710,543	609,393
Lumber, shingles, etc.	1,222,969	957,740
Shooks, box	415,918	536,501
Furniture	359,093	233,059
Trimmings, molding and other manufactures	500,640	523,749
Wool and manufactures of	445,679	481,888
All other articles	990,446	2,239,864
Total value merchandise shipments	$43,967,255	$43,646,515
Total value foreign merchandise from U. S.	307,219	

The total value of domestic merchandise received from the United States during 1917 was $43,967,256 and during 1918 was $43,646,515. The total value of the foreign merchandise received from the United States was $307,219 during 1917.

EUROPEAN LINES PLAN EXTENSION

TRADE between the Pacific Coast and Europe appears to be about to make a striking gain as soon as peace is signed and steamship companies feel at liberty to strike out without danger of government requisitions. Several lines are investigating prospects for business between the Pacific Coast and Europe, but it is noteworthy that the identity of the companies is being kept secret for the time being.

Two of the lines are Scandinavian; two are British; one would ply from the French Channel ports; another from the Mediterranean, and still another Italian line from Fiume, provided Italy is awarded Fiume by the peace conference.

The San Francisco Chamber of Commerce, through its foreign trade department, has recommended in each case that the vessels also call at Seattle.

Recent published statements that Australia had placed embargoes against all goods except those of British origin have been investigated by the foreign trade department of the San Francisco Chamber of Commerce and discovered to be without foundation. The only embargo is against dyestuffs not of British manufacture.

PORTLAND FOREIGN TRADE

PORTLAND'S export trade for 1918 fails to show one of the most important items of former years—wheat. No exports whatever appear, due to the embargo placed upon same by the government during 1918. A very small amount was exported during 1917.

The government, having acquired the 1918 wheat crop, shipped from Portland in Portland-built vessels twenty-two cargoes of wheat and flour which were not entered as exports. These cargoes were assigned to the United Kingdom and France.

There were shipped in Portland-built vessels forty-nine cargoes of lumber for government account during 1918.

The principal items of foreign trade were:

Imports

	1917	1918
Copra, tons	10,373	9,421
Curios and merchandise, packages	13,262	8,647
Hides, packages	6,159	1,336
Hardwood, feet	359,851	770,160
Linseed, bags	12,656	......
Peanuts, bags	2,993	......
Provisions, packages	29,980	9,099
Rice, bags	18,722	7,414
Wool, bales	......	5,316
Wheat, bushels	......	25,631

Exports

	1917	1918
Barley Meal, pounds	......	626,000
Flour, barrels	97,980	1,568,175
Groats, pounds	5,174,381	2,259,958
Iron and steel, pounds	685,384	733,075
Lumber, feet	68,333,578	45,551,278
Machinery, pounds	34,110	22,193
Milk, condensed, cases	8,045	......
Wheat, bushels	1,760,403	......

Domestic shipments from Portland to Pacific Coast ports by water during 1918 aggregated 1,647,977 tons, valued at $13,420,074, as compared with 308,014 tons, valued at $20,568,060, in 1917. The shipments to Alaska in 1918 were valued at $257,077 and in 1917 at $191,407.

Domestic cargoes received at Portland from Pacific Coast ports in 1918 were 1,080,124 tons, valued at $36,004,732, in addition to 91,227 cases of canned salmon from Alaska, valued at $784,512. For 1917 the figures were 1,013,095 tons, valued at $27,075,874; and Alaska salmon aggregated 86,084 cases, valued at $504,566.

Revolutionizing Business Methods

By A. C. Worthington,

Vice-President and General Manager, Maritime Navigation Company and United Freight and Brokers' Corporation

WHEN the Maritime Navigation Company first discussed the wisdom of extending its direct connections to the Pacific Coast, it was left for me to decide whether we would go to San Francisco or Seattle. The Puget Sound port offered many inducements, and it was a rather difficult question placed before the directors. We wanted to decide rightly, and in the course of a week, when we were no nearer a decision than at the beginning, the directors ended the discussion by voting to place the matter in my hands for settlement. Then I came to the Coast—it was about the one hundred and twentieth time—and Seattle first was considered.

Now, you must credit the Seattle men with one thing. They talk a good bit, work more than they talk, and advertise more than they either talk or work. Then they will work together for the common good and you never hear a Seattle man criticise his city or his port. No, not even when the State of Washington went "bone-dry." I liked the spirit of the people, but viewing the situation in the cold-blooded light of business logic and comparing the place with San Francisco, I decided to come back to the great Pacific metropolis for a final look-about.

San Francisco's Disadvantages

I had realized for years that San Francisco is the city of destiny; that its wonderful physical advantages, together with the most superb climate in the world, ultimately would force it to the top of all seaports on the Pacific. My decision to choose San Francisco as the main bulwark of my firm's Western extension really was made before I arrived here. A further investigation settled this conviction, and so it came about that I am here in the midst of the most wonderful trade opportunities possible. But, although San Francisco has many advantages, there are also certain disadvantages.

What we lack here is the spirit necessary to pull together for the common good. We are too much like the youthful salesman who studied the weaknesses of his rivals to such an extent that he could not refrain from telling his customers all about them. The result is that he did not make good. The customer wishes to hear about your own merchandise and not about your rival's. The other fellow is busy at all times trying to sell his goods, and if you talk about his merchandise you are helping the other fellow and working injury to your own cause.

A Little Bit Pessimistic

San Franciscans have talked too much about Seattle and other places and not enough about their own place. And then we are just a bit pessimistic here. That is wrong. One employs poor business ethics when he indulges in pessimism. I believe that one should be optimistic at all times and that is regardless of what the real and exact state of affairs may be. If a merchant becomes pessimistic he finds it difficult to secure an extension of old credit, to say nothing of securing additional credit. I have been accused of indulging too frequently in "hot air" by the other fellow who has been out fighting for the same business that was engaging my attention at the time. Now that is quite gratifying to hear—that is, to me. It is my experience that a bright and breezy person who always has a cheerful word always is welcome.

I admit that at the present time business is not as good as it might be. We should be doing about 500 per cent more foreign business at this moment. There is an abundance of goods on the shelves that should be moving along to the ultimate consumer. We have a lot of merchandise in the warehouses that is rotting away and the vast majority sit down and, directing their gaze over the tops of the tall buildings from the windows of the Commercial Club—and seeing a lone ship being towed up the bay—they sigh and remark:

"Say, Jim, everything is rotten, isn't it?"

"Yes, and then some," responds Jim; and then they go below to seek comfort in a beverage.

"You Are Crazy!"

That was what I heard the first time I came into San Francisco shipping, exporting and importing circles. I then suggested that it would be interesting to know if there were any vast stocks on hand in the warehouses that were not being moved. I was assured that it was the truth. Then I investigated and bumped right into a big stock of copra that had lain dormant for several months. I went to the owners and asked them their price. They told me that it would be foolish to suggest a price, as the stuff could not be sold until the market conditions were better.

"You are crazy, Worthington!" they said. "This is not New York or any other place except San Francisco. Talk will not sell this stuff."

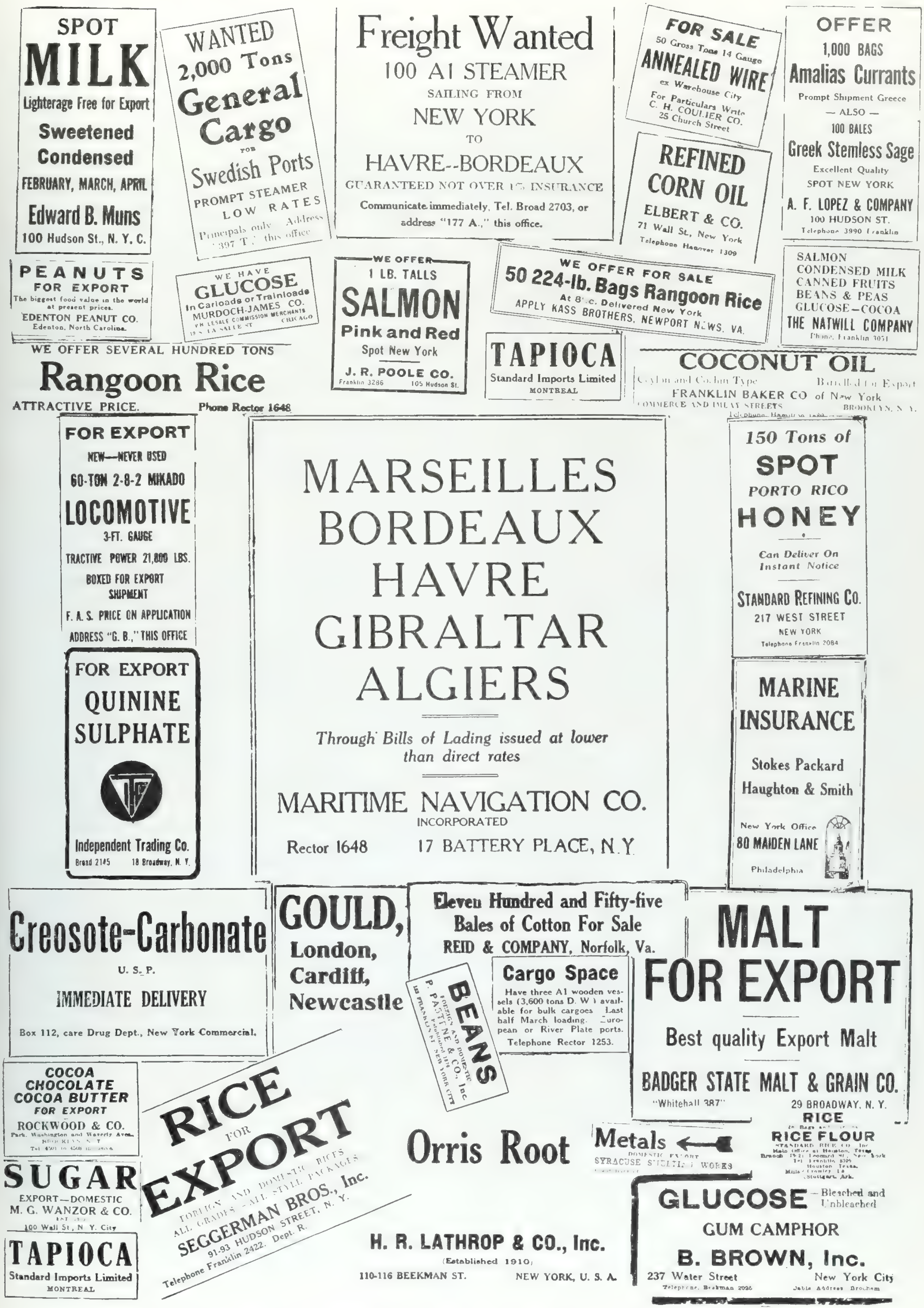
"Name a price and we will see," I persisted.

After some coaxing they did name a price and then I did an unusual thing—so they say. I wired instructions to the East and the next day we ran a big "ad" in a daily newspaper. Yes, just a regular newspaper, the kind of an "ad" your Emporium or White House would place if they wanted to sell a lot of shoes or something.

Advertisement Is Answered

Now it seems that one of our big manufacturing concerns just happened to need a lot of copra. So it answered the "ad" just as a housewife would if a large department store advertised in the Chronicle or Examiner. The result was that in about two days I came back to the owners and notified them that their copra was sold. Now, there you are. We violated all the regular rules of the game, but we won out and made a home-run just the same.

I maintain that in view of numerous experiences in New York, Chicago and other places, it is possible to stimulate business even in the game of shipping, exporting, importing or any other angle of the commercial field by going after business just as Los Angeles goes after the tourist. If the city of the Southland sat quietly on the beach at Redondo and sang that old familiar song, "How Rotten Is Business," the tourists either would remain at home



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How ship-operators, importers and exporters of the Eastern States use display advertising or go elsewhere. But they don't do that sort of thing down there. They just talk you to death—nearly—then shout their virtues from the house and hill-tops through the newspapers and magazines, and you are persuaded that Southern California is the place to go to. And you go or you would not believe them.

In 1916 the Ford Motor Car Company wished to send 12,000 tons of automobiles to Australasia. I worked for the Illinois Central Railroad, and we were not considered in the running as a business-getter in this instance. But I came to San Francisco; and, when the other fellows said that nothing could be done because there were no ships, I went to Reggie Back of the Union Steamship Company and, using unusual methods, managed to secure the ships. The railroad fraternity is still talking about Worthington's Illinois Central "steal."

Advertise in Logical Manner

So the Maritime Navigation Company, together with the United Freight Brokers' Corporation, has come here to do business. We expect to do it. I have been here but a few weeks, but, in that time, we have earned the expenses of the local organization for more than one year. We are placing another active executive in the field, and we expect to promote business. We will not remain contented to take what business filters our way without any effort on our part.

I believe that the opportunity for San Francisco is here. We must pull together in harmony and then we must advertise in a logical manner. We must forget all about the old-time ethics of the world of shipping, importing and exporting. We must get "down to brass tacks" and recognize that in these days of rapid transportation and more rapid communication, we must depend upon printed matter. We must use the printing press to exploit our business and our wares. If there be any doubt about the success that will result from this method, I will suggest that the experience of my firm has proved conclusively that one can get the right results at all times by adopting the new methods.

And the new method can be expressed in the one word—publicity.

Use More Publicity

I realize that there may be numerous opinions and many will be adverse to mine. Well, there is a simple way of trying it out. Let any doubter come to me with a commodity—and it matters not what it may be or what the amount may be—let him bring me a fair and reasonable quotation, and, by using the Worthington publicity method, I will come pretty near to disposing of the stuff. In regard to ships, let me illustrate. Suppose a vessel is placed on the berth for a voyage to a certain port and there is no announcement in any publication regarding the fact. I venture to say that it will be difficult to supply the necessary cargo. The same is true regarding a passenger ship. But when all who would be interested in knowing about the sailing and the space available read about it, they hasten to the agents.

What I propose is that we make the system of publicity more extensive. Let us take the public into our confidence right along the line and they will respond by filling our ships, buying our commodities, and because San Francisco offers the opportunity, the public will come to San Francisco to do business. Every big undertaking of note has only been successful because of the tons of paper and ink expended to shed the broadest light of publicity to the public. That is what made all of the Liberty loans successful. The war could never have been won without publicity. Without publicity, the statesmen assembled at the peace conference at Paris never would be permitted to conclude their negotiations in peace. And unless San Francisco wakes up and utilizes the avenues of publicity, she will never succeed in becoming the premier seaport of the Pacific, as she deserves to be.

Shipbuilding in 1918

THE total mercantile output, in tonnage, of the Allied and neutral countries during 1918 was 5,447,444 tons, according to Lloyds' annual summary. Even though the Central powers are not included in this tabulation, the total is more than 63 per cent in excess of the former record year, 1913, which included both Germany and Austria-Hungary.

The number of steel ocean-going steamers of between 5000 and 10,000 tons launched during 1918 amounted to 439, which represents 28 per cent of the total number of such vessels in existence at the beginning of the year.

Exclusive of the United Kingdom, which produced 1,348,120 tons, the countries where the largest output has taken place during the year under review are the United States, Japan and Canada. The totals for these countries amount to 3,781,145 tons, and account for 92 per cent of the total output abroad.

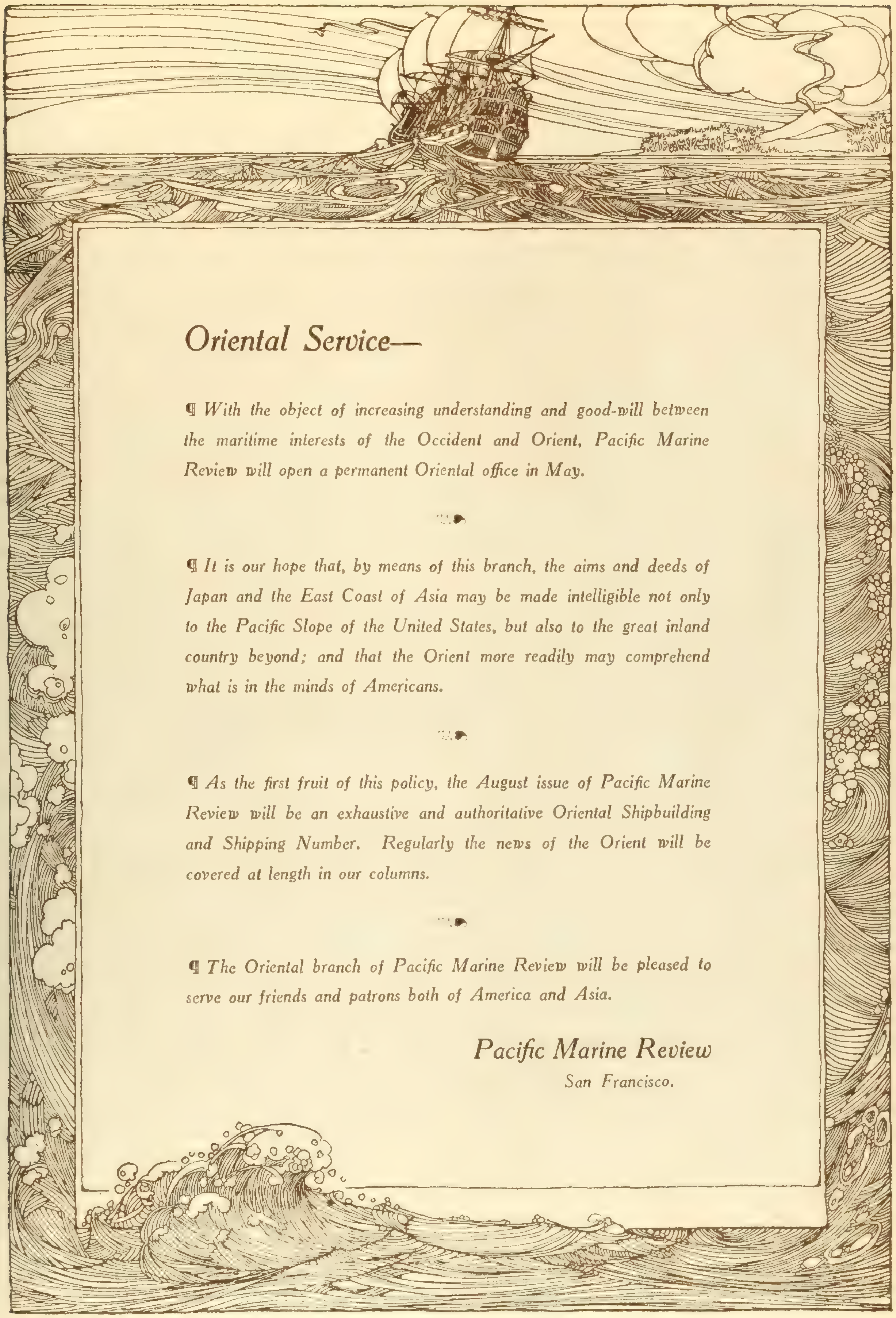
The United States output for the year 1918—viz., 3,033,030 tons gross—is a convincing proof of the great development in the shipbuilding industry which is generally known to have taken place in this country. This total for one year is higher than the whole output of the United States during the ten years 1907-1916; it is more than three times the amount launched during 1917, and it exceeds by over 25 per cent the combined output of the rest of the world for the year 1918.

Pacific Coast Production

The most striking increase has taken place in the yards on the Pacific Coast. The average yearly output on that coast during the four years 1912-1915 was under 30,000, in 1916 it was 123,882 tons, in 1917 it amounted to 428,622 tons, and during 1918 it has reached 1,514,296 tons. Of the total launched on the Great Lakes (430,877) only one steamer of 5429 tons is for trade on those lakes, all the other vessels being intended for seagoing purposes.

JANET CARRUTHERS WRECK SOLD

ON his bid of $11,100, which was the highest submitted, J. H. Price, head of the J. H. Price Shipbuilding Company of Seattle, became the owner of the British auxiliary schooner Janet Carruthers, ashore on the beach near Oyehut, a few miles above the Grays Harbor entrance. Mr. Price also purchased the vessel's cargo of 400,000 feet of lumber, but the amount of his bid on it was not made public. It is stated the vessel will be dismantled and an effort made to float the hull on high tide later in the season.



Oriental Service—

¶ With the object of increasing understanding and good-will between the maritime interests of the Occident and Orient, Pacific Marine Review will open a permanent Oriental office in May.

◆

¶ It is our hope that, by means of this branch, the aims and deeds of Japan and the East Coast of Asia may be made intelligible not only to the Pacific Slope of the United States, but also to the great inland country beyond; and that the Orient more readily may comprehend what is in the minds of Americans.

◆

¶ As the first fruit of this policy, the August issue of Pacific Marine Review will be an exhaustive and authoritative Oriental Shipbuilding and Shipping Number. Regularly the news of the Orient will be covered at length in our columns.

◆

¶ The Oriental branch of Pacific Marine Review will be pleased to serve our friends and patrons both of America and Asia.

Pacific Marine Review
San Francisco.

Shipping Rates Before, During and After the War

A TABLE showing fluctuations in ocean shipping rates before, during and since the signing of the armistice follows. Rates are per hundred pounds. Tonnage rates are based on long ton of 2240 pounds:

FROM NEW YORK to	Pre-War	1914-15	1916-17	1918	Present
United Kingdom	20c	$ .84-3.00	$3.00-8.00	$6.50*	$1.00
BELGIUM:					
Antwerp	20c	....	....	...	1.25
FRANCE:					
Marseilles	25c	1.00-3.00	3.00-8.00	3.20*	3.20
Havre and Bordeaux	25c	1.00-3.00	3.00-8.00	3.00*	3.25
ITALY:					
Genoa	27c	1.00-3.00	3.00-8.00	6.00*	3.40
RUSSIA:					
Vladivostock	35c	1.00	2.00	4.00	2.00
SPAIN:					
Barcelona	25c	1.00-2.00	2.00-4.00	3.20	3.20
Balboa	25c	1.20-2.40	2.40-4.80	3.45	3.45
ARGENTINA:					
Buenos Ayres	35c	1.00-2.00	2.00-5.00	1.80	1.12
BRAZIL:					
Santos and Rio	35c	1.00-2.00	2.00-4.00	2.00	1.12
URUGUAY:					
Montevideo	35c	1.00-2.00	2.00-5.00	1.80	1.12
CHINA:					
Shanghai	27c	.75-1.75	2.25	2.75	1.12
JAPAN:					
Yokohama and Kobe	27c	.75-1.75	2.25	2.75	1.12
INDIA:					
Singapore	27c	.75-1.75	2.25	2.75	1.12
Calcutta and Bombay	25c	.75-1.75	2.25	2.75	1.08
EGYPT:					
Alexandria	35c	....	3.00-8.00	5.00	4.00
AUSTRALIA:					
Sydney-Melbourne	55c	.75-1.75	2.25	2.75	1.12
AFRICA:					
Capetown	50c	.75-1.75	2.25	2.75	1.20
Port Natal	50c	1.00-2.00	2.50	2.80	1.20
FROM SAN FRANCISCO to					
U. K., Antwerp or a French (West Coast) Port	40c	.35-1.00	1.30-1.75	no shipm'ts	1.30

* War Control.

CRITICIZE INEQUITABLE BILLS OF LADING

NOTWITHSTANDING the report of the Dominions Royal Commission, there is still a tendency on the part of some shipowners to continue to insert what are by many considered to be inequitable clauses in bills of lading, says the annual report of the Institute of London Underwriters.

The following is an extract from a bill of lading which has recently been brought to the notice of underwriters:

"In the event of the full number of packages or articles signed for in this bill of lading not being delivered at destination, a certificate signed by the master or agent of the vessel that the goods are missing shall be conclusive evidence that the goods have been lost through one or other of the within excepted perils. It shall not be necessary in such certificate to specify the particular peril causing the loss and the shipowner shall not be liable therefor, notwithstanding that it may arise from theft, pilferage, or other wrongful action on the part of the shipowner's servants or agents, the goods being carried on the condition that no responsibility is accepted for any shortage in the number of packages or for pilferage of contents, breakage, etc., the goods being carried entirely at the risk of the owner of the goods, however and wheresoever the loss of same may be caused and whether ashore or afloat.

"The shipowner is to be free of all risks, including delay arising directly or indirectly from war hostilities, disturbances or commotions or the consequence thereof."

Representations have been made to the government both by the "marine insurance committee" as well as by your committee that legislation on the lines of the Harter act be passed in the United Kingdom.

IMPORTS AND EXPORTS, 1917 AND 1918

A COMPARISON of the Pacific Coast exports and imports for the years 1917 and 1918 and for the months of December, 1918, and January, 1919, is given below. January exports from the San Francisco and Washington districts were the largest ever recorded for any one month, says the report of John Perrin, federal reserve agent, Federal Reserve Bank of San Francisco:

EXPORTS
(000 omitted)

District	1918	1917	Increase Value	Increase Per Cent
San Francisco	$211,292	$158,726	$ 52,566	33.1
Southern California	7,627	7,593	34	.4
Oregon	14,616	6,282	8,334	132.6
Washington	296,189	188,087	108,102	57.4
Total	$529,724	$360,688	$169,036	46.8

IMPORTS
(000 omitted)

District	1918	1917	Increase Value	Increase Per Cent
San Francisco	$245,738	$232,016	$ 13,722	5.9
Southern California	9,727	8,068	1,659	20.6
Oregon	2,755	2,432	323	13.2
Washington	300,990	289,478	11,512	3.9
Total	$559,210	$531,994	$ 27,216	5.1

EXPORTS
(000 omitted)

District	Jan., 1919	Dec., 1918	Increase Value	Increase Per Cent
San Francisco	$30,733	$17,638	$13,095	74.2
Southern California	639	524	115	21.9
Oregon	5,370	2,439	2,931	120.1
Washington	36,917	31,938	4,979	15.6
Total	$73,659	$52,539	$21,120	40.2

IMPORTS
(000 omitted)

District	Jan., 1919	Dec., 1918	Increase Value	Increase Per Cent
San Francisco	$16,184	$13,222	$2,962	22.4
Southern California	1,716	2,056	*340	*16.5
Oregon	142	215	*73	*33.9
Washington	18,181	16,229	1,955	12.0
Total	$36,226	$31,722	$4,504	14.2

*Decrease.

GROWTH OF JAPAN'S TRADE

A STUDY of Japanese commerce from 1913 to 1917 by the United States Tariff Commission shows striking changes in the financial position of that country during the war period. Japan's total trade rose from $680,500,000 in 1913 to $1,319,000,000 in 1917, an increase of 94 per cent.

The figures for exports and imports were: Exports in 1913, $316,000,000, and in 1917, $801,500,000; imports in 1913, $364,500,000, and in 1917, $517,500,000. For the four years 1910 to 1913 the imports normally exceeded the exports by an annual average of $32,500,000. In 1914 there was still a slight balance in favor of imports; in the three years 1915-17 the excess of exports over imports averaged $185,500,000. The excess in 1917 was $283,500,000.

KATHERINE GIVEN ENGINES

THE four-masted steel ship Katherine, formerly the County of Linlithgow, built by Barclay, Curle & Company, Glasgow, in 1887, is being converted to a Diesel-engined tanker at the Hanlon yard, East Oakland.

The Philippine Mission

By Guy T. Slaughter

THE Philippine mission is a delegation from the most Occidental of all Oriental peoples. The near approach of the East to the West in the Filipino people has been a matter of slow but steady growth, beginning, not with the American occupation of the Philippine Islands in 1898, as many are inclined to think, but rather with the landing of Magellan on the Island of Mindanao, nearly four hundred years ago (Easter Sunday, 1521), or, at the latest, with the founding of Manila by Legaspi fifty years later.

It is worthy of note that the first considerable Western influence on the Filipino people emanated from our own continent, Spain having governed the Philippines for many decades through the viceroy of Mexico.

Old Civilization in Islands

In addition to these three and one-half or four centuries of contact with Western nations in affairs of government, commerce, education and religion, the Philippine people have back of them a civilization of their own, the beginning of which antedates the arrival of Legaspi and Magellan by no one knows how many years or centuries.

These few facts are here set forth because we Americans all too often overlook just such facts in our dealings with people of other races.

The Philippine mission is said to have come to the United States primarily to urge our government now to grant absolute independence to the Filipino people. The membership of the mission and its auxiliary staff includes the highest Filipino executive and legislative officers of the Philippine government; also lawyers, doctors, newspaper men, minority and majority political leaders, university professors, agriculturalists, labor leaders, manufacturers, merchants and capitalists. All of them are Filipinos of a high order of ability and perfectly able to fight their own battles in Washington, so let us turn to the commercial significance of the visit of this able delegation.

Everything Consumed Is Imported

Practically everything produced in the Philippine Islands is exported and practically everything consumed is imported. This condition makes the foreign trade a very high percentage of the total commerce of the country. Anyone in foreign trade naturally will, so far as possible, buy in the market in which he sells. It therefore behooves the business people of the United States and San Francisco, in particular, to make the acquaintance of the members of the Philippine mission, to exchange information and ideas with the members, with a view of not only increasing sales to the Philippines, but increasing purchases from them as well.

By reason of the fact that the Philippine Archipelago consists of a great number of inhabited and productive islands, an enormous number of inter-island vessels is required to handle the domestic commerce. The Filipinos take kindly to sea-faring and the greater part of the inter-island fleets are manned entirely by Filipinos, from cabin boy to captain, and from firemen to chief engineer. Some off-shore vessels also are similarly manned. Amer-

Luncheon given by the San Francisco Commercial Club to the Philippine Mission

The Philippine Mission

Chairman
HON. MANUEL L. QUEZON
President of the Philippine Senate
Vice-Chairman
HON. RAFAEL PALMA
Secretary of the Interior and Senator, Fourth District (Manila)
Members ex-officio
HON. JAIME C. DE VEYRA
Resident Commissioner from the Philippines in the United States
*HON. TEODORE R. YANGCO
Resident Commissioner from the Philippines in the United States
Members

Hon. Dionisio Jakosalem	Secretary of Commerce and Communications
Hon. Pedro M. Sison	Senator, Second District (Pangasinan)
Hon. Vicente Singson Encarnacion	Senator, First District (Ilocos)
Hon. Rafael Alunan	Representative (Occidental Negros) Majority (Nacionalista) Floor Leader
Hon. Emiliano Tria Tirona	Representative (Cavite) Minority Floor Leader and President of the Partido Democrata
Hon. Gregorio Nieva	Representative (Tayabas)
Hon. Mariano Escueta	Representative (Bulacan)
Hon. Manuel Escudero	Representative (Sorsogon)
Hon. Pedro Aunario	Representative (Mountain Province)
*Hon. Pablo Ocampo, Former Resident Commissioner from the Philippines to the United States (1907-1909)	
Hon. Filemon Perez	Former Representative (Tayabas), Agriculturist
Hon. Jose Reyes	Former Governor of Misamis, Agriculturist
Hon. Delfin Mahinay	Former Representative (Occidental Negros), Agriculturist
Hon. Ceferino de Leon	Former Representative (Bulacan), Agriculturist
Prof. Jorge Bocobo	Dean, College of Law, University of the Philippines
*Mr. Tomas Earnshaw	President, Earnshaw's Engineering and Slipways Co.
*Mr. Juan B. Alegre	Hemp Merchant
*Mr. Carlos Cuyugan	Vice-President Compania Mercantil de Filipinas
Dr. Gregorio Singian	Professor, University of St. Thomas
Mr. Marcos Roces	Merchant
Mr. Gabriel La O	Lawyer
Mr. Pedro Gil	Cocoanut Oil Manufacturer
Mr. Crisanto Evangelista	Labor Leader

Technical Advisers

Hon. Quintin Paredes	Attorney General of the Philippine Islands
Prof. Conrado Benitez	Dean, College of Liberal Arts, University of the Philippines
Mr. Enrique Altavas	Chief of Land Registration Office
*Mr. Camilo Osias	Assistant Director of Education
Mr. Jose A. Santos	Assistant Attorney General
Mr. Maximo M. Kalaw	Assistant Professor, University of the Philippines

Secretary

Mr. Julian La O	Secretary to the Speaker, House of Representatives
Dr. Gutierrez	Physician, Philippine General Hospital

Aid-de-Camp and Secretary to the Chairman

*Major Jorge B. Vargas	Philippine National Guard

Disbursing Officer

*Captain Bernabe Bustamante	Philippine National Guard
Mr. Francisco Villanueva, Jr.	Secretary, Public Utilities Board

Stenographer to the Chairman
Mr. Guillermo Cabrera
Newspaper Representatives

*Mr. Arsenio N. Luz	Editor *El Ideal*
Mr. Francisco Varona	Associate Editor *El Debate*

Unofficial

General Ralph W. Jones	Philippine National Guard
Mr. Ruben A. Robbs	Newspaper Man

*Note—Will join the mission at Washington

San Francisco, March 23, 1919

icans for many decades have not taken very kindly to seafaring, but the war has, as everyone knows, enormously stimulated shipbuilding in the United States.

Why not American-built ships, San Francisco-built preferred, manned by Filipinos on direct runs between the Pacific Coast and the Philippine Islands, owned and operated jointly by San Franciscans and residents of the Philippine Islands, European, American and Filipino?

FREIGHT REPORT

San Francisco.

OUR last circular was dated February 20, and as the British and American governments withdraw restraint on the shipping business, it seems to increase proportionately. It is really gratifying, for the first time in many years, to report the charter of sail tonnage to load barley from this port to the United Kingdom, Balfour, Guthrie & Company having chartered the first vessel, the French ship Bretagne at 102 shillings sixpence a ton, with a full cargo of brewing barley, to Queenstown or Falmouth for orders, to discharge at a safe port in the United Kingdom. They have also, since, chartered the American ships Wm. T. Lewis and the Celtic Monarch at advanced rates to the Bretagne, but which rates they wish kept quiet. It is reported on the street that they have also chartered the Belgian sailer L'Avenir, also on private terms.

We quote the market, today, at 125 shillings, offered for steel vessels to the United Kingdom. There is also a demand for tonnage from this port for barley to Denmark and Scandinavia, but no business has resulted so far, as vessels are asking far beyond what shippers seem able to pay. We should imagine the market to be about 135 shillings to 140 shillings. No doubt steamers could get more than the rates we have quoted in either direction, but there has been no available steamer tonnage.

There has been no business transacted in time charters. A large Japanese steamer has indicated she would accept 10 yen, delivery and re-delivery Japan, for about nine months or one year for world-wide trade, but no one has cared to take her in this market yet. Possibly at about 7 yen she might interest charterers.

Lumber for U. K. Active

Quite an activity has obtained in lumber charters for the United Kingdom from the North. Comyn, Mackall & Company started the ball rolling by closing the motor schooners Snetind and Trolltind to United Kingdom or Continental ports, West side, at $50 a thousand feet, followed, a few days later, by the Ocean Lumber Company chartering the motor schooner Cap Horn for a direct port, United Kingdom, at $45. A. F. Thane & Company then chartered the motor schooner Cap Palos for ties from Puget Sound for one direct port, United Kingdom, at $45, and also the Cap Vert, from Humboldt Bay, same destination, $47.50 on vessel's fir-carrying capacity.

Thompson & Mitchell, of the North, are reported to have also chartered one of the "Cap" motor schooners at $45 for ties or lumber from Columbia River to the United Kingdom. We have also to report chartered the schooner Brisk at $42, ties to the United Kingdom, as also the A. S. H. C. Hansen for the same busines at $41. Charterers are now holding out for tonnage at $40, and from all we can hear there will be quite a number of vessels required to carry engagements reported made in Europe for ties from the North to their countries.

South American Lumber Weakens

Lumber freights to the West Coast of South America have weakened from $37.50 to $35, at which one or two steam schooners have been chartered and we believe that the next rate of freight will be $32.50 a thousand feet.

No demand exists for tonnage to Australia. The only charter reported in that direction is one reported chartered for case oil from this port to Melbourne at 50 cents a case, a decided drop from the previous charter, which was $1.20 a case.

Charles R. McCormick & Company are said to have closed a contract for delivering several million ties on the East Atlantic Coast of the United States, and have been furnished with five or six wooden steamers by the United States Shipping Board to carry the same, on a basis of $16 a thousand. For Africa there has been nothing reported.

The only charter for lumber to the Orient is the motor vessel City of Portland, from British Columbia to Taku Bar, chartered by the Robert Dollar Company at $35.

The only sale reported is the good old steamer Humboldt, bought by Scammell on private terms. They expect to put her on the run from San Francisco down to Southern California.

PAGE BROTHERS.

National Merchant Marine Association

THE members of the council of the National Merchant Marine Association met in Washington, March 17, at the Willard Hotel, for the purpose of perfecting its organization so that steps toward results could be taken in the immediate future. A number of vice-presidents were named, J. Parker Kirlin being designated for New York. An executive committee was named, consisting of Edward B. Burling, former chief counsel of the United States Shipping Board, chairman; William Allen of New Orleans, Captain Charles A. McAllister of the United States Coast Guard, L. L. Richards, chief of Bureau of Transportation, War Trade Board (formerly of Bowring & Company of New York); Emile P. Albrecht, president of the Philadelphia Bourse; Mr. Hendon Chubb of New York, and Judge George W. Norris of the Federal Farm Loan Bureau. The executive committee is to form the operating organization of the association, the secretary for the present being William Allen, who will conduct the business from his present office in the Maryland Building, Washington. The executive committee will submit to the council by referendum matters in hand and contemplated, so that the council will in fact pass upon policies to be pursued.

To Educate the Public

At the meeting March 17 a plan was perfected to raise $50,000 for propaganda and other necessary expenses of reaching the public and educating it along progressive and substantial lines calculated to put the American ship back on the ocean and keep it there. Subscriptions from any one concern are limited to $1000, so as to eliminate criticism of any particular interest dominating the policies of the organization. Membership fees have been made $5 a year, in the hope of attracting a great many people to assist in the work.

H. H. Raymond, president of the American Steamship Association, was elected a member of the council.

Shut Out German Capital

The council during its session discussed the question of building in American yards for foreign account, and it decided to recommend to the United States Shipping Board that steps be taken at once to remove the bar and permit yards to take on contracts without restriction of any kind. During the discussion it was suggested that one of the reasons why the American builders had not been permitted to take on work for foreign account was through the desire of the administration not to open our yards to German capital to rehabilitate their merchant marine, which it was thought might be done through placing orders as from neutral countries.

The meeting was well attended and showed quite a spirit of enthusiasm and there seems to be a disposition upon the part of all to start an intensive campaign in the interest of American shipping.

Our Ships for Foreign Trade

Senator Joseph E. Ransdell of Louisiana, president of the National Merchant Marine Association, in a letter addressed to the council of that body, says:

"There is strong feeling among a portion of the American people that this country should have its own merchant marine for foreign trade. How much this feeling is based on patriotic sentiment and how much it is based on business and military requirements is at present an unknown quantity. As part of the salvage of the great war we now find ourselves in possession of a vast tonnage, either in being or in the various stages of construction. It is an accepted fact that a considerable portion of this tonnage is necessary for the transportation of our exports and imports if we are to conduct at least a fair proportion of our foreign trade in our own vessels. Certain nations of the world specialize in the ocean-carrying trade for other nations which do not possess their own shipping. Are we to engage in the carrying trade for other nations, and can it be done economically? All these are questions of vital import to us as a nation at the present time. Congress is lacking a policy for future legislation concerning the merchant marine. Owing to our long inactivity in ocean carrying, there is a great dearth of reliable data concerning its requirements. The Shipping Board is engaged in helping to solve the problem. The best American talent from all the co-ordinate branches of ocean carrying should be invoked in order to render advice as to what is best to be done under existing conditions."

He suggests that the purposes of the association be defined as follows:

"The purpose of this association is to aid in the development of a merchant marine under the American flag adequate to the needs of American commerce and to provide the merchant ships adequate to meet our military and naval requirements in time of war.

"To that end it shall be the business of the association—

"(a) To develop all facts relating to the need of the United States of America having a merchant marine under its own flag.

"(b) To develop and suggest to Congress a shipping policy and laws to be passed in accordance therewith, which will promote the best interests of America as a whole.

"(c) To develop and advance practical suggestions respecting the tonnage already built or contracted for by the Shipping Board following as closely as possible the results of above paragraph (b)."

The council of this association, as will be seen in the following list, includes some of the most prominent shipping men and shipowners in the United States:

Hon. Jos. E. Ransdell (acting president), U. S. Senator, Washington, D. C.; H. L. Aldrich, Aldrich Publishing Company, 6 East Thirty-ninth street, New York City; Emile P. Albrecht, president Philadelphia Bourse, Philadelphia, Pennsylvania; William Allen, commercial representative, City of New Orleans, 331 Maryland Building, Washington, D. C.; Harry A. Black, Galveston, Texas; William S. Brown, president National Association of Marine Engineers, 356 Ellicott Square, Buffalo, New York; Edward B. Burling, lawyer, Evans Building, Washington, D. C.; W. A. Bowen, editor and publisher, Arlington, Texas; J. L. Bernard, shipbuilder, 115 Broadway, Room 604, New York City; Hendon Chubb, underwriter, 5 South

William street, New York City; E. T. Chamberlain, commissioner of navigation, Washington, D. C.; T. F. Cunningham, vice-president Board of Trade, New Orleans, Louisiana; Robert Dollar, president the Robert Dollar Company, San Francisco, California; Oscar K. Davis, secretary National Foreign Trade Council, Hanover Square, New York; George S. Dearborn, president American-Hawaiian Steamship Company, 8 Bridge street, New York City; Holden A. Evans, president Baltimore Dry Docks & Shipbuilding Company, Baltimore; John H. Fahey, president St. John's River Ship Yard Company, 40 Court street, Boston; P. A. S. Franklin, president International Mercantile Marine Company, 9 Broadway, New York City; Frank P. Glass, Birmingham, Alabama; C. E. Grunsky, civil engineer, San Francisco, California; H. C. Hunter, secretary Atlantic Coast Shipbuilders' Association, 30 Church street, New York City; P. O. Knight, lawyer-shipbuilder, Knight, Thompson & Turner, Tampa, Florida; J. Parker Kirlin, lawyer, 27 William street, New York City; John H. Kirby, president National Lumber Manufacturers' Association, Chicago, Illinois; Chas. S. Keith, president Central Coal & Coke Company, Kansas City, Missouri; Paul J. Kruesi, manager American Lava Company, Chattanooga, Tennessee; Alexander Legge, general manager International Harvester Company, Chicago, Illinois; Edgar L. Luckenbach, steamship owner and operator, 44 Whitehall street, New York City; Sumner Myrick, lawyer, in charge of Marine Transportation Bureau, Chamber of Commerce of the United States, Washington, D. C.; Captain C. A. McAllister, United States Coast Guard, Washington, D. C.; H. H. Merrick, Armour & Company, Chicago, Illinois; T. F. Newman, Cleveland & Detroit Steamship Company, Cleveland, Ohio; George W. Norris, commissioner, Federal Farm Loan Bureau, Washington, D. C.; J. K. Orr, Atlanta, Georgia; John H. Pruett, president Masters, Mates & Pilots Association, 116 Broad street, Room 61, New York City; Commander W. V. N. Powelson, Overseas Transport Service, 61 Broadway, New York City; J. C. Rohlfs, manager marine department, Standard Oil Company, San Francisco, California; L. L. Richards, steamship broker, director of Bureau of Transportation, War Trade Board, Washington, D. C.; F. L. Sanford, Southern Pine Association, Zona, Louisiana; M. J. Sanders, steamship agent, Federal manager Mississippi-Warrior Waterways, 1212 Hibernia Building, New Orleans, Louisiana; Ernest T. Trigg, president Chamber of Commerce, Philadelphia, Pennsylvania; Lieutenant Commander Stevenson Taylor, president American Bureau of Shipping, 66 Beaver street, New York City; Eugene P. Thomas, president United States Steel Products Corporation, 30 Church street, New York City; Mathew Woll, American Federation of Labor, Washington, D. C.; Paul Wooton, Union Trust Building, Washington, D. C.; H. A. Wheeler, banker, president Chamber of Commerce of the United States, 7 South Dearborn street, Chicago, Illinois; Fred Arn, president J. M. Card Lumber Company, Chattanooga, Tennessee; William Butterworth, president Deere Plow Company, Moline, Illinois; H. V. Bernard, importer and exporter, Room 1802, 505 Fifth Avenue, New York City; W. R. Ingalls, consulting mining engineer, Hill Building, Tenth avenue and Thirty-sixth street, New York City; H. H. Raymond, president Clyde Steamship Company and Mallory Steamship Company, Pier 36, North River, New York City. Resigned: Paul J. Kruesi, Chattanooga, Tennessee (who nominated Mr. Arn).

Europe is Rebuilding Rapidly

AFTER ten weeks in France and England, during which he investigated, through personal observation, talks with business men and officials and reports from agents, the commercial and industrial conditions of Europe and the prospect of our own foreign trade, George A. Gaston, president of Gaston, Williams & Wigmore, international merchants, of 39 Broadway, has returned to New York.

Mr. Gaston said that the rebuilding of Europe was getting under way faster than had been deemed possible; that a greater commerce than any of them has known before is awaiting all nations; that manufacturers, exporters and importers will make more money than they ever did; that in the revival of industry and finding quick markets America has several years' advantages over Great Britain, France and Italy, and instead of sitting back and glooming the business men of the United States ought to be up and doing.

Favors Private Control of Shipping

He expressed the conviction that Great Britain will continue to be "mistress of the seas and of banking also" and that it would be unwise for the United States Government to try to operate our merchant marine, but that for two years at least use can be found for all the ships that can be built, as "our trade both coming and going will make a new record."

Mr. Gaston's views on the outlook, summarized, follow:

"All of France realizes that the nation must turn to manufactures and exports of manufactured goods to replace the loss consequent on the passage of prohibition in the United States. Substitution of factory products for those of the vineyard already is begun in the erection of factories in the region of Paris and Bordeaux. France is turning from the manufacture of luxuries to more substantial lines.

"One of the new staples is cheap automobiles, which several factories, including the Renault, will produce. There also is a plan to get the American designs of sewing machines and typewriters and make them in France. The automobile manufacturers are trying to have the government declare an embargo for at least five years on the importation of pleasure cars and trucks, but I doubt if this will be done. I think the Peace Conference will have a say about it.

"French banks have plenty of money to lend to manufacturers and the great plan of rebuilding and extending the steel mills of the north will be amply financed.

"From Belgians and his company's agents, Mr. Gaston learned that Belgium is very active in planing for restoration, and has plenty of money to finance the tremendous job."

FIREMAN'S FUN
Insures Hulls, Cargoe
HEAD OFFICE: CALIFORNIA AND SANSO

JOSEPH HADLEY, European Agent
3 LOTHBURY, E. C.
LONDON

G. KIRKHAM SMITH, Special Agent
714-715 BOARD OF TRADE BUILDING
PORTLAND, ORE.

FRANK G. TAYLOR, GENERAL AGENT FOR WASHINGTON, OREGON, ALAS

About the National Capital

IT is rumored that there is a well-defined intention on the part of the Shipping Board of disposing of all wooden tonnage as soon as possible, and that the plan involves those partially constructed as well as those already completed and in operation. The board recently received a recommendation from a committee appointed to look into the wood ship situation that such vessels be sold at something like $90 a ton, and that those building be likewise sold so that purchasers could complete them according to their own plans. Notwithstanding rumors to the contrary, there seems to be no present intention of chartering or selling steel tonnage.

No Foreign Transfers Now

In the matter of transfers to foreign flags, there has been a decided tightening up in that direction recently, and it is understood no applications are to be favorably acted upon until further instructions are received by the board from the President. Some seem to think this action, as well as that refusing yards the right to take on work for foreign account, is directly connected with deliberations at the Peace Conference—that the President considers the policy as in some manner enabling him to better negotiate for principles and conditions advanced by this country.

It is not considered likely that there will be any change in the program about yards building for foreign account until after peace is proclaimed. Immediately thereafter it is expected yards will be freed to go after such work in their own way and without government restriction of any kind.

Opinion Favors Private Ownership

In the matter of the future policy of the government in connection with shipping—whether it shall be government or private ownership—notwithstanding views to the contrary, it probably can be safely said that the preponderence of opinion in the East is for private ownership and operation. The difficulty, however, lies in working out a plan that can turn over vessels constructed during the war emergency to individuals and corporations at a price that will make competition with foreign tonnage possible and sufficiently profitable to investors to cause them to wish to continue in the business. There is no question that the board fully appreciates the necessity of writing off a large sum as war costs before such tonnage could be operated competitively, but it is considered just about as hard to bring some parts of the country to view this with favor as it always has been to convince those sections of the necessity of granting subsidies. That such a plan eventually will be evolved seems certain, but it will take time to bring about that national assent necessary before a decision to write off a proper amount can be reached.

At the convention of the National Automobile Exporters' Association in New York recently the admiralty counsel of the United States Shipping Board addressed those present on the subject of the future policy of the government towards shipping. Although it was understood the admiralty counsel was not speaking specifically for the board, nor committing it to his plans, it might be said that the ideas expressed by Mr. Campbell have been favorably commented upon by a good many here.

Only Recruiting Service Affected

What effect will the failure of Congress to appropriate a fund for the United States Shipping Board have upon the program? There will be no apparent effect except as the recruiting service is concerned. The recommendations of the board for funds were based upon continuing the modified program of building, and if the next Congress assembles by June and passes the measures that failed in the Congress just closed, matters will work along practically all right. Heretofore Congress authorized a certain building program, but appropriated only such sum of money as was necessary to carry on the work to the end of the fiscal year, June 30, 1919. The additional fund was to be appropriated from time to time as necessary. Thus, the money carried in the general deficiency and other bills which failed enactment was for continuing work after June 30, 1919. Hence, as it looks now, the work in hand will proceed as usual, notwithstanding the failure of the several bills.

Relief Vessel for Diamond Shoals

In consequence of the failure of the sundry civil appropriation bill at the session just closed, and the urgency of a lightship being placed on Diamond Shoals, the Lighthouse Bureau has determined to place there temporarily the only relief vessel which it possesses. This relief vessel has not been available earlier because of needed repairs which, by reason of the crowded condition of the yards, could not be completed.

ISURANCE COMPANY
eights and Disbursements
ETS, SAN FRANCISCO, CALIFORNIA
W. H. WOODRUFF, Special Agent
.30 BYRNE BUILDING
LOS ANGELES
O. G. ORR & CO., Managers
ATLANTIC MARINE DEPARTMENT
37-43 WALL STREET NEW YORK
BRITISH COLUMBIA, 264 COLMAN BUILDING, SEATTLE, WASHINGTON

In placing this vessel at Diamond Shoals at this time the bureau is trying as best it can to meet the needs of shipping, and, although there is every reason to believe Congress will provide at the next session a permanent vessel for this station, we should not relax our efforts and should lend every assistance to the bureau in impressing Congress with the necessity for this appropriation. During these times of heavy expenditures there is a disposition to pare to the bone, and we must not allow ourselves or our congressmen to feel that in the placing of this relief vessel at Diamond Shoals at this time that the needs have been met and that an indifferent attitude may be displayed towards the appropriation for a new and permanent vessel on this station.

AFTER DEMOBILIZATION: WHAT FLAG?

By A. G. McLellan

(Nautical Magazine)

AT the present time there are more ships building in American shipyards than in all the rest of the world put together. Our own shipyards have had an exceedingly busy time during the war in the construction of naval and merchant tonnage, not to speak of repair work, and it is confidently anticipated that full pressure will be maintained for many years to come. But in spite of what the future promises to our shipbuilding industry, the fact that we have lost our premier position in construction to America cannot be forgotten. The rapid growth of American shipbuilding raises no fears, however, in the heart of such an authority as Lord Pirrie; but it is difficult to determine if he regards the situation from a building, or an owning, point of view. For the purposes of this paper, it were as well to view the matter from a shipowning standpoint and determine, if possible, where the American menace will seriously affect our shipping industry during the next five years.

Where Will They Find Officers?

One of the many problems presented to my mind is: Where is Britain, and where is Amercia, to find the officers to handle their ships during the period under review? Remember that in pre-war days America had a very small deep-water tonnage and practically no sea stock to draw upon, and that now she is fully determined on the possession of a navy and merchant marine commensurate with her size, power and wealth. This fact is full of significance to British shipping interests and must be fully reckoned with in all future calculations.

At the moment, there are thousands of young, active officers in the navy who will soon be demobilized and returned to civil duties. I have seen many of them at their best: in command of thirty-knot destroyers, "P" boats, "Q" boats, sweepers, sloops and trawlers, or carrying on in the capacity of No. 1 in the same vessels. Their ability to handle and fight their ships is beyond question, as facts are before us and speak louder than words. Such officers, under war conditions, have matured rapidly both in ability and mentality. Often have I listened to their many arguments and fears as to what British merchant ships held in store for them, and have fallen to wondering who will get this valuable material—Britain or America. True, a portion of it will return to its original fold owing to its possession of a certain amount of seniority in decent companies when war broke out, but I feel sure that the bulk of it will trek west and officer American ships if conditions aboard British ships do not level up to something approximating American standards. In fact, I am acquainted with a score of good officers who have already transferred their affections to the American flag.

To the Highest Bidder

We must remember that all Britain stands for in the world, so, too, does America; therefore there is really no moral impediment in the way of transferring one's allegiance from the British to the American flag. Without favor to either side, even after making every allowance for economic values, one cannot help admitting that American standards and conditions, both ashore and afloat, are on a higher plane than our own. With language the same and institutions closely akin to ours in ideals and sentiments, the process then of transferring one's allegiance to the American flag becomes merely a matter of following out certain thoughts to their logical conclusions and making a few simple mental calculations as to wages and means under healthier conditions.

The war has altered most things, and it is unnatural to suppose that our merchant marine is to be left untouched thereby, and that is why I am disposed to believe that the material I have just spoken of will offer its skill and ability to the highest bidder, be he British or American.

New Grant Smith-Porter Superintendent

ALTHOUGH going to Grays Harbor soon after the signing of the armistice, when the realization that the country no longer had the same pressing need for building ships was making itself felt and having its inevitable effect upon the men—in other words, just when the change to a peace-time basis was taking place and when the Macy wage scale was a subject of more or less contention among the various shipyard crafts—J. C. Langille, the new superintendent at the Aberdeen yard of the Grant Smith-Porter Company, is taking hold with a firm hand and making good all along the line.

Grew Up in Industry

Mr. Langille has grown up in the wooden shipbuilding industry, putting in many hours and days of hard toil, graduating from the school of hard knocks to that of shipbuilding. He started in when a boy of fifteen, going to work in the yards at New Bedford, Massachusetts. Three years later, in 1889, he came West to Seattle, and the following spring helped to build the steamer Bailey Gatzert, a stern-wheel vessel of Puget Sound and Columbia River traffic.

J. C. Langille, superintendent Grant Smith-Porter Aberdeen yard

The following five years he spent in shipyards around the Sound, and then, moving to San Francisco, under Captain Matthew Turner at Benicia, he completed his trade as shipwright, joiner, draftsman and calker. He was employed at the plants of the Union Iron Works, Fulton Iron Works, and S. F. Hoy and Wright at Alameda, and at Bendivon's yard at Eureka.

Master of Steam Vessels

In 1900 Mr. Langille entered partnership with Charles Fulton and Herbert Sandstrom, building the four-masted schooner Sehome at Whatcom. One year later he accepted the position of superintendent for the Northern Commercial Company of St. Michaels, Alaska, after which he returned to Seattle and started in building and repairing vessels with Herman Sandstrom.

In 1911 he qualified as captain of inland steam vessels, and for the next five years was known around Seattle as captain, builder and owner. Later he became a draftsman for the Puget Sound Bridge & Dredge Company, and within a few months was made superintendent of the Columbia Engine Works at Portland.

In May, 1917, Mr. Langille entered the service of the Grant Smith-Porter Company at St. Johns, Oregon, as master shipbuilder and helped transform a marshy swamp land into an eight-way modern shipyard. In December, 1918, he was appointed superintendent of the dry docks for the Emergency Fleet Corporation at Portland, and after two weeks on the job was appointed to fill the vacancy caused by the resignation of Superintendent Harry Hall at the Aberdeen yard of the Grant Smith-Porter Company.

CAMOUFLAGE OF SHIPS

IN an address on camouflage, Maximilian Toch of New York, one of the early leaders in this work in America, spoke in part as follows:

"The Shipping Board, in conjunction with the navy, found it advisable to adopt methods for lowering the visibility of ships, and the important information on this subject which the public ought to know, is that if anybody thinks a ship can be lowered in visibility to a point where it becomes totally invisible, he is thoroughly mistaken. No ship, however thoroughly it may be camouflaged, can become invisible against the rising or setting sun. I have shown photographs of white flying birds and camouflaged ships against the light which show their total opacity. The navy adopted four systems, viz., the Brush, Herzog, Mackay and Toch systems, and, later on, the Toch system. But, Admiral Sims, in 1918, decided that the Wilkinson system, which bore great similarity to the Toch system, excepting that Wilkinson used blue where I used green, be adopted by the English and the Americans.

"The total effect of ship camouflage is one of distortion and not of the lowering of visibility, and a ship properly camouflaged becomes so distorted that it is impossible to tell its correct direction within twenty-five degrees. This I determined for myself by having spent a day at sea in one of our submarines, in which the camouflaged ship Parthenia accompanied us, and in five range-finding operations showed up from 10 to 18 per cent, and in no case, even at 600 yards, which is point blank fire, could the Parthenia have been hit by the U-boat from which I made my observations."

Pacific Coast Shipbuilding Returns

Albina Engine and Machine Works, Inc., Portland Ore.

Purchasing Agent, **W. L. Deute.**
Hulls Nos 11 to 19, 300 by 44 by 21.5; engines 22-36-60, 1400-h. p.

Allen Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **G. E. Hunt.**
Two Allen type vessels, 274.6 B. P. by 44.9 by 26.4.

American Concrete Pipe & Shipbuilding Co., Seattle, Wash.

One 7,500-ton concrete steamship.
One 150-foot steam concrete tugboat.
Two concrete scows, 120 feet long.

Ames Shipbuilding and Dry Dock Co., Seattle, Wash.

Purchasing Agent, **Mr. C. A. Barron.**
Twenty-seven vessels under contract, mostly 8800- ton freighters.

Anacortes Shipbuilding Co., Anacortes, Wash.

Purchasing Agent, **Will W. Dunn.**
Six wooden vessels, Ferris type, 281 by 46 by 23.6; engines 19-36-56; 1500- h. p. watertube boilers.

Anderson Shipbuilding Corporation, 602 Alaska Building, Seattle, Wash.

Purchasing Agent, **W. G. Hall.**
No. 6, 270 by 43 by 24, 1200-h. p. Scott water-tube boilers, 3-Island type; 3000 ton.
No. 7, 270 by 43 by 24, 1200-h. p. Seabury boilers, 3-Island type, for Oriental Navigation Co.; 3000-ton.
Nos. 8 and 9, 3000-ton dw. motorships. For Christoffer Hannevig, Inc.

Apex Manufacturing Company, Emeryville, Cal.

Purchasing Agent, **A. Youngholm.**
Three hundred metallic life boats for U. S. Shipping Board.
Thirty metallic life boats for shipyards.
Twelve Catamaran rafts for ship yards.

Astoria Marine Iron Works, Astoria, Ore.

Purchasing Agent, **Mr. J. A. Jackson.**
Completely outfitting 27 Hough and Ferris type wooden vessels.
Contractors for United States and French governments.
Overhauling and repair of ships a specialty.

Babare Bros., Old Town, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. Babare.**
Four wooden freighters, Ferris type.

Ballard Shipbuilding Co., Ballard, Wash.

Purchasing Agent, **Mr. T. W. Smith.**
Three wooden steamers, 215 by 40 by 18.

Ballin Water Tube Boiler Co., Portland, Ore.

Sixteen Ballin type water-tube boilers for eight steamers. For the Supple & Ballin Shipbuilding Co.
Twelve Ballin type water-tube boilers for six steamers building at the G. M. Standifer Construction Corporation.

Barnes & Tibbitts, Alameda, Cal.

Purchasing Agent, **Mr. J. J. Barnes.**
Installation of machinery and fitting out nine vessels for Emergency Fleet Corporation.
General repair and dry-docking business.

Benicia Shipbuilding Corporation, Benicia, Cal.

Purchasing Agent, **L. S. Jones**, Alaska Commercial Bldg., San Francisco, Cal.

Bethlehem Shipbuilding Corporation, Ltd. (Union Works Alameda Plant), San Francisco, Cal.

Purchasing Agent, **Mr. A. H. Williams.**
Three 12,000-ton steel freighters; hulls 170, 215 and 216.
Eighteen 12,000-ton dw. steel tankers.
Contracts for six additional freighters.

Cameron-Genoa Mills Shipbuilders, Ltd., Victoria, B. C.

Purchasing Agent, **Mr. P. D. Bannerman.**
Four Wooden freighters, 250 by 43.6 by 25; 950 h. p., 2800 tons dw.

Ralph J. Chandler Shipbuilding Co., Wilmington, Cal.

Six wooden vessels, 281 feet long.

Chilman's Shipyard, Hoquiam, Wash.

Purchasing Agent, **Mr. Iver Chilman.**
Two 3-mast auxiliary schooners 130 by 33 by 14. One 300-h. p. engine, for Belgian interests.

Coast Shipbuilding Company, Portland, Ore.

Ten wooden freighters, Ferris type, 281.6 and 268 by 46 by 26, 1400 h. p.
Contracts for four additional Ferris type freighters. Deliveries 1919.

Columbia Engineering Works (Linnton), Portland, Ore.

Purchasing Agent, **Mr. C. W. Steele.**
No. 14, motorship, 173 by 36 by 15.5; single screw Avance 320-h. p. oil engine. Delivery March, 1919. For Chr. Christensen, Jr.
No. 15, topsail schooner, 178 by 36 by 15. Delivery April, 1919.

Columbia River Shipbuilding Corp., Portland, Ore.

Purchasing Agent, **Mr. H. A. Killam.**
Fifteen steel merchant ships, 8800 tons dw., General Electric and De Laval turbines, Scotch marine boilers. Deliveries 1919. Five of above now on ways.

Commercial Boiler Works, Seattle, Wash.

Purchasing Agent, **Mr. J. H. Fox.**
Contracts for:
156 Scotch marine boilers, 14.9 inside dia. by 11 ft. long, H. S. 2695.5 sq. ft., W. P. 210 lbs., for vessels building on Pacific Coast. Delivery, twelve completed boilers per month.

Coos Bay Shipbuilding Company, Marshfield, Ore.

Manager, **Mr. J. H. Polhemus.**
Contracts for four Ferris type vessels. Length over all 281.6, 3500 dw. tons. Deliveries starting November 1st.

J. Coughlan & Sons, Vancouver, B. C.

Purchasing Agent, **J. Joseph.**
Four 8100-ton dw. freighters, 400 by 52 by 31, 3000-h. p., three Scotch marine boilers. For Dominion Government.

Crowley Launch & Tugboat Co., San Francisco, Cal.

..Purchasing Agent, **John L. Crowley.**
Six 28-foot launches with 10-h. p. engines.
Four 45-foot launches with 50-h. p. engines.
Eight covered barges, 125 by 40 by 12.
Derrick barge, 75-ton lifts, 125 by 50 by 12.

J. F. Duthie & Co., Shipbuilders & Engineers, Seattle, Wash.

Purchasing Agent, **E. C. Gaumnitz.**
Fifteen 8800-ton cargo vessels, 2800-h. p., 425 feet by 54 feet x 29.9; Scotch boilers.

Elliott Bay Dry Dock Company, Seattle, Wash.

Local repair work, cleaning, painting and overhauling.

Elliott Bay Shipbuilding Co., Seattle, Wash.

Purchasing Dept., **C. A. Morrow.**
Six vessels, 260 by 46 by 26.
Contracts for five 3500-ton carriers.

Elliott Bay Yacht & Engine Co., Seattle, Wash.

Large amount of repair work.

Feeney-Bremer Company, Tillamook, Ore.

Contract for two wooden ships. Ferris type, 281.6 by 46 by 26.

Foundation Company of British Columbia, Ltd., Victoria, B. C.

Purchasing Agent, **Mr. D. D. Long.**
Twenty 3000-ton dw. twin screw wooden steamers, 293.2 by 47.6 by 23.6, two Scotch marine boilers.

Foundation Co., Portland, Ore.

Local Purchasing Agent, **G. M. Raymond.**

Foundation Co., Tacoma, Wash.

Purchasing Agent, **Mr. Whiteside.**
Seattle Office: Smith Building.

Fulton Shipbuilding Company, Wilmington, Cal.

Purchasing Agent, **A. H. MacFarland.**
Four Hough design wooden steamers.
Nine Ferris design wooden steamers.

Grant Smith-Porter Ship Company, Aberdeen Shipyard, Aberdeen, Wash.

Purchasing Agent, **Mr. Z. A. Toye.**
Contracts for eleven Ferris type steamers.

The Grant-Smith-Porter Ship Co., Portland, Ore.

Purchasing Agent, **Mr. P. S. Sinnock.**
Contract for fourteen Ferris type ships. Length 286 feet, beam 46 feet, depth 28 feet; two standard E. F. C. boilers.

Grays Harbor Motorship Corporation, Aberdeen, Wash.

Purchasing Agent, Mr. H. L. Rich.
Twelve 4000-ton ships of Ward type. For Emergency Fleet Corporation. Deliveries about two a month.

Great Northern Concrete Shipbuilding Company, Vancouver, Wash.

Purchasing Agent, **Mr. Pacquet.**
Three concrete hulls, Nos. 4, 5 and 6, 100 by 25 by 12.6.

Hammond Lumber Co., Eureka, Cal.

Purchasing Agent, **W. R. McMillan.**
Four steamers, Ferris type.

Hanlon Dry Dock & Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **C. J. Foard.**
Twelve cargo vessels, 320.9 by 46 by 26.9; three water-tube boilers. For Emergency Fleet Corporation.

Harrison & Lamond, South Vancouver, B. C.

One auxiliary schooner.

Helser Machine Works, Inc., Portland, Ore.

Purchasing Agent, **Mr. H. P. Rasmussen.**

20 large size hawser reels for Pacific Coast Shipbuilding Co.

12 same as above for Pensacola Shipbuilding Co.

30 same as above for J. F. Duthie & Co.

44 same as above for The Columbia River Shipbuilding Co.

56 8¼ by 8 single geared winches, single gypsey.

28 8¼ by 8 single geared winches, double gypsey.

56 9 by 9 single geared winches, single gypsey.

All of above winches for Southwestern Shipbuilding Co.

180 cargo winches for Schaw-Batcher Shipbuilding Co.

200 9 by 9 cargo winches.

300 8¼ by 8 cargo winches.

Hesse-Martin Iron Works, Portland, Ore.

Purchasing Agent, **Mr. R. M. Hoffman.**

All auxiliary machinery for ten wooden steamers building by the G. M. Standifer Construction Co.

All auxiliary machinery for twenty-four wooden steamers building by the Grant-Smith-Porter Ship Co., at Aberdeen.

Anchor windlasses, cargo winches, steam capstans and steam steering gears. for eight wooden steamers building by Supple & Ballin at Portland.

Forty steam cargo winches for ten steel steamers building by the Northwest Steel Company.

One hundred and thirty anchor windlasses, forty steam steering gears and fifty hand steering gears.

Herzog Electric & Engineering Company, San Francisco

Purchasing Agent, **H. C. Toumey.**

Two 750-h. p. single gear, double reduction De Laval turbines on S. S. "Johanna Smith."

One Herzog double electric steering gear on M. S. "Katherine" at Hanlon Shipyard.

Five De Laval oil purifiers for Schaw-Batcher Company.

Five De Laval oil purifiers for the Union Construction Company.

Four De Laval oil purifiers for Bethlehem Shipbuilding Company.

G. W. Kneass, San Francisco, Cal.

Purchasing Agent, **G. W. Kneass.**

Two tow boats, 60x15, 125-h. p. engine. For Peterson Tow Boat & Lighterage Company.

Three hundred metal life boats for Bethlehem Shipbuilding Corporation, Union Plant.

Kiernan & Kern Shipbuilding Co., Portland, Ore.

Purchasing Agent, **Mr. McCall.**

Six composite steamers of Ballin design.

Kruse & Banks, North Bend, Ore.

Purchasing Agent, **Robert Banks.**

Six hulls, Ferris design, 286 by 46 by 28.

Llewellyn Iron Works, Los Angeles, Calif.

Builders of Marine Engines, Boilers, Tanks, etc., for Emergency Fleet Corporation.

Present contracts include 1400-h. p. and 2800-h. p. marine engines with marine boilers for same, for most of the ships being built on the Pacific Coast.

Also reinforced concrete bars for concrete ships being built for the Emergency Fleet Corporation at the San Francisco Shipbuilding Company's yard in Oakland and at the Pacific Marine & Construction Company's yards in San Diego.

Long Beach Shipbuilding Company, Long Beach, Calif.

Purchasing Agent, **Mr. John Craig.**

Ten steel vessels of 9000 tons.

Eight steel steamers, 8,800 deadweight tons each.

Los Angeles Shipbuilding & Dry Dock Co., Los Angeles, Cal.

Thirty-two 8800-ton dw. vessels, 410 by 54 by 29.9, 3500 I. H. P. three Foster water-tube boilers. For Emergency Fleet Corporation. Delivery 1919-1920.

West Montop, launched March 30.

The Wm. Lyall Shipbuilding Co., Ltd., North Vancouver, B. C.

Three auxiliary schooners, 235 W. L. by 44.6 by 20.6 moulded.

Two 200-h. p. Fairbanks Morse Semi-Diesel engines for these boats.

Marine Pipe and Machine Works, Inc., Seattle, Wash.

Purchasing Agent, **Mr. E. A. Lamb.**

One 6 cylinder Sumner type heavy oil engine, 650-h. p.

One 6-cylinder Sumner type heavy oil engine, 650-h. p. For Chilean Government.

Two 1200-h. p. triple exp. steam engines.

Martinolich Shipbuilding Co., 306 California Bldg., Tacoma Wash.; Yard at Dockton, Wash.

Purchasing Agent, **Mr. Martinolich.**

Three wooden 4-masted auxiliary schooners, 250 by 43 by 21; twin 240-h. p. Skandia engines. For Norwegian interests.

Matthews Shipbuilding Company, Hoquiam, Wash.

Purchasing Agent, **G. F. Matthews.**

Lumber carrier for Hart-Wood Lumber Company, 250 ft. long, capacity 1,500,000 ft.

Two auxiliary 4-masted schooners, 250 by 43 by 21. Twin 240-h. p. Skandia engines. For M. Isaakson, Norway.

McAteer Shipbuilding Company, Seattle, Wash.

Purchasing Agent. **Mr. Ramm.**

One steel vessel, 160 by 30 by 16.

Two four-masted schooners, 250 by 44 by 21; Skandia engines.

McEachern Ship Co., Astoria, Ore.

Purchasing Agent, **Mr. O. E. Draper.**

Ten steamers, 286 by 46 by 28; Hough design.

Meacham & Babcock Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **Mr. W. N. Voegtly, Jr.**

Ten hulls, Ferris type.

Moore Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **M. G. Waites.**

Sixteen 9400-ton dw. steel freighters, 402 feet 6 inches by 53 feet by 34 feet 6 inches; 2800 h. p. For U. S. Shipping Board.

Ten 10,000-ton dw. steel tankers, 425 feet by 57 feet by 33 feet; 2800 h. p. For U. S. Shipping Board.

Fitting out:

Tuckenuck. Launched January 30, 1919.

Motorship Construction Co., Vancouver, Wash.

Purchasing Agent, **J. W. Dougherty.**

Large number of wooden and metal lifeboats and Columbia River fishing boats.

Also contract for 750 lifeboats for Emergency Fleet Corporation.

National Engineering Corporation, Wilmington, Calif.

Outfitting ships for Emergency Fleet Corporation.

New Westminster Construction & Engineering Co., New Westminster, B. C.

Purchasing Agent, **Mr. H. M. Fullerton.**

Four 2800 dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

Five 1500-ton dw. wooden freighters, 204 by 40.6 by 17, 550-h. p. twin engines, watertube boilers.

Nilson & Kelez, Seattle, Wash.

Purchasing Agent, **Mr. Kelez.**

Eight wooden hulls, Ferris type.

Northwest Steel Company, Portland, Ore.

Purchasing Agent, **Mr. W. C. Smith.**

Sixteen freighters, 425 o. a. by 54 by 29.9, 8800 tons dw.; geared turbine drive; 3 Scotch boilers fitted for either coal or oil fuel.

Eight freighters, 425 o. a. by 54 by 29.9, 8800 tons dw.; geared turbine drive; 3 Scotch boilers fitted for coal.

Ten freighters, 3000-h. p. turbine engines.

Pacific American Fisheries, South Bellingham, Wash.

Purchasing Agent, **Mr. B. U. Slyster.**

Pacific Boat & Iron Works, Portland, Ore.

Two hundred metal lifeboats and 100 liferafts for steel yard in this district.

Contract for several Corser's one-man simultaneous releasing hooks for lifeboats.

Pacific Coast Shipbuilding Co., 317 First National Bank Bldg., San Francisco, Cal.; Plant, Bay Point, Cal.

Purchasing Agent, **Mr. J. M. Duke.**

Ten 9500-ton dw. steamers.

Pacific Construction Co., Ltd., Coquitlam, B. C.

Purchasing Agent, **Mr. R. W. Holland.**

Two 2800-ton dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

No. 3, Wooden steamer, 250 by 43.6 by 25, 1000-h. p. water-tube boilers.

No. 4, Same as No. 3.

Nos. 5 and 6, 1500-ton full-power barges, 204.8 by 39.8 by 17, 275 I. H. P. engines, 5 water-tube boilers.

Pacific Marine and Construction Company (Schofield Engineering Company) San Diego, Cal.

Contracts for two concrete ships of 7500 tons.

Pacific Marine Iron Works, Portland, Ore.

Purchasing Agent, **Mr. V. L. Hamlin.**

Contracts for twelve 1600-h. p. triple expansion engines.

Contracts for six 1400-h. p. triple expansion engines.

Thirty-two boilers for Standifer Construction Co.

Sixteen boilers for Supple & Ballin Shipbuilding Co.

Patterson-MacDonald Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **W. J. Thomas.**

Ten wooden steamers, 281.6 by 46.10 by 27, twin screw, triple expansion engines, 1550-h. p. 30"-15½-25½-42. Two Heine boilers.

Pacific Shipbuilding Corpn., Seattle, Wash.

Purchasing Agent, **C. H. Jones.**

Yard designed with six building ways.

Peninsula Shipbuilding Co., Portland, Ore.

Purchasing Dept, **Mr. H. H. Fisher.**

Contracts for twelve steamers, 287 by 49.8 by 27.6. To be equipped with Westinghouse turbines.

Puget Sound Boiler Works, Seattle, Wash.

One Scott Patent Water Tube Boiler, 200-h. p. pressure, for Anderson Shipbuilding Co.

Contracts for condensers, water feed tanks, boiler casings and smoke stacks.

Large amount of local marine repair work.

Puget Sound Bridge & Dredging Co., Seattle, Wash.

Purchasing Agent, **Mr. Moore.**

Complete installation of machinery for twenty-four wooden vessels.

Two wooden hulls, Grays Harbor Motorship type.

Six 5,000-ton wooden hulls.

Geo. F. Rodgers & Co., Astoria, Ore.

Purchasing Agent, **W. N. Browning.**

Contracts for two 3500 ton cargo carriers

Six hulls, Ferris type, 3500 tons dw., 281.6 by 46 by 26. For U. S. Shipping Board.

Rolph Shipbuilding Company, Eureka, Cal.

Purchasing Agent, **John D. Stelling.**

Nine steamers, Ferris type, for U. S. Shipping Board.

Two four-masted barkentines, 1,650,000 feet lumber capacity. For builders' account.

One tug-boat, 750 h. p., for Rolph Navigation & Coal Company.

Sanderson & Porter, Raymond, Wash.

Purchasing Agent, **Mr. Wm. Evans.**

Four wooden hulls, Ferris type, standard wood steamships. Delivery 1919.

S. S. "Biscayne," launched March 15, 1919.

San Diego Marine Construction Co., San Diego, Cal.

Purchasing Agent, **C. W. Stose.**

No. 132, "U. S. No. 2," 35 by 7 by 2, 150 h. p.

No. 135, "U. S. No. 3," 40 by 7 by 2, 200-h. p.

No. 136, Tow-boat "Pullet," 55 by 12 by 7.6; 100 h. p. Leary oil engines. Delivery April, 1919. For San Diego Tow Boat Company

San Francisco Shipbuilding Co., 310 California St., San Francisco, Cal.

Purchasing Agent, **Mr. J. M. Cummins.**

Two 7500-ton dw. bulk oil steamers and one 7500-ton dw. freighter, reinforced concrete, at Government Island Plant, Oakland, Cal.

Schaw-Batcher Company, South San Francisco

Purchasing Agent, **K. I. Dazey.**

Three single-screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2500-h. p. Curtis turbines, 4 Heinie boilers.

Ten single-screw freighters, 8800-ton dw., 427 by 54 by 29.9; 2800-i. h. p. reciprocating engines, 24½ by 41½ by 72 by 48; three Scotch boilers. Deliveries -1919.

Seaborn Shipyards Company, Tacoma, Wash.

Purchasing Agent, **P. J. Anderson.**

Fourteen hulls, Ferris type. Deliveries by April, 1919.

Four-way yard prepared for any kind of wood construction.

Seattle Machine Works, Inc., Seattle, Wash.

Purchasing Agents, **Frank H. Wheelon** and **D. Crause.**

Eight 2700-h. p. triple-expansion engines for Skinner & Eddy Corporation.

Six 750-h. p. triple-expansion engines for Pacific American Fisheries.

One 500-h. p. triple expansion engine for McAteer Shipbuilding Co.

Seattle-North Pacific Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **F. H. Magune.**

Ten freighters, 402.5 by 53 by 34.5. Parson turbine, three Foster boilers. Deliveries 1919.

Skandia Pacific Oil Engine Co., Oakland, Cal.

Purchasing Agent, **Mr. L. M. Bliss.**

Twenty 825 B. H. P. Werkspoor Diesel engines for installation in 5600 tons steel fabricated motorships.

Six 500-h. p. Skandia oil engines; four 240 h. p. and six 120 h. p. engines.

Additional engines of smaller capacity.

Skinner & Eddy Corporation, Seattle, Wash

Purchasing Agent, **Ray Anderson.**

Contracts for sixty 9600-ton dw. freighters.

S. S. "Eldena," launched March 21.

Sloan Shipyards Corporation, Olympia, Wash.

Purchasing Agent, **Mr. L. P. Byrne.**

Sixteen freighters, 281.6 by 46 by 26, 19-32-56 by 36; 1400-h. p.

Smith & Watson Iron Works, Portland, Ore.

Purchasing Agent, **Mr. H. W. Bates.**

Contracts to furnish all castings, fittings, condensers and auxiliary machinery for thirty-two ships building by Columbia River Shipbuilding Corporation.

Somarstrom Shipbuilding Co., Columbia City, Ore.

Four wooden steamers, Hough design, 288 feet long.

Four wooden steamers, Ferris type.

Southwestern Shipbuilding Co., Los Angeles, Cal.

Twenty-three single screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2800 i. h. p. reciprocating engines; three Scotch boilers. For U. S. Shipping Board.

"West Cavanal," launched March 20.

Standard Vault & Metal Works, Portland, Ore.

Purchasing Agent, **Mr. R. G. E. Cornish.**

Life boats, life rafts.

Sheet metal equipment for ships.

G. M. Standifer Construction Corp., North Portland, Ore., and Vancouver, Wash.

Purchasing Agent, **Mr. H. Luckett,** Vancouver, Wash.

Four wooden freighters, 281 by 46 by 26; 1700-h. p., Ferris type.

Five composite steamers, Ballin design, 4500 tons.

Fifteen steel steamers, 9500 tons. Delivery early in 1919.

Stephens Bros., Stockton, Cal.

Two wooden towboats, 50 by 13 by 8, for Island Transportation Co.

One 65 ft. by 14 ft. butcher boat, equipped with 6-cylinder Wisconsin motor. For Pollard Brothers.

One 40 ft. by 7½ ft. raised deck runabout cruiser, equipped with 6 cylinder Wisconsin motor. For Mr. W. Q. Wright, of the Bay & River Dredging Company.

St. Helens Shipbuilding Co., St. Helens, Ore.

Purchasing Agent, **Mr. Barnett.**

No. 42, schooner, 286 o. a. by 48 by 27; to the order of Chas. R. McCormick & Co.

Fort Sheridan, launched February 11, 1919

Fort Shaw, launched February 11, 1919

W. F. Stone Shipbuilding Co., Oakland, Cal.

Purchasing Agent, **Mr. Lester F. Stone....**

Four 150-foot wooden hulls for seagoing tugs, 30-foot molded beam by 17 ft. depth.

Miscellaneous repair work.

Supple & Ballin Shipbuilding Corporation, Portland, Ore.

Purchasing Agent, **Mr. Charles Burton.**

Eight 4500-ton steamers, Ballin design, 309 feet o. a. by 44 by 26, diagonal planked, steel reinforcing on top sides, single screw; 1500-h. p.

Nos. 9 to 12, Same as above.

Tacoma Shipbuilding Company, Tacoma, Wash.

Purchasing Agent, **Mr. D. D. McKay.**

Contracts for six Ferris type vessels. For U. S. Shipping Board.

T. R. Trahey, Ballard, Wash.

One oil barge, 110 feet long and 32 feet wide, capacity 150,000 gallons. For General Petroleum Company

Tregoning Boat Co., Seattle, Wash.

Purchasing Agent, **Mr. C .Tregoning.**

A large number of lifeboats and ship power launches.

Todd Dry Dock & Shipbuilding Co., Tacoma, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

Eight cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 watertube boilers.

Twenty-four cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 S. E. S. boilers.

All of above for Emergency Fleet Corporation. Deliveries by January, 1920.

Todd DryDocks, Inc., Harbor Island, Seattle, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

General drydock and repair work.

Union Construction Company, Oakland, Cal.

Purchasing Agent, **Mr. Chas. L. Froding.**

Contracts for 10 steel ships of 9400 tons, Isherwood type, 402.5 by 53 by 34.5; three watertube boilers, 2800-h. p. turbines. For the U. S. Shipping Board.

Vancouver Shipyards & Engine Works, Ltd., Vancouver, B. C.

Contracts in hand for two wooden vessels.

Wallace Shipyards, Ltd., North Vancouver, B. C.

Purchasing Agent, **Mr. C. Wallace.**

Three steamers, 300 by 45 by 27, single screw, reciprocating engines.

Contracts for four 8,100 dw. steel vessels.

Western Canada Shipyards, Ltd., Vancouver, B. C.

Five 195 by 39.8 by 17 watertube boilers.

Willamette Iron & Steel Works, Portland, Ore.

Purchasing Agent, **Mr. R. B. Woodbury.**

177 high-pressure, three-furnace, Scotch marine boilers for vessels building in Pacific Coast yards.

Building and installing all machinery on Northwest Steel Company's hull, 15 to 24, inclusive.

Building and installing all machinery on G. M. Standifer Construction Corporation's wooden hulls, 24 to 29, inclusive.

Wilson Shipbuilding Company, Astoria, Ore.

Purchasing Agent, **W. G. Wray.**

Five wooden vessels, 281.6 by 46 by 26; Ferris type. For Emergency Fleet Corporation. Delivery March 1 to August 1, 1919.

Wilson Shipyards, Inc., Seattle, Wash.

Three building-ways ready for constructing wooden vessels up to 3500 tons.

Wright Shipyards, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. P. Wright.**

Two wooden steamers, "Elissa" and "Endymion," 3500 tons each, length 282 feet, beam 46, depth 26. For U. S. Shipping Board.

Yarrows, Ltd., Esquimalt, B. C.

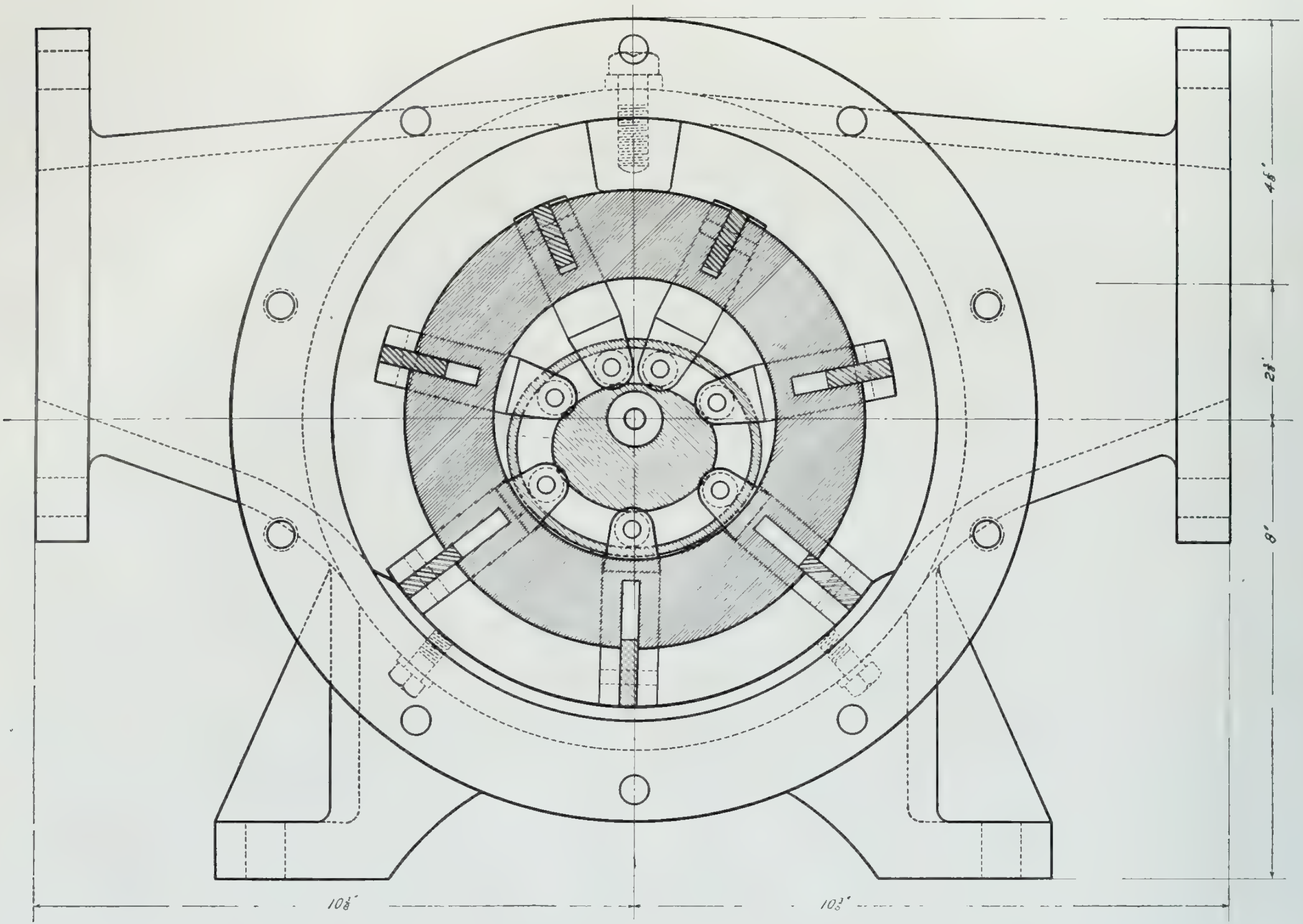
Two shipways suitable for building vessels up to 350 feet in length.

Marine repairs a specialty.

OTHER SHIPBUILDING COMPANIES

American Shipbuilding Company, Warrenton, Ore.
Ballard Marine Railway Company, Seattle, Wash.
Chico Shipbuilding Co., 4185 Arcade Building, Seattle, Wash.
Clapp & Reed Shipbuilding Company, Seattle, Wash.
Columbia River Shipbuilding Co., Vancouver, Wash.
Craig-Wilde Ship Company, Los Angeles, Cal.
Wm. Cryer & Son, Oakland, Cal. W. E. Cryer, Purchasing Agent.
Fellows & Stewart, Inc. V. B. Stewart, Purchasing Agent, Wilmington, Cal.
French-American Shipbuilding Corp., 418-420 Marsh-Strong Bldg., Los Angeles.
Halstrom Shipbuilding Co., Inc., Seattle, Wash.
International Shipbuilding Company, Columbia City, Ore.
King & Winge Shipbuilding Co., C. B. Winge, Purchasing Agent, Seattle, Wash.
Marine Iron Works, Seattle, Wash.
Mare Island Navy Yard, Mare Island, Cal.
Muller Shipbuilding Company, 410 I. N. Van Nuys Building, Los Angeles, Cal.
Oceanic Shipbuilding Co., Milwaukee, Ore.
John E. Price & Company, Hoge Building, Seattle, Wash.
Port Blakeley Shipyard, Port Blakeley, Wash.
Puget Sound Navy Yard, Bremerton, Wash.
T. B. Puck & Co., Honolulu, T. H.
Raymond Shipbuilding Co., Raymond, Wash.
Sehrs Shipyard, Port Townsend, Wash.
South Bend Shipbuilding Co., South Bend., Wash.
Southern California Shipbuilding Corporation, 405 Trust & Savings Bldg., Los Angeles, Cal.
H. D. Stewart Shipbuilding Company, American Bank Building, Seattle, Wash.
Union Timber & Products Co., O. L. Craven, Pres., Port Towsend, Wash.
United Shipbuilding Corporation, Hoge Bldg., Seattle, Wash.
U. S. Steel Shipbuilding Corp., Ltd., Los Angeles, Cal.
Varney Shipbuilding Corporation, Seattle, Wash.
Washington Shipbuilding Corp., C. E. McMasters, Pres., Burke Bldg., Seattle, Wash.
West Coast Shipbuilding Co., H. W. Hellman Bldg., Los Angeles, Cal.

A Unique Rotary Pump



The Monarch rotary pump

THIS pump is of the rotary type, but unlike all other rotary pumps, the blades, or vanes, impelling the fluid pumped are controlled by a series of arms projecting or radiating from the center of and through the surface of the rotor. These arms are connected up to a grooved harmonic plate cam situated within the rotor. This cam is stationary when the pump is in motion and therefore causes the arms to project and retract systematically along the cam curve.

On the side of the rotor where the blades are retracted there is situated, on the inner wall of the cylinder, an abutment fitting up closely to the rotor. This prevents the water from churning around with the rotor. On the opposite side from the abutment, at the point where the blades are extended, there is situated, also on the inner face of the cylinder, a draftplate formed so that its curve is parallel with the curve of the cam.

Adjustable to Wear

This abutment and the draftplate both are adjustable to wear and are set close to prevent slippage, but owing to the positive control of the blades in the rotor there is no friction between the blades and draftplate nor between rotor and abutment; so it is clearly seen that the rotor, or impeller, is rotating perfectly freely and without coming in contact with its housing at any point. The inner mechanism controlling the blades is thoroughly and effectively lubricated by means of a channel through the stationary cam shaft.

This pump is made in all sizes and for all purposes, for deep wells, as well as surface installation, for mining, irrigation, bilge pumps, hydraulic and fire pumps. It is unexcelled for suction; even the smallest size holds the limit in vacuum; is self priming, and does not need a foot valve.

In Proportion to Speed

As to capacity, considering weight, a pump weighing 450 pounds will deliver 750 gallons a minute. This pump will deliver absolutely in proportion to speed. For instance, a 1000-gallon pump can be run so slow as to deliver only fifty gallons a minute. On the other hand, a pump designed for only 400 gallons a minute can be speeded up to deliver 800 gallons a minute. Of course, this is not recommended.

This pump is also made in deep well style for lowering into bored wells, as small as six inches in diameter. This size is good for 100 gallons a minute, speed about 600 r.p.m., and for a twelve-inch well the capacity is normally about 600 gallons a minute, speed 400 r.p.m.

1. Under actual working conditions this pump will develop an efficiency of 80 per cent.
2. It has lifted water (center of suction to surface of water) 31 feet 8 inches, at sea level.
3. A pump of 750 gallons a minute capacity occupies a floor space of 28 by 32 inches and weighs approximately 450 pounds (size, 6 inches).
4. This pump will work from 1 to 300 feet head. Above this head they are multi-staged to suit.

Variations of Speed Possible

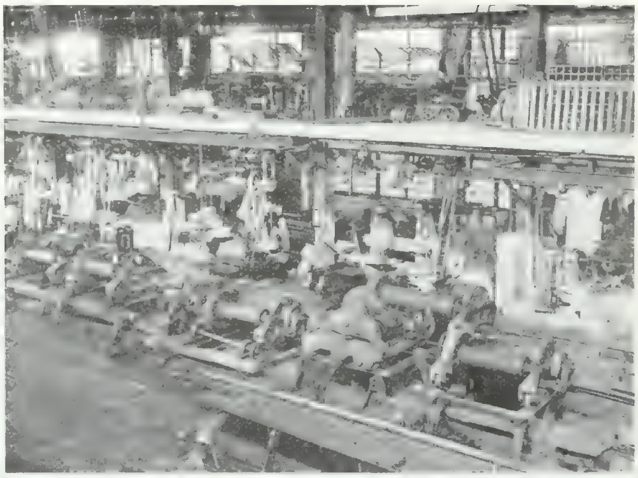
5. While its maximum efficiency is obtained at a definite speed, great variations of speed may be made while still holding high efficiency.
6. It can be operated in either direction if necessary. It is preferable to operate in one direction normally, but if it is desired intermittently to reverse the conditions of suction and discharge, it can be done.
7. The mechanism operating the blades is perfectly lubricated and entirely enclosed, insuring long life.
8. It is adjustable to wear.

This pump is not an experiment and has been in service nearly three years in various classes of work.

Ship Stability and Trim, by Percy A. Hillhouse, B.Sc., M.I.A. Two hundred and ninety-six pages. Many illustrations and diagrams. D. van Nostrand Company, New York. $4.50 net.

An excellent treatise on a very timely subject. Every work on naval architecture must include chapters on stability and several treatises have been devoted entirely to the theoretical and mathematical aspects of the subject. The aim of the author of this volume is to present the practical side and more especially from the standpoint of the shipowner, ship operator and ship master.

Shipment of two girders, composing one of the crane bridges for the Cramp yard



Champion crane trolley assembling floor, showing portions of two machine shops

The Champion Engineering Company

THE electric traveling crane of the standard overhead type, termed the "bridge type," is the premier machine tool or the most essential machine required in practically every shop or material-handling yard. The design and manufacture of electric traveling cranes has improved for the last seven years with very rapid strides. In fact, ever since the perfection of the material grab-bucket and the lifting magnet, the uses to which electric traveling cranes can be put have greatly multiplied.

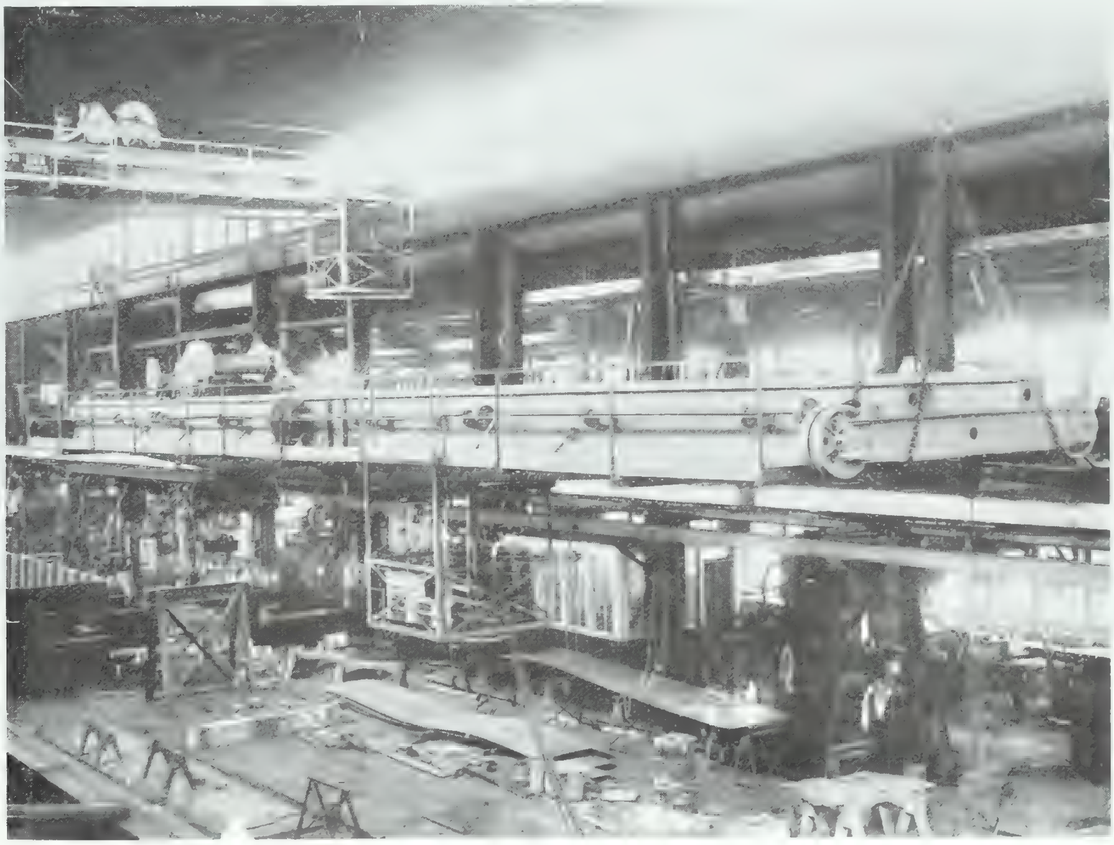
The demand for electric traveling cranes during the war emergency was for a while without limit, as reflected by the long deliveries quoted by manufacturers of this article, but well toward the end of the war conditions had adjusted themselves to such an extent that electric traveling cranes could be secured within reasonable time delivery.

Among the electric traveling crane manufacturers who had a good share in supplying the manufacturers of this country with cranes during the war emergency was the Champion Engineering Company of Kenton, Ohio, manufacturers of Champion cranes. Although this concern is comparatively new as compared with the old-established crane builders, who have been in business for a number of years, yet the Champion organization is not new, as the members who compose it are men who have had many years' experience in various capacities among the largest crane builders of the United States. Both the engineering and operating departments of the Champion are composed of men who are considered experts in their respective lines.

Bought by Discriminating Concerns

The bulk of the customers of the Champion Engineering Company are manufacturers who have for many years bought quite a number of cranes for their plants — in other words, discriminating buyers who represent the largest concerns in the United States.

The plant of the Champion Engineering Company is located on a twenty-four-acre plot in the city of Kenton, Ohio. The plant has good shipping facilities and is served by switches from the Chicago & Erie Railroad tracks, the Big Four and Toledo & Ohio Central Railways. This plant has recently been enlarged and equipped with new machine tools, both standard and special, and power-plant equipment. It consists of eighteen miscellaneous buildings. A large machine shop and assembling floor 125 feet wide by 300 feet long, two stories high, with a high level central bay served with electric traveling cranes, makes it



Completely assembled crane, before being taken apart, all ready marked for shipment possible to assemble and erect on the floor cranes of large capacity and span, as well as great height. Incidentally, it is the practice of the Champion Engineering Company to operate all the motions of all the cranes completed on the assembling floor, the same as they would be on the customer's runway. All the machinery is tested and marked before taking down for shipment. A track runs the entire length of the assembling building, permitting a considerable number of cars to come under the cranes for shipping purposes.

The Operating Departments

The various operating departments are as follows: Engineering department, pattern shop, gray iron foundry, brass foundry, structural steel fabricating shop, machine shop, fitting shop, general assembly, and it also has several auxiliary shops, such as electrical experimental rooms, crane wiring, loading-shipping departments. It is the practice of the Champion Engineering Company to build its standard units in large quantities, making it possible to ship cranes in a relatively very short time as the immense stock of structural steel, gray iron, bronze and steel castings, electric motors and control equipment makes this possible. The finished crane parts are rigidly inspected before assembling and after testing.

General view of the Champion crane plant

The arrangement of the buildings is such that it permits the construction and assembling of the cranes to follow along straight lines. The location of this plant may be said to be at the natural and logical center of crane business. It is accessible to the Eastern Coast and just as accessible to the Pacific Coast as any Eastern crane builder. It is close to and is quickly supplied by the steel warehouses, at Cleveland, Chicago, St. Louis and the Pittsburgh district. The majority of the men in the plant have been in this community for years and practically all of them own their own homes. Therefore, the labor "turnover" is very low. The most excellent spirit exists among the rank and file of the organization. They have their own social clubs, and the company operates a restaurant — cafeteria style — where good food is furnished the men at cost. The Champion organization is very proud of its basketball team, known as "Champion Cranes." The team is the best in Northern Ohio.

Four Built for Cramps

Among the large number of Eastern shipyards to which the Champion Company has furnished cranes is the William Cramp & Sons' Ship & Engine Building Company, for which it has built four large special overhead traveling cranes for the ship ways. These cranes are four in number, twenty-ton capacity, 112-foot span, with lattice (open work) girders, equipped with double bridge drive and magnet control throughout. These cranes are also equipped with four-ton very rapid auxiliary hoist and include special features of design developed for this particular installation. They operate on a runway approximately 125 feet above the water line. Two cranes are on each runway, making it possible for a pair of these cranes when locked together to lift a completed bulkhead in position after it has been brought by them from the fabricating shop.

This concern is represented on the Pacific Coast by L. G. Henes, with offices at 75 Fremont street, San Francisco; Title Insurance Building, Los Angeles; and also at Portland and Seattle by the Portland Machinery Company and Hallidie Machinery Company as sub-agents for Mr. Henes, who is Pacific Coast manager. The Champion Company has four offices on the Atlantic Coast. Quite a number of installations have been made on the Pacific Coast, the most recent of which is at the Joshua Hendy Iron Works plant at Sunnyvale. Mr. Henes has had many years of experience in the sale and distribution of cranes, and his intimate knowledge of manufacturing conditions and machine shop practice should be of great value to the industrial managers of the Pacific Coast.

PIPE BENDING FIRM TO REORGANIZE

The American Pipe Bending Machine Company, with offices at 39 Pearl street, Boston, Mass., U. S. A., is about to open up pipe-bending plants in all large cities throughout the country. The first plant is about ready for operation at Lowell, Mass. "Wonder" pipe benders, manufactured by this company, will be used at all plants. The company will make a specialty of furnishing bent pipe and make delivery of small orders in forty-eight hours' notice. Heretofore contractors and other users of bent pipe have had to wait from two weeks to three months to get deliveries. Each plant will have facilities for turning out from 1000 to 3000 bends per day and will be in charge of an expert pipe bender. The present company was capitalized at $100,000, but is about to reorganize with a capital of $1,000,000 to carry on this business.

CHICAGO PNEUMATIC MOVES OFFICE

The Chicago Pneumatic Tool Company announces the removal of its Cleveland district office from Room 813 to Rooms 406-408, Engineers' Building, effective March 1. The new headquarters will provide excellent facilities for giving the best possible service to the company's expanding interests within the Cleveland district. Ross Watson, district manager, will gladly welcome visitors to the new offices.

Electrical Industrial Apparatus

THE last four years have been a proving time for industrial equipment. Particularly has this been true of handling machinery; many new types of equipment have come to the fore; some old types have gone into the discard; some already well recognized further have established their efficiency and usefulness.

Prominent in the latter class is the electric industrial truck, which has seen a remarkable development as the necessities of increased production have emphasized the value of this method of interior and exterior transportation as encountered in industrial establishments, factories, at railroad and steamship freight terminals, warehouses, etc.

Trucks Pay for Themselves Quickly

The use of efficient transportation methods is particularly of interest to merchants and manufacturers on the Pacific Coast, where a high labor cost is always encountered.

The economic advantages of the electric truck and tractor have been so great that frequently a truck has paid for itself in a few months, and there are innumerable cases where the saving effected per unit is about $10 a day. In one instance a manufacturer reported a saving of $500 a week from the use of one crane-truck.

Among the manufacturers who have been to the fore in developing the industrial truck is the Baker R. & L. Company of Cleveland, Ohio. This company has been engaged exclusively in the manufacture of storage battery driven vehicles for twenty years and the line of industrial machines it now builds is the result of that experience.

Built for Heavy Duty

The equipment built by this company comprises tractors, utility load carrying, elevating and low-platform trucks, and swivel, carrying and stacking crane types. Its experience has indicated that in almost every case where industrial vehicles have failed to make good it has been on account of the failure of the manufacturer to appreciate the severity of conditions under which this type machine is usually operated. As a consequence, the Baker R. & L. product is especially built for heavy duty service and is of extremely rugged construction. In addition to this, realizing the necessity for proper standardization of parts to facilitate repairs and also to keep down manufacturing costs, the company has developed a system of inter-standardization, which makes all vital parts, such as complete driving axle, worm gears, differential, wheels, universal joints, driving shafts, controllers, automatic cut outs, brakes, steering mechanism, etc., identical and interchangeable on all models.

The Baker R. & L. Company is now actively represented in California by the firm of Gunn, Carle & Company, 444 Market street, San Francisco, successors to the old established firm of Woods, Huddart & Gunn. Gunn, Carle & Company have a competent staff of engineers whose experience in the industrial field particularly equips them to solve problems involving haulage and transportation.

Baker R. & L. tractor handling metal in congested room

Baker R. & L. utility truck with trailer

Baker R. & L. tractor hauling sheet metal in a modern factory. Note idle overhead crane. This shows the greater economy of handling materials by tractor

Pacific Coast Coal Company

Seattle bunkering terminals of the Pacific Coast Coal Company

TO THE shipowner or operator sources of fuel supply are always matters of prime consideration. But the North Pacific Coast is particularly fortunate in having an abundance of excellent coal, easy of access to marine bunkers. Coal from this district not only motivates ships that go to ports of all the world, but cargoes are carried far and wide, with a market that promises notable expansion.

Keeping pace with the development of the mines is that of the facilities for handling coal in the North Pacific ports. Hundreds of thousands of dollars have been expended within the last few years in providing equipment of the most modern kind for the quick loading of coal in ships. With the big vessels that come into these ports worth hundreds of dollars a day, the time of loading is a vital matter, so it has been essential, if the North Pacific ports are to compete with others in a maritime way, that facilities compare favorably with any in the world.

The Pacific Coast Coal Company, with its parent company, the Pacific Coast Company, having headquarters in Seattle and being the largest miner of commercial coal on the Pacific Coast, has been quick to see the necessity of providing adequate facilities for coal bunkering and handling, and has established at Seattle, Tacoma and Portland marine and domestic terminals with the most modern and efficient equipment for the quick loading of any sort of vessel that may desire fuel for cargo or its own use.

Seven mines are operated by the Pacific Coast Coal Company, with a total production of more than a million tons a year. Among the coals produced are the famous Black Diamond and South Prairie, known favorably among shipping men for two generations or more. In addition, the Pacific Coal Company has become a large importer of the best grades of outside coals, including "Hi-Heat," one of the very best known fuels produced in the Utah field.

N. D. Moore, vice-president of the Pacific Coast Coal Company

With such a source of supply, the Pacific Coast Coal Company has placed itself in a position of being able to provide almost any fuel or fuel combination that could be desired, and through its transportation, storage and terminal facilities is able to insure proper and speedy delivery of its products to the holds, bunkers or galleys of anything from the smallest to the largest craft.

Located at a particularly convenient point in the heart of the Seattle waterfront, the company has built up a great terminal for ship-loading that will take care of four large vessels at one time, with delivery equipment that can operate up to 600 tons an hour. This is regarded as one of the most efficient terminals in existence in any port. Wide berthing facilities and deep water make it possible for the very largest vessels afloat to find ample accommodations.

The Pacific Coast organization has a history starting far back in the last century, and is a very extensive concern in its various fields of operation. It acquired large land holdings many years ago, and the big terminal for coal handling was on the fringe of Seattle's waterfront in those days, but now it is in the center of things, right adjoining the shipyards of Skinner & Eddy, and within a few steps of Seattle's wholesale and business district. Close at hand are the ship chandlery stores and supply houses.

The photograph gives an excellent view of the coal company's Seattle terminals, with the Pacific Coast Engineering Company's dock (this being an allied company) showing on the extreme left. Right in the center of the background the picture shows the forty-two-story L. C. Smith Building, in which the company's general offices are located. At the right and beyond the coal bunkers may be seen the construction and repair shops of the Pacific Coast Railroad Company, another allied company which brings the coal to tidewater from the Pacific Coast mines.

In these Pacific Coast shops shipowners have another convenience, for they are prepared to turn out any sort of marine construction or ship repair work, having a large force of skilled workmen under direction of practical, experienced engineers. Compressed air is piped directly to the coaling berths.

Tacoma is well provided with marine bunkering equipment, too. The marine terminal of the company faces the Tacoma waterway, and there vessels of moderate size are quickly accommodated, while the large steamships are loaded with Pacific Coast coals at the electric bunkers of the Northern Pacific Railway Company.

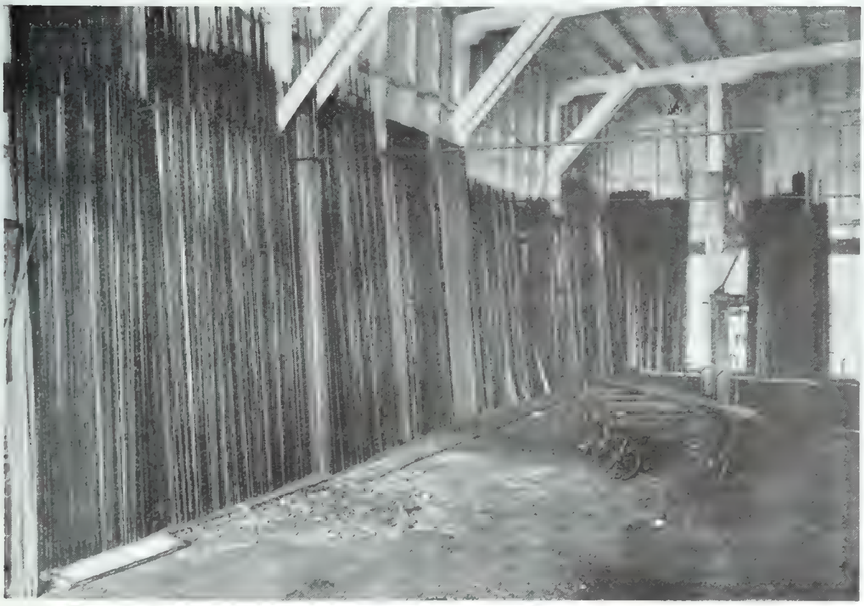
In Portland new bunkering terminals have just been completed, affording exceptionally efficient facilities for marine loading. The many big liners and tramp carriers that enter the Port of Portland can be assured of quick service under the most favorable conditions.

The general Pacific Coast organization is headed by President William M. Barnum, with headquarters in New York.

Drake Lock Nuts

Four-spindle national Acme full automatic screw machines used in the manufacture of Drake lock nuts

Part of stock room and tool room



Stocks of cold-rolled hexagonal steel from which Drake lock nuts are manufactured

THE history of the establishment of the Drake Lock Nut Company in San Francisco is interesting from the standpoint that it is the first automatic screw machine plant established on the Pacific Coast for the manufacture of a commodity that has gone into the world's market.

The Drake Lock Nut was originated by George F. Drake and completed, in a mechanical and engineering way, late in the fall of 1916.

In the spring of 1917 Mr. Drake was in the East and purchased the entire equipment for the automatic screw machine plant to be established in San Francisco for the manufacture of Drake lock nuts automatically. He returned to San Francisco on the day war was declared, so one could imagine, with all the strenuous times that war conditions brought to manufacturers in the steel trade, that he had a very strenuous time before him.

Manufacture Begun in 1917

Nevertheless, with untiring energy and unceasing labor a model automatic screw machine plant was established and the manufacture of Drake lock nuts began early in the fall of 1917.

This demonstrates what can be done with manufacturing on the Pacific Coast and in San Francisco. Drake lock nuts are milled from the solid steel hexagon bar on automatic screw machines. The steel bars were brought from Pittsburgh and the Drake lock nut manufactured in San Francisco. A very great number were sold and shipped to many points east of the Rocky Mountains, to Pittsburgh itself, and to all the large cities on the Atlantic seaboard.

Thus Mr. Drake proved that a staple commodity could be manufactured in San Francisco and sold in the various markets of the world. The best proof that this has created a genuine interest in the East is the fact that recently one of the largest manufacturers of bolts has taken over the Drake Lock Nut Company's interests east of the Rocky Mountains and is now manufacturing Drake lock nuts in Cleveland.

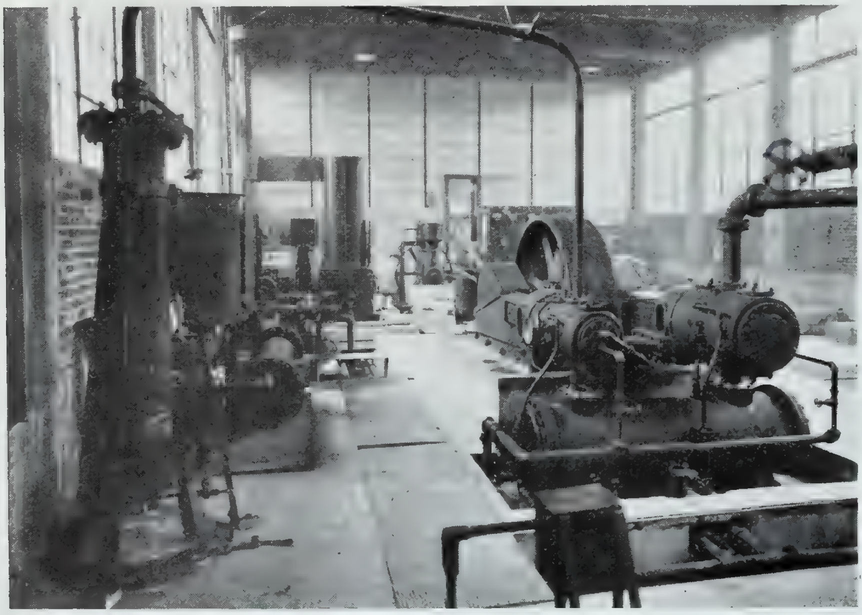
Large Quantities Shipped to Orient

Mr. Drake states that the San Francisco plant still will manufacture for the business west of the Rocky Mountains and for the Oriental demand, which has begun to develop in good shape. The company has recently shipped large quantities to Singapore, Calcutta and Shanghai.

Mr. Drake, the vice-president and general manager, states that the company is enthusiastic over the modern idea of "better business" and that the policy and pride of the company is to make the very best article of its kind that can be made, of the very best material and the very best workmanship, thus doing its bit to sustain the reputation of San Francisco for producing material and merchandise of merit.

Oxyacetylene Service

Seattle plant, Air Reduction Company of California



Compressors, Seattle plant, Air Reduction Company of California

Air bottles in stock, Air Reduction Company of California

THE Air Reduction Company of California recently has moved into its new plant located at 3623 East Marginal Way, in the heart of the shipbuilding district of Seattle. This plant has now a capacity of 50,000 cubic feet a day, and within three months this daily capacity will be increased to 100,000 cubic feet. A complete line of welding apparatus and supplies, rods and carbide is kept in stock, and in the near future an acetylene plant will be installed.

At the present time the plant is employing thirty men, running three shifts. The building is 80 feet by 170 feet. A five-ton Mack truck with a five-ton trailer is used for deliveries, giving a combined capacity of 150 cylinders for one trip.

BOOK REVIEWS

Practical Ship Production, by Lieutenant-Commander A. W. Carmichael, United States Navy, Naval Architect and Marine Engineer. Ten chapters, 243 pages, 101 illustrations.

This book presents in convenient form the most important general principles of ship design, and describes the various processes in connection with the building of ships. A very handy volume as an introduction to the study of naval architecture.

The Elements of Wood Ship Construction, by W. H. Curtis, Naval Architect and Marine Engineer. Five chapters, 229 pages, 199 illustrations.

This volume collects in compact form a series of pamphlets prepared by the author for the education and training section of the Emergency Fleet Corporation. It is intended for the use of carpenters who, though skilled in their trade, lack the special knowledge necessary to enable them to work efficiently as ship carpenters.

Newton Machine Tool Works Catalog, 49A. Twenty-five pages profusely illustrated. Free on application.

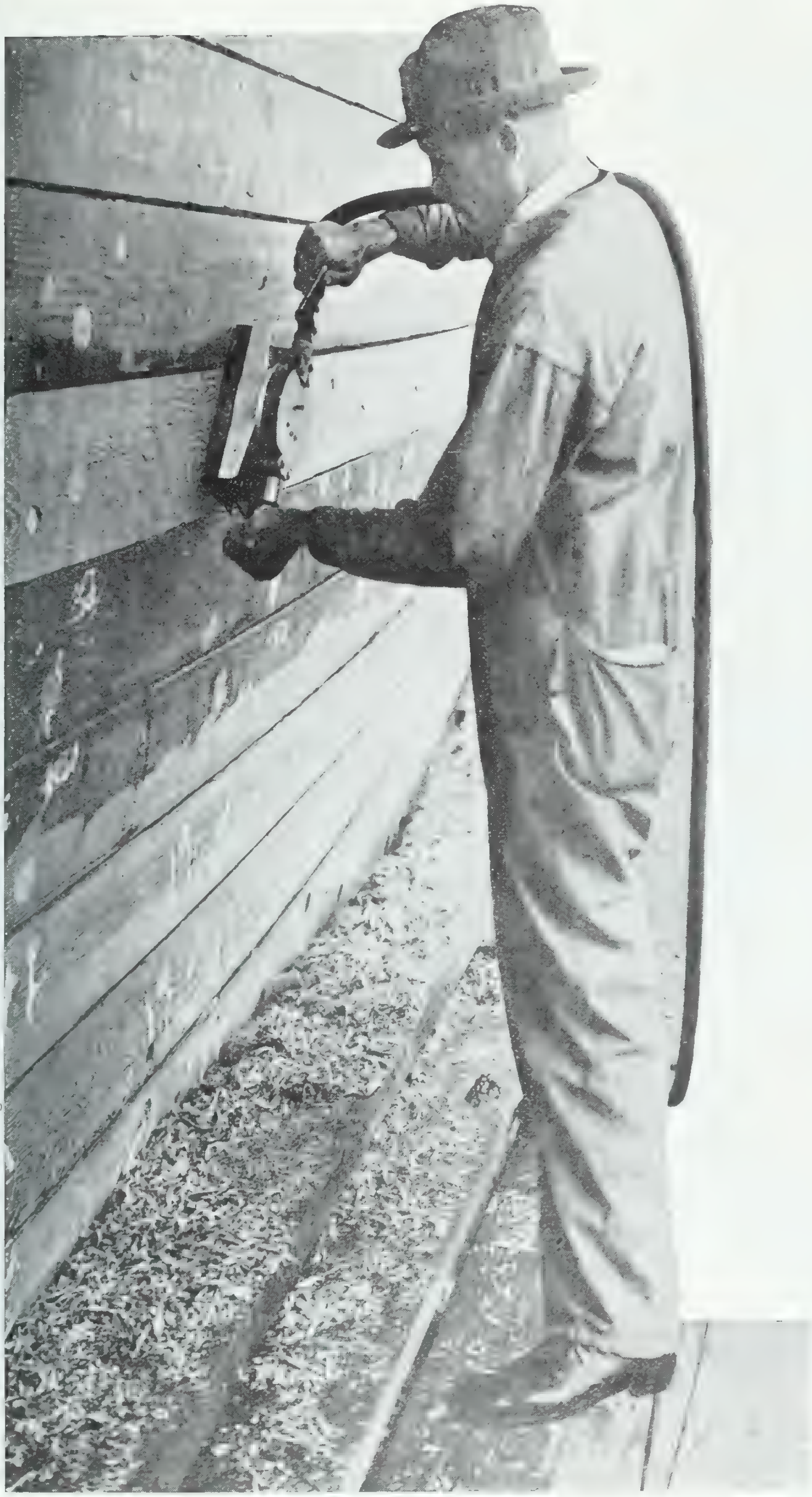
An attractive booklet describing the slotting machine of this well known firm.

Naval Architect's and Shipbuilder's Pocket Book, by Clement Mackrow and Lloyd Woolland. Twelfth edition. Thoroughly revised and enlarged. Seven hundred and sixty pages, numerous illustrations. The Norman W. Henley Publishing Company, New York. $6 net.

This twelfth edition of the standard handbook on naval architecture is very welcome at this time. Under the able revision of Lloyd Woolland it has been brought up to date and enlarged to include a fine chapter on aeronautics and aerodynamics. The index is complete and satisfactory, and the book will be a great help to the naval architect and the marine engineer.

(Section continued on Page 166)

This Machine pays for itself every two weeks



"Model D, air dubber in operation"

Is the Statement
Made by

Mr. FRANK P. ALLEN, Jr.

Wooden Shipbuilder
Seattle, Wash.

* * *

Let us send you some interesting proof of how this is done

* * *

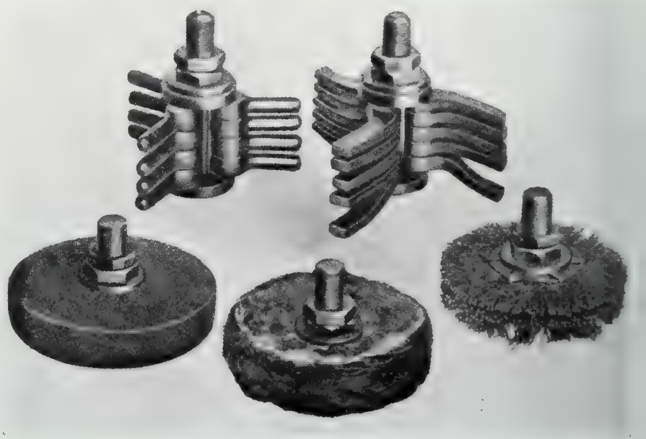
Shipbuilders Pneumatic Tool Company

Chamber of Commerce
Building

Portland, Oregon

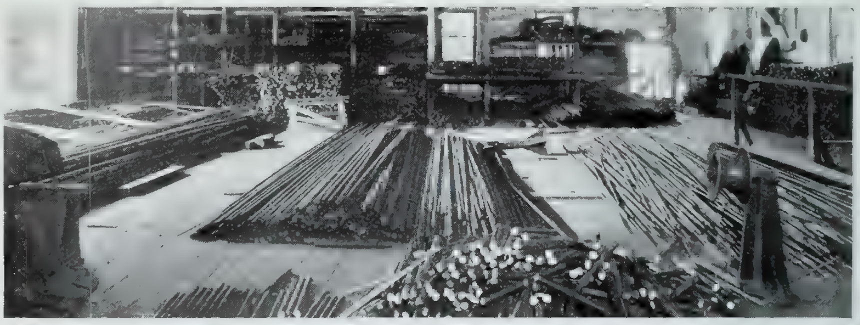
Rust and Scales Removed Quickly

Rotary scraper machine in operation


Above, left, round hammer; right, sharp hammer, Rotary scraper machine; below, left to right, emery wheel, buffing wheel and steel brush

A NEW, cheap and convenient method of removing rust, paint and boiler scales is found in the Rotary Scraper Machine, manufactured by the Rotary Scraper Machine Company, 17 Battery Place, New York City. The makers assert that the machine will do the work of ten to fifteen men working with chipping hammers or about twice as much as a compressed air chisel or hammer, with the added advantage that blows are not directed squarely against the metal surface, denting the plate and driving small particles of rust more deeply into the metal, but fall at a more acute angle.

The machine weighs complete fifty pounds. The power is electric, the motor developing about one-half horsepower. Different types of motors for direct and alternating currents and for different voltages may be had. The speeds are 3500 and 4000 r. p. m. The cleaning equipment is made up of three hammer tools, round or sharp, as desired; one steel wire brush, one emery wheel, and one buffing wheel. The round hammer tools are used on light or medium rust or paint and the sharp for heavier work. Each hammer tool consists of a spindle having a three-cornered center and one round flange at each end. Between the flanges, at equal distances from the center and at angles of 120 degrees, are three round bars, each serving at a bearing for four detachable hammers.


Raw material for the chain-makers, Seattle Chain Company

Finished product, Seattle Chain Company. This company is specializing in anchor chains for vessels

A support is provided for the motor so that it may be used in any position, and the power is transmitted by a flexible shaft from the motor to the tool.

The rotary scraper will be found especially useful on ships, inasmuch as the crews will be able to keep them free from scale and rust; also any large metal structure, such as a bridge, could be cleaned quickly and economically in preparation for painting.

(Section continued on Page 167)

Badenhausen Co.

HIGH EFFICIENCY

MARINE WATER-TUBE BOILERS
AND SUPERHEATERS

1425 Chestnut St., Philadelphia, Pa., U. S. A.

Branch Sales Offices: New York, Pittsburgh,
Chicago, San Francisco

Works: Philadelphia, on Delaware River

LET THE
W. C. McPHERSON Co.
PORTLAND, OREGON
Build the VENTILATORS
for YOUR SHIPS

Snow Serves Ships

Louis T. Snow & Company's wholesale grocery, 235-237 Front Street, San Francisco

THE ship-purveying business of Louis T. Snow & Company was established in 1876 by Louis T. Snow of Rockland, Maine, and since that time has built up a reputation second to none on the Pacific Coast for quick delivery of ship's stores. This firm is well known to ships and ship masters from all countries and of all nationalities—colliers from Sydney, copra schooners from Apia, motorships from Stockholm—strange craft from here and there, tramp ships from everywhere.

Closer to Waterfront

For twenty-five years Louis T. Snow & Company were located at 219 California street, but the great fire of 1906 forced them to move closer to the waterfront during the reconstruction period. This change they found to be of great convenience to their ever-growing clientele and they decided to remain in the shipping district. Their present establishment is on Front street, corner of Halleck street, which gives extensive side-street entrance for receiving large volumes of goods, leaving the wide frontage free for quick despatch of ship stores, accelerated by all modern labor saving devices such as the Jack lift truck and other conveyances for the expeditious handling of goods.

This firm not only has a reputation for quick dispatch of goods, its excellent method of packing also has been a special factor in its success. One of the first essentials of ship's stores is that they be well packed. One man in the Louis T. Snow organization has been studying this feature for twenty years, with the results that the Louis T. Snow Company's ship's stores are now packed in tin-lined cases, hermetically sealed, thoroughly ratproof and waterproof, so that no matter how long a voyage may be, when the case is opened up its contents are always fresh.

Large Stock and Wide Experience

As wholesale grocers, specializing exclusively in ship's stores, this firm asserts that it has the largest stock and the widest experience of any store house on the Pacific Coast. Its delivery is excellent because it has no other interests to serve, and this was exemplified in contingencies like the great fire and during the stevedores' strike when it was the only house making deliveries to ships.

G. W. Easton is president of Louis T. Snow & Company and M. D. Leahy is vice-president.

The Aldrich Marine Directory. 240 pages. Aldrich Publishing Company, New York.

A trade list of concerns which build and repair vessels and of steamship, steamboat, and other vessel owners using the American flag.

The Rudder Marine Directory, 1919. Three hundred and thirty-two pages. Can be obtained through Pacific Marine Review, $5 net.

A very comprehensive trade list of shipbuilding and marine industries, naval architects, steamship companies, ship owners, ship operators and marine insurance companies.

(Section continued on Page 168)

STAR BRASS MFG. CO.

53 Oliver Street *Boston, Mass.*

Manufacturers of

Accurate "Non-corrosive" Pressure and Recording Gages, Revolution Counters, Marine Clocks.
Dead Weight Gage Testers.
Marine Safety and Relief Valves for all pressures.
Marine Whistles and Sirens.
Extra Heavy Renewable Globe, Angle and Check Valves
Star Outside Spring Steam Engine Indicators.

High grade throughout
Specify and order the best

BRANCHES: CHICAGO, PITTSBURGH, NEW YORK

S. L. KREIDER

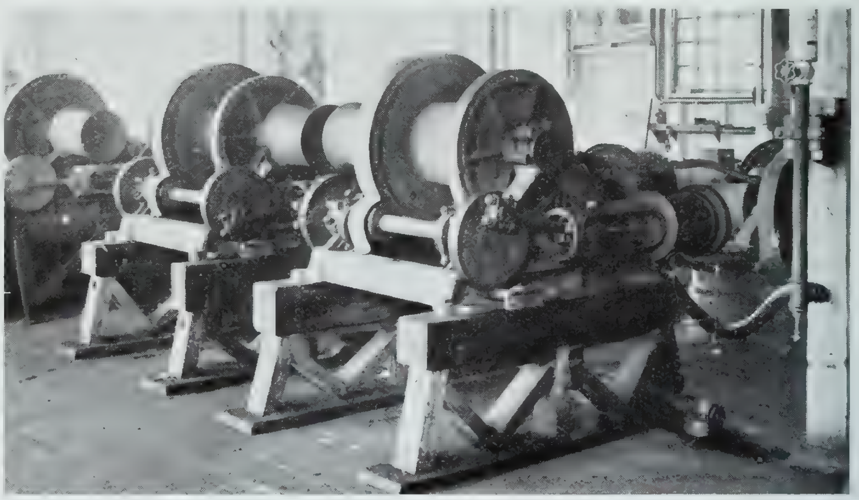
GENERAL TRANSPORTATION
FOREIGN FREIGHT TRAFFIC

EXPORT MANAGER

C. I. F. Quotations
Purchasing for Foreign Buyers
MARINE INSURANCE
Cable Address: KREIDER—All Codes
380-382 Pacific Electric Bldg.
LOS ANGELES CALIFORNIA

Helser Winches Stand the Test

Machine shop, Helser Machine Works. Note the number of winches



Cargo winches as manufactured for the Emergency Fleet Corporation by the Helser Machine Works

THE United States Shipping Board recently has completed at the plant of the Helser Machine Works of Portland, Oregon, a very interesting load test of the cargo winches built by this company for the Emergency Fleet Corporation. As a matter of fact, the operation was more than a mere test; it was an actual demonstration of how the Helser cargo winch performs on shipboard under various working conditions. In putting the machine through its paces it was required in many instances to lift more than capacity loads. That such loads were lifted at required speed with less than normal steam pressure, and with valve only partially opened, proves that the Helser cargo winch has been carefully developed and is now of a greatly improved type, possessing unusual lifting power.

The test also evidenced that the Helser Company's engineers have achieved this result without sacrifice of that most important item—economy of operation. The improved cargo winch shown in cut herewith is one of the most powerful and most economically operated of any now offered to the shipbuilding world. The steam cylinders are nine-inch diameter and nine-inch stroke; the drum is sixteen-inch diameter and the gear reduction is 13 to 67.

Although the test was conducted in accordance with government requirements specified by the Emergency Fleet Corporation, it has long been the practice of the Helser Machine Works to subject every cargo winch built by it to a brake test under full head of steam before permitting the machine to leave the shop.

A large section of the forward end of the shop has been given over to this work and the series of testing blocks assembled there is under the direct supervision of the company's most efficient engineers.

The brake test has proved very effective in detecting faults in adjustments and defects of parts. The winch that was used in the load test by the United States Shipping Board was selected at random from a number that the Helser Company had previously subjected to the brake test and had assembled ready for shipment.

Helser winches have been installed on the ships built for the Emergency Fleet Corporation by many Pacific Coast firms, including the Schaw-Batcher Company, Southwestern Shipbuilding Company, Todd Dry Dock & Construction Company, Tacoma; Columbia River Shipbuilding Corporation, Albina Engine & Machine Works, and the Peninsula Shipbuilding Company.

To insure prompt deliveries on these large orders, the Helser Machine Works has greatly enlarged its shops and increased its equipment. The winches are standardized as to parts and the jig system is one of the most complete in the Northwest. Trackage provided is ample to insure quick shipment and the plant has built up a very enviable reputation for reliability and promptness in delivery of its winches.

LARGE ROSEWOOD SHIPMENT

J. H. DIECKMANN, JR., the well-known importer of hardwoods and cabinet woods, has just received a shipment of the best rosewood that ever came into this market. The logs weigh an average of more than 1000 pounds each, so those familiar with this kind of wood can realize the unusual sizes in this lot.

Mr. Dieckmann reports that he has ready for shipment a large stock of teak, Spanish cedar, lignum vitae, jenisero, primavera and other woods.

Firms interested in foreign hardwoods would do well to get in touch with the above-mentioned importer and dealer, who specializes in hardwoods and consequently can supply them to best advantage.

(Section continued on Page 170)

"MILFORD" HACK SAW BLADES
MILFORD
"Go By The Name"
Sample Sent on request.
The Henry G. Thompson & Son Co., New Haven, Conn.

BROWN & CO.
Marine Surveyors
SUPERVISION AND INSPECTIONS
Wood Vessels
Sail, Motor, Auxiliary, and Steam
Seattle, Wash. Raymond, Wash.

Marine Paints that Meet Your Needs

In the Marine field, probably more than in any other, the necessity for **special paints for specific purposes** has been most forcefully demonstrated.

The severe conditions to which Marine Paints are constantly subjected, demand not only the best quality, but that these paints be made and used for a **definite** purpose.

While we manufacture a complete line of the widely used Marine Paints—for both construction and maintenance—we also have excellent facilities for making **special paints for specific purposes,**—no matter how exacting the requirements.

Tell us how we can serve you—write or wire our Marine Department.

PABCO MARINE PRODUCTS

Include Paints, Bituminous Primer and Enamel, Calking Pitches, and Seam-tite (a packing for seams).

Samples, prices and complete information gladly sent.

THE PARAFFINE COMPANIES, INC.
34 First St., San Francisco

PABCO 10 and 20 Year GUARANTEED ROOFS

ROOFINGS
FELTS
BUILDING PAPERS
BOX-BOARD
WALL-BOARD
FLOOR COVERING
INDUSTRIAL PAINTS
PAPER BOXES
FIBRE CONTAINERS

"Each the standard of its kind"

Frederick Post Company

ONE hardly can name a line of Pacific Coast effort which has not been touched and quickened into new life by the revival of shipbuilding. The influence of this tremendous program of contracts for hulls has in many cases been such an incentive as to induce manufacturing in place of brokerage. Such is the case with the Frederick Post Company in its specialty of high-class blue print paper.

A visit to the plant of this company is highly interesting. Let us follow the raw material through the various processes until it is rolled—a finished product ready for the impression from tracing or negative.

130,000 Pounds of Paper

In the raw stock room we find seemingly endless rolls of paper, amounting in all at the present time to about 130,000 pounds. The paper is stored here for some time before going to the machines, and is kept under conditions conducive to proper seasoning.

From this room the paper goes direct to the coating machine, the mechanism of which is arranged so that the continuous passage of the paper through a chemical bath and a drying zone results in the delivery of the finished product ready for use.

The chemicals necessary are stored in tanks in a separate room where they are mixed fresh for each batch of paper going through the machines, the whole secret of success in manufacturing blue print paper being fresh chemicals, mixed in the right proportion and evenly applied to the stock.

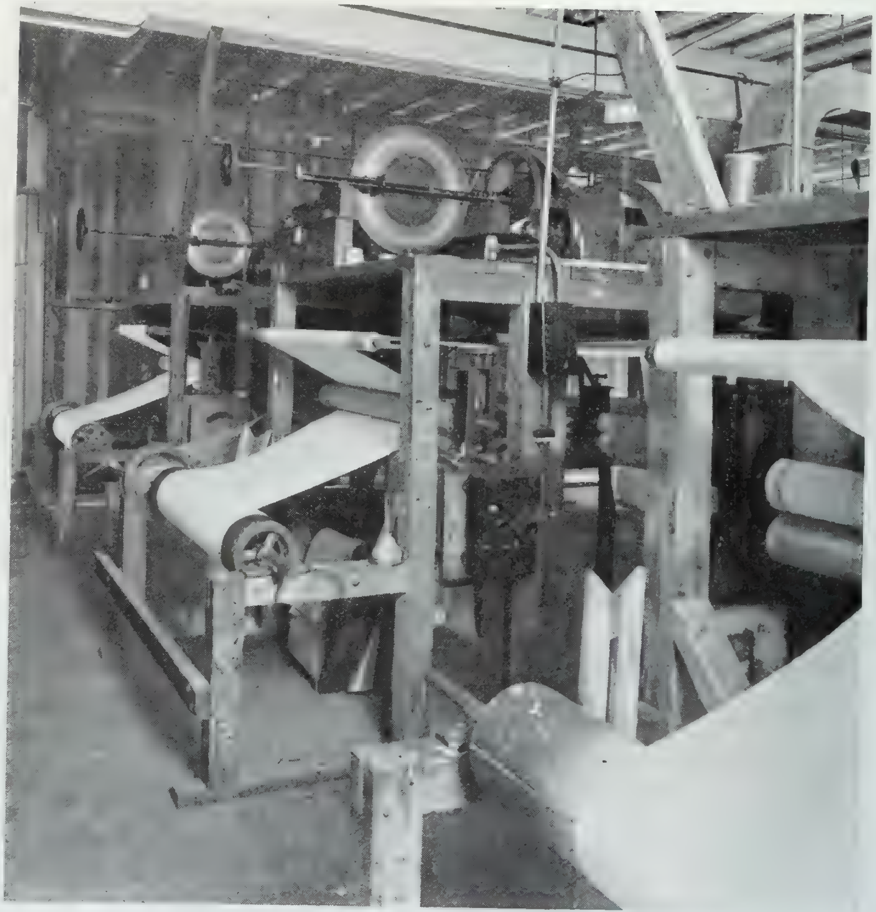
Hot Air for Drying

Three of these coating machines are installed with a combined capacity using full width paper of 10,000 yards of the finished product a day. A novel planetary control is used which holds the machine to just the right speed for the proper coating of the paper.

For drying, hot air is used. This is blown from gas fired furnaces and a drying chamber through ducts which discharge across the paper in the drying zone of the coating machine.

Three brands of blue print paper and sensitized cloth are manufactured, viz.: Rapid speed, electric rapid, and double electric. These grades cover the range of printing speeds used in modern practice, from the ordinary daylight impressed, sun dried print to the continuous electric machines.

The manufacturing activity of this firm is of great advantage to local industries, as it insures absolutely fresh dependable blue print paper or sensitized cloth when needed.



Blue print coating machines, Frederick Post Company

Stock of raw blue print paper

The Rule of the Road at Sea and Precautionary Aids to Mariners, by Daniel H. Hayne. Can be obtained through Pacific Marine Review, $3.25 net.

This is the latest authoritative treatise on navigation and nautical subjects and has been adopted as a government text book. Where its rules have been complied with collisions have been greatly reduced.

New Propeller Catalog. The new catalog of the Columbian Bronze Corporation has just been issued and is entitled: "Propellers in a Nutshell." It is a 48-page, 6 by 9 inch book and contains a mass of information of real interest to every owner and prospective owner of a motorboat.

At the back of the book are valuable tables covering speed of boats in miles an hour in relation to the diameter and pitch of the propeller used, also a time and speed table whereby it is easy to figure the speed of your boat after either the statute or nautical mile.

A limited edition of this book has been published, but a copy will gladly be sent to you if you will write to the Columbian Bronze Corporation, 50 Church street, City of New York, and mention Pacific Marine Review.

(Section continued on Page 172)

"Coes" Wrenches

Wrenches that will not slip or round the corners of the stiffest nut; that will hold firmly anything the jaws can grip. Practical tools, their long wearing qualities are known to mechanics everywhere. Every wrench stamped "Coes." Order "Coes Wrenches" *by name* from your dealer—for your own protection.

COES WRENCH COMPANY

WORCESTER **MASS., U. S. A.**

AGENTS: J. C. McCarty & Co., 29 Murray St., New York. 438 Market St., San Francisco, Cal. 1515 Lorimer St., Denver, Colo.

AGENTS: John H. Graham & Co., 113 Chambers St., New York. London, E. C., 118-122 Holborn. Fenwick Freres, Paris, France.

GENERAL WELDING & EQUIPMENT CO.
G.W.&E.C.
107 MASS. AVE. BOSTON, MASS.

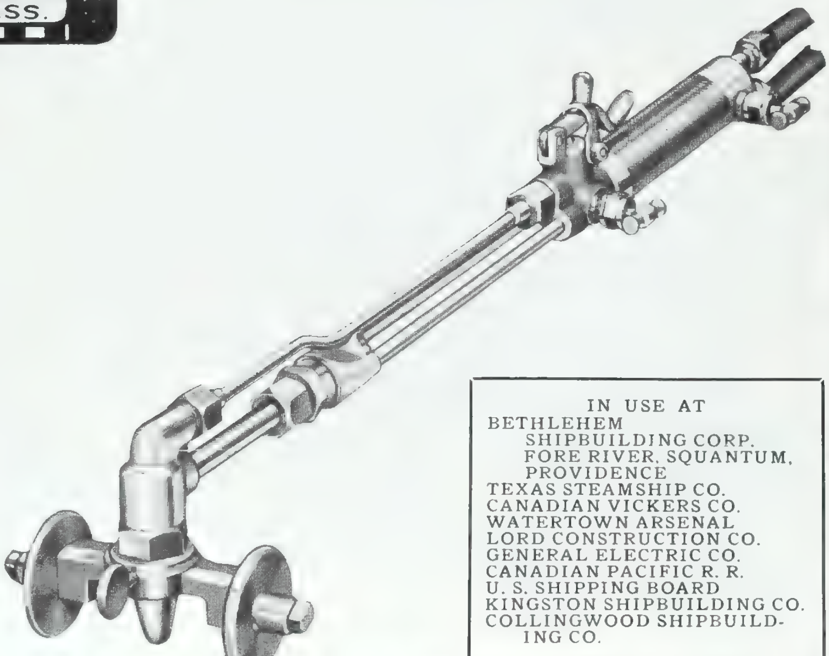
Welding and Cutting Equipments

Cutting Torch

The construction of a first class tool should combine two essentials: first, efficient and economical work, second easiness of repairs and maintenance, so that the operator can do everything himself, making him independent of the manufacturer.

Both essentials are covered with our Cutting Torches. First they are used by the thousands and by the most prominent concerns, which proves their efficiency. Second, all essential parts are easily accessible and exchangeable and by carrying a few spare parts, even a smashed cutter can be fixed up like new in less than one-half hour by your own man.

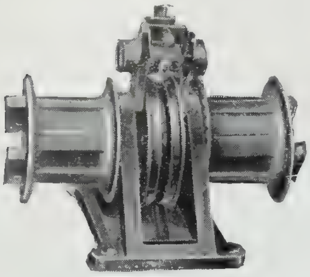
Many concerns standardized on our Cutting Torches, impressed by their efficiency and by their marvelous open and simple construction. Why not send in a trial order?



IN USE AT
BETHLEHEM
SHIPBUILDING CORP.
FORE RIVER, SQUANTUM, PROVIDENCE
TEXAS STEAMSHIP CO.
CANADIAN VICKERS CO.
WATERTOWN ARSENAL
LORD CONSTRUCTION CO.
GENERAL ELECTRIC CO.
CANADIAN PACIFIC R. R.
U. S. SHIPPING BOARD
KINGSTON SHIPBUILDING CO.
COLLINGWOOD SHIPBUILDING CO.

The Eells Anchor

MOST people familiar with anchor rope have wished that something could be done to reduce the weight of the hook without destroying its holding power. The new Eells anchor, now being marketed by C. D. Durkee & Company, of 2 South street, New York City, seems to fill the bill, for the Durkee firm states that it will withstand double the strain, pound for pound, of any other anchor. It is also declared that the Eells will hold to any bottom, and will turn itself so thoroughly and promptly that it is almost impossible for it to foul, while at the same time it is more easily broken out by reason of having a hollow crown or head. The flukes are broad and pointed, and the shank is pivoted to them, as is the case in most stockless anchors. It is made in weights from five pounds to ten tons.


The Andrade windlass

The Andrade new grip windlass is another article that has unusual merit. If any one in interested in being posted on these reliable leaders in their lines, illustrated literature will be promptly forwarded by C. D. Durkee & Company, 2 South street, New York City, who are the manufacturers.

Chemical room, Frederick Post Company

Hot-air furnaces for drying blue print paper, Frederick Post Company

---

CAPTAIN BLAIN LOCATES IN SEATTLE

HAVING resigned as district manager of the United States Shipping Board Emergency Fleet Corporation, effective April 1, 1919, this is to announce that my services are at your disposal in the capacity of agent, owner's representative or surveyor of any floating property, for account of owners, shippers or underwriters, says an announcement of Captain John F. Blain. Associated with me is a competent marine engineer, of executive experience, for survey work in connection with engines and boilers.

On behalf of owners I will give personal attention to looking after their interests as agent or where ship repair work or new construction is undertaken, in any port of Oregon or Washington.

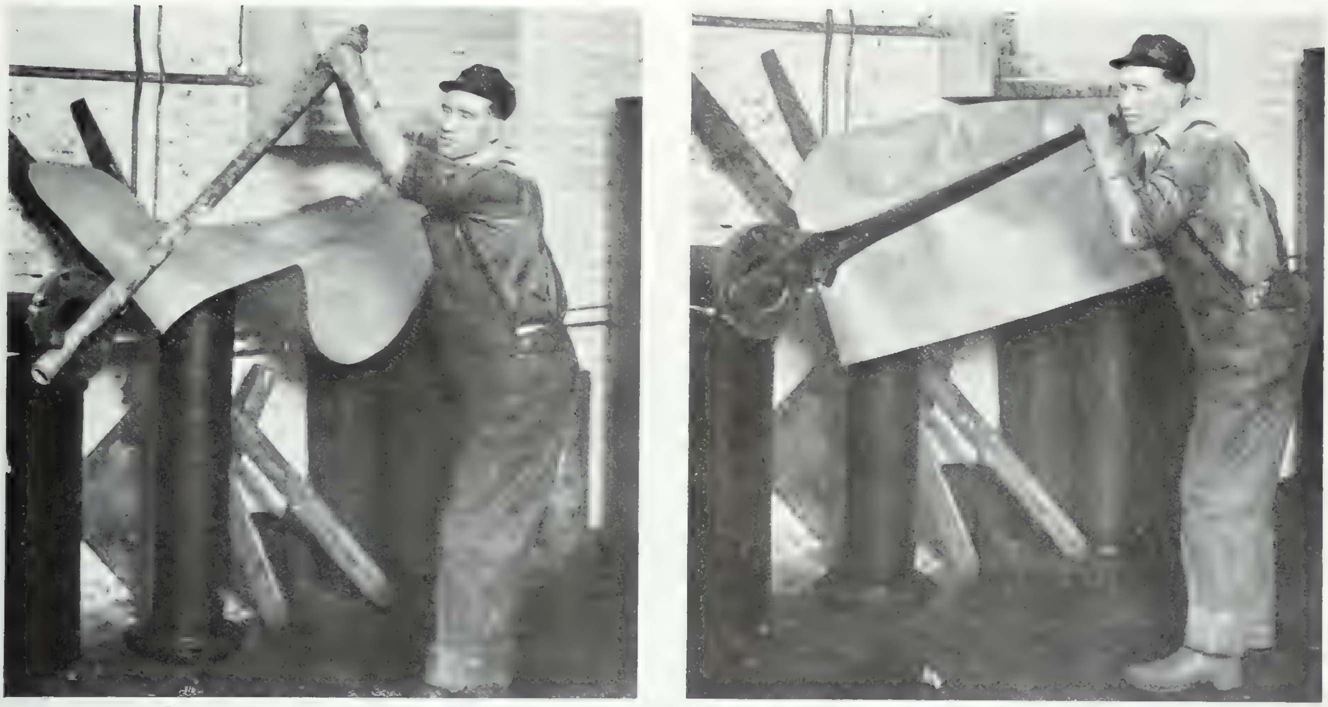
JOHN F. BLAIN, Captain.
453-4 Colman Building,
Seattle, Washington.

(Section continued on Page 173)

GUARANTEED CAL-PA-CO BEST QUALITY
Cable Address CALPACO OAKLAND, CAL.
SHIP PAINTS and VARNISHES
Our Specialty: EMERGENCY FLEET CORPORATION SPECIFICATIONS
OUR COMPLETE STOCKS INSURE SPOT DELIVERY
Ask for Prices
Everything Reliable in Paint
Five First Awards P. P. I. E. 1915
CALIFORNIA PAINT COMPANY
Manufacturers since 1865
Oakland, California, U. S. A.

The Home of Brown Bros. Welding Co. in San Francisco

The Allmon Pipe Flange Wrench



On the left, the old method of tightening pipe flanges; on the right, the new method with the Allmon wrench

ALL steam fitters of any experience at some time or other have run afoul of tightening pipe flanges with two bolts and a bar. J. G. Allmon, practical mechanic, often was confronted with this operation, and always was impressed with the danger both to operator and to flange. The result of his thought on this subject was incorporated into a wrench designed for this special problem. Letters patent were issued on this wrench in January, 1918, and it is being manufactured and is in use in many pipe shops and shipyards, including the Bethlehem Shipbuilding Corporation, Skinner & Eddy, Union Construction Company, and many others.

The illustrations show very clearly the difference between the old and new ways of tightening pipe flanges. The Allmon wrench puts the strain on the flange, so that all the force is directed tangentially and there is no side strain and no danger of breakage to flange or slippage of wrench and injury to mechanic. The lugs hold the wrench firmly in place and the sturdy construction of the tool insures long life.

(Section continued on Page 176)

FLUE GAS RETARDERS

DAN E. ERICKSON CORPORATION

Marine Equipment

93 First Street, Portland, Ore.
H. H. Erickson & Co., Chicago, Ill.

TEAK

(SIAM)

A Large Assortment of Teak Planks and Logs for Immediate Delivery. Shipments Can Be Made by Rail or Water. Consumers of This Wood Should Wire or Write for Quotations in Any Quantity.

J. H. DIECKMANN, Jr.

WHOLESALE HARDWOODS AND CABINET WOODS

519 CALIFORNIA STREET **SAN FRANCISCO**

Cable Address "DIECO" Codes—A. B. C.; Bentleys.

ALSO LARGE STOCKS OF ROSEWOOD, SPANISH CEDAR, LIGNUM VITAE AND OTHER WOODS

W. T. Cleverdon

Average Adjuster

FOR SALE

Salvage from the Passenger "S. S. Bear"

4500 H. P. Engines, Anchor and Cargo Winches, and General Equipment

Also numerous other Engines and Boilers (up to 1200 H. P.) from other vessels

Steamers and Tugs for Sale

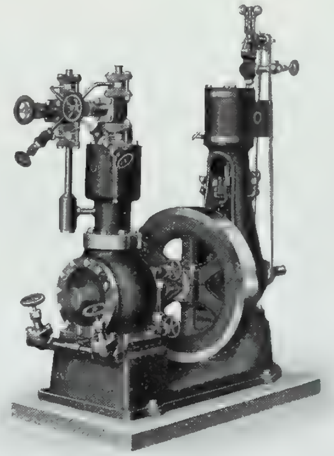
Nickel Steel **Hull,** 170x17x5′ 11″
Torpedo Boat **"Rowan"** and
3 **Thornycroft Boilers,** 3200 H. P.

FIFE BUILDING SAN FRANCISCO

ICE MACHINES

FOR SHIPS

"ON-TIME" DELIVERY



Approved by Shipping Board

BEDELL ENGINEERING CO.

LOS ANGELES

We offer our experience of many years as specialists in Marine Refrigeration.

The ALLMON Flange Wrench

(Patented Jan. 14, 1919)

A great time saver for holding or screwing on pipe flanges. Avoids accidents common to old method of bolts and bar. No twisting action is produced on the wrench or flange. This prevents breaking the flanges.

The fitters all like to use the Allmon Wrench.

Prices on Application.

Wrenches made to order for extra heavy or special flanges.

PARTIAL LIST OF USERS
- Associated Oil Co.
- A. T. & Santa Fe Ry. Co.
- Bethlehem Shipbuilding Corp.
- Calif.-Hawaiian Sugar Refinery Co.
- Crane Company.
- Hanlon Dry Dock & Shipbuilding Co
- Moore Shipbuilding Co.
- Pacific Coast Borax Co.
- Schaw-Batcher Shipbuilding Co.
- Shell Company of California.
- Standard Oil Co. of California.

MANUFACTURED BY

ALLMON FLANGE WRENCH CO.

OAKLAND, CALIFORNIA, U. S. A.

METALS

Babbitt Metal
Type Metal Solder
Ingot Copper Ingot Brass Pig Tin
Pig Lead Zinc Aluminum
Antimony, Etc.

NATIONAL SMELTING CORPORATION

554 Bryant Street, San Francisco

Announcement

We are glad to announce to our friends that PACIFIC MARINE REVIEW *has established an Eastern office at Room Three Thirty-nine in the Hudson Terminal Building, Thirty Church St., New York City.*

This office, in charge of Mr. Myron B. Stewart, will be conducted for the convenience of our advertisers and readers and will be an important link in PACIFIC MARINE REVIEW'S *service chain.*

PACIFIC MARINE REVIEW
The National Magazine of Shipping
J. S. Hines, Publisher
San Francisco

With the Verse-smiths and Rhyme-forgers

THE ONLY WET LEFT

Prohibition has inspired a shipbuilding versifier to a dirge. He is M. J. O'Farrell and he works at the Pacific Coast Shipbuilding Company's yard east of San Francisco, where they are building 9400 deadweight ton cargo ships. His verses are published in the yard paper, "Full Speed Ahead," under the heading, "The Only Wet Left Will Be Our Salt, Salt Tears," and here they are:

Goodbye, old can; we two must part.
You're voted out; I'm on the cart.
This land, I say, is going dry:
The gate, therefore, for you. Goodbye!

In days agone at evening's close
I've held you underneath my nose
And from your brim in foaming floods
Received the satisfying suds.

Accessory before the bun,
It looks as if your race is run;
But maybe, in a moister clime,
We'll meet, and I shall have a dime.

LITTLE BILLEE

There were three sailors of Bristol city
Who took a boat and went to sea.
But first with beef and captain's biscuits
And pickled pork they loaded she.

There was gorging Jack and guzzling Jimmy,
And the youngest he was little Billee.
Now when they got as far as the Equator
They'd nothing left but one split pea.

Says gorging Jack to guzzling Jimmy,
"I am extremely hungaree."
To gorging Jack says guzzling Jimmy,
"We've nothing left, us must eat we."

Says gorging Jack to guzzling Jimmy,
"With one another we shouldn't agree!
There's little Billee, he's young and tender,
We're old and tough, so let's eat he.

"Oh! Billy, we're going to kill and eat you,
So undo the button of your chemie."
When Bill received this information
He used his pocket handkerchie.

"First let me say my catechism,
Which my poor mammy taught to me."
"Make haste, make haste," says guzzling Jimmy,
While Jack pulled out his snickersnee.

So Billy went up to the main-top gallant mast,
And down he fell on his bended knee.
He scarce had come to the twelfth commandment
When up he jumps. "There's land I see:

"Jerusalem and Madagascar,
And North and South Amerikee:
There's the British flag a riding at anchor,
With Admiral Napier, K. C. B."

So when they got aboard of the Admiral's
He hanged fat Jack and flogged Jimmee;
But as for little Bill he made him
The Captain of a Seventy-three.

—W. M. T.

SPOTTIE

Spottie was me pal, 'e was,
A ginger-headed bloke,
An everlasting gas bag,
And as stubborn as a moke,
'E gave us all the 'ump, 'e did
Afore he went to war,
A-sporting all his bite o' French
That no one asked 'im for.
'E says to me, "Old son," 'e says,
"You won't stand 'arf a chance,
When I gets in conversation
With those damoselles o' France."
I says to 'im, "You close your beastly mug."
'E says, "All right, Bon Soir,
Don't 'urt yourself, Mon Cherie-mi, so long,
Au Revoir."

Well, we gets our marching orders,
You can bet we wasn't slow,
A-singing "Tipperary,
It's a long, long way to go."
On that transport how 'e swanked it,
With 'is parleyvouing airs,
Till I nearly knocked 'is block off,
When 'e says, "I'm Mal-de-mer."
When we landed, what a Beno!
How those Frenchies laughed and cried.
I sees old Spottie swelling,
Fit to burst himself with pride.
'E was blowin' of 'em kisses,
A-singin' "Vive la France,"
Till the Sergeant Major copped 'im,
And 'e says, "Camou-vous-chance."

But they did not keep us waiting,
Where we went nobody knows,
An' it wasn't like the fightin'
That you gets in picture shows.
It was days of 'ell together, boys,
Till they told us to retire;
Then Spottie's flow o' language
Set those water-carts on fire.
Me and 'im was pretty lucky,
For two-thirds of us were dead,
With their greasy Black Marias,
And the shrapnel overhead,
An' every time they missed us
When the fire was murd'rous hot,
Old Spottie cries, "Encore! Encore!"
That's French for rotten shot.

But there soon came a time
When we got them on the go,
An' me an' 'im was fightin'
In a little place called Moe;
We was laying down together
In a hole dug with our hands,
For you gets it quick an' sudden
If you makes a move or stands.
We was sharin' arf a fag, we was;
Yes, turn an' turn about,
When I felt 'im move towards me,
An' 'e says, "Oh, mate, I'm out."
Now 'is eyes they couldn't see me,
An' they never will no more;
But 'is twisted mouth, it whispered,
"So long, matey, Au Revoir."

After that, things weren't quite the same,
For me an' 'im were pals,
An' if I had 'im with me now,
You could keep your fancy gals;
An' whatever place 'e's gone to,
I don't ask nothin' more
Than to line up with 'im later.
"So long, Spottie, Au Revoir."

THE OPEN BOAT

"When this here war is done," says
Dan, "and all the fightin' through,
There's some'll pal with Fritz again
as they was used to do;
But not me," says Dan, the sailor
man, "not me," says he;
"Lord knows it's nippy in an open
boat on winter nights at sea.

"When the last battle's lost an' won,
an' won an' lost the game,
There's some'll think no 'arm to drink
with squareheads just the same;
But not me," says Dan the sailor
man, "an' if you ask me why—
Lord knows it's thirsty in an open
boat when the water beaker's dry.

"When all the bloomin' mines is
swep' an' ships are sunk no more,
There's some'll set them down to eat
with Germans as before;
But not me," says Dan the sailor
man, "not me, for one—
Lord knows it's hungry in an open
boat when the last biscuit's done.

"When peace is signed and treaties
made an' trade begins again,
There's some'll shake a German
hand an' never see the stain;
But not me," says Dan the sailor
man, "not me, as God's on high—
Lord knows it's bitter in an open
boat to see your shipmates die."

—Punch.

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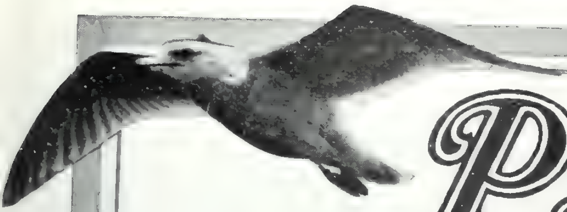

Pacific Marine Review

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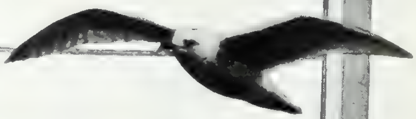

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Pacific Marine Review
The National Magazine of Shipping
May, 1919

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The Port of Shanghai

By Paul Page Whitham,
United States Trade Commissioner

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SHANGHAI is the premier port of China on account of its position relative to China itself and to the trans-Pacific and European trade routes. Preliminary to a description of the port, it may be well to enlarge upon the reasons for its being.

It should be borne in mind that until only recently have railways been a transportation factor in China. The difficulties and expense of transport overland, when it was necessary to carry goods by cart, or more often on the backs of animals and men, forced the use of natural and artificial waterways to the fullest extent. It called into being the Grand Canal, since allowed to deteriorate, as an artery between the rich Yangtze valley and the capital, Peking.

Yangtze River Chief Artery

The chief artery of transportation is the great Yangtze River, crossing China, east and west, through its richest section. The river is continuously navigable by small native boats or junks for a distance of 1630 miles, and recently has been opened to steamboat navigation to Suifu, approximately 1500 miles above Shanghai. For a period of several months each year good-sized ocean vessels ply to Hankow, 580 miles above Shanghai, and all the year round large river steamers comparable to the Long Island Sound type run between Shanghai and Hankow. Some of the tributaries are navigable by steamers and many by native boats for long distances. The Yangtze basin or watershed embraces an area of approximately 760,000 square miles. The watershed of the Mississippi is 1,244,000 square miles, or little over one-third larger; nevertheless the Yangtze ranks among the great rivers of the world. Through the influence of the Grand Canal and other means of transportation to the North and West, the trade territory of Shanghai is substantially larger than the watershed. This is further augmented by means of the coast shipping routes northward to the Gulf of Chihli and southward toward Hongkong.

The completed railways contribute to rather than detract from Shanghai's advantages accruing from inland waterway navigation. The Shanghai-Nanking Railway, which meets the Tientsin-Pukow Railway at Nanking, forms a through route to Tientsin and Peking. This railway system draws products to Shanghai from as far north as the Yellow River.

Other Tributary Railways

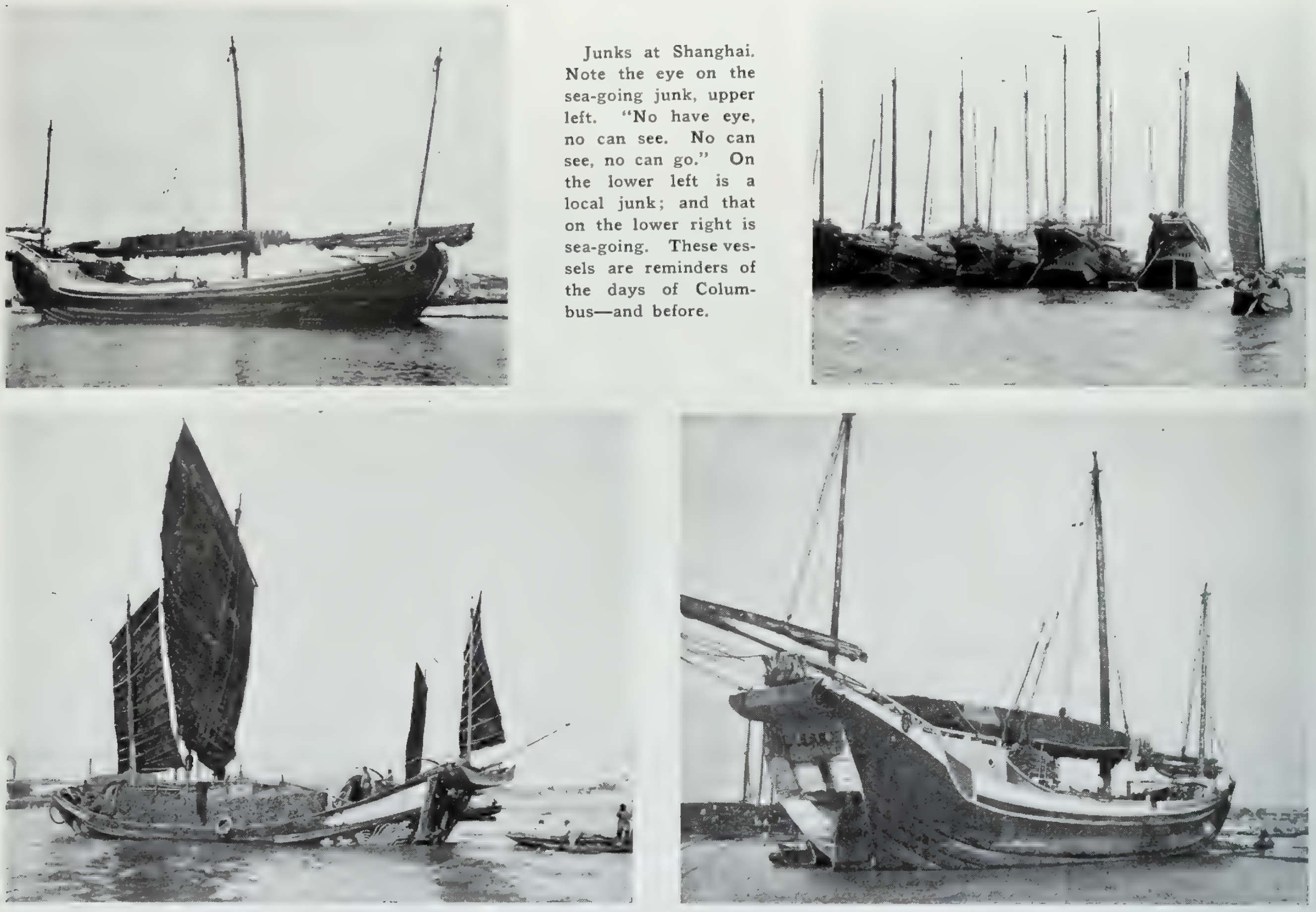
The Peking-Hankow Railway attracts products to Hankow from the Yellow River southward, which in turn reach Shanghai by the Yangtze River steamers.

The section of the Canton-Hankow Railway, recently completed from Hankow south to Changsha, will facilitate the movement of goods to Hankow for trans-shipment by river to Shanghai.

The Shanghai-Hangchow-Ningpo Railway facilitates traffic tributary to Shanghai. The projected Pukow-Sinyangchow Railway (delayed by the war) will further facilitate traffic, as would the proposed extension of the Shanghai-Hangchow Railway to Nanchang and eventually to a junction with the Canton-Hankow line.

It is roughly estimated that from 150 to 180 million people live in the Yangtze watershed; at least one-half the population of China and half as many again as inhabit the United States. Under present conditions of transport, it would seem conservative to say that three-fourths of China's population is tributary more or less directly to Shanghai. The Maritime Customs report for 1917 shows the foreign trade of Shanghai to be a little over

For thousands of years vessels like these carried the products of interior China to the coast, and even now continue in competition with steam-propelled vessels. The river is the Yangtze



Junks at Shanghai. Note the eye on the sea-going junk, upper left. "No have eye, no can see. No can see, no can go." On the lower left is a local junk; and that on the lower right is sea-going. These vessels are reminders of the days of Columbus—and before.

taels 407,000,000, which, at the present rate of exchange, would equal better than half-a-billion American dollars. This amount represents close to half the foreign trade of China.

Southern Ports Have Advantage

The main marine route from Europe to the China Sea constitutes practically an extension of the route from America. Considered as a through route, the line passes within approximately 250 miles of Shanghai. As the changes of course to call at Shanghai are on oblique lines, the effective offset is considerably less. China ports south of Shanghai have a slight advantage in this respect, but all ports north are at an appreciable disadvantage.

Of the "Big Four" ports of the extreme Orient—that is, Shanghai, Hongkong, Manila and Kobe—Shanghai is in the central position. Approaching China from America, Shanghai is the nearest port, the chief point of contact between continental United States and the even larger continental territory of the Republic of China. With this prospective in mind of Shanghai's position relative to China and the maritime trade routes, it is advisable that consideration be given the general features of the port and contiguous territory.

General Description of Shanghai

Shanghai is situated on the Yangtze delta plain not far from the mouth of the river. It is not actually located on the Yangtze estuary, being about twelve miles up the Whangpoo, a small branch stream. The alluvial delta plain extending back as far as Nanking on both sides of the river is very fertile, easily producing two crops a year. It is criss-crossed by a veritable maze of canals furnishing cheap, though primitive, means of transport for the farmers and between farms and villages. Only a guess can be made of the population within a radius of 150 miles from Shanghai. However, Shanghai is estimated to have a population of from 700,000 to 1,000,000.

Estimated populations:

Soochow	400,000 to 500,000
Wusih	75,000 to 100,000
Changchow, about	100,000
Chingkiang	150,000 to 175,000
Hangchow	500,000 to 600,000
Ningpo	300,000 to 400,000
Tungchow, north of the river	100,000 to 125,000

All the above within the 150-mile radius circle.

Knowing that the area includes many other good sized towns and that the country is densely populated, it seems quite conservative to set down the population as being close to six million people. Nanking, just outside the 150-mile circle, is estimated to have a population of between 250,000 and 350,000.

Entire Delta Has Water Transport

The purpose of this presentation is to indicate that in the immediate vicinity by agricultural production and population resource, Shanghai is well sustained as a first-class port and city. Practically the entire delta district is served by water transport in some form, ranging from the small canal boats, the large junks and the steam launches, plying on the Whangpoo and the Grand Canal, to the large inland steamers on the Shanghai-Ningpo and the Shanghai-Nanking and up the river runs. Taihu is a shallow marsh grass-bordered lake, navigable by small native boats only.

Shanghai is not a public-administered port in so far as the docking and storage facilities are concerned. The Whangpoo Conservancy Board is a Chinese-International body having to do with the improvement and maintenance of the Whangpoo channel. By building training works and some dredging operations, the channel has been much improved in recent years, so that the minimum low water depth is now approximately twenty-four feet. The same board is having data gathered and investigations made to form the basis upon which to reach a conclusion as to what is required to further deepen the Yangtze estuary and Whangpoo channel in order to accommodate larger and deeper draft vessels. At present, vessels calling at Shanghai are limited to twenty-seven to twenty-eight feet draft, ordinary high water, and sixteen to eighteen feet low water, springs.

Better Warehouse Facilities Required

The wharf and godown (warehouse) facilities of the port, on account of their private and detached development, are more or less haphazard, not well coordinated. In the past they have served the purpose reasonably well, but it is apparent that in the event of an appreciable increase in the business and shipping of the port, better and larger facilities will be required.

The wharf and railway facilities have not been coordinated nor has this been necessary in the past.

Shanghai is the chief industrial center of China, its industrial expansion during the past few years having been greatly accelerated. Not only are there a large number of native industrial establishments, some of them such as flour and cotton mills, silk filatures and shipyards, being quite modern, but foreign firms have been establishing plants in increasing numbers. It has been found advantageous in certain lines to build branch factories at Shanghai, in order to take advantage of the low cost of labor, thus better enabling competition in the cheap Oriental markets. Recently several American firms have built branch factories at Shanghai with such marked success that it points the way to a large field for American enterprise. As an industrial center the site of Shanghai is advantageous in much the same way as is New York. To it converge the sea routes from the principal ports of the world. The rivers and numerous canals afford an extensive water frontage on or near which locations may be secured, assuring cheap transport. Also like New York, Shanghai's fuel supply comes from distant points. However, coal mines are being opened in the Yangtze valley within a few hundred miles of Shanghai. As this fuel can be moved down the river, it seems reasonable to expect that the problem of cheaper fuel will be solved in the near future.

This group of Nippon Yusen Kaisha godowns extends two blocks. It is one of the tragedies of American shipping that this very valuable property passed out of American ownership only a few years ago. American interests do not possess a shipping terminal at Shanghai, as other leading countries do, although one American firm is now building a moderate-sized wharf and godown system for use of itself and associated companies.

International in Character

Shanghai is distinctly international in its character and population. The foreign settlements are governed by international councils, while the native city and suburbs adjoining the settlements are un-

A Grand Canal scene at Wusih. A railway transfer house is alongside, on the left. This ancient waterway is one of the most famous of the world der Chinese administration. As a city, Shanghai is likely to prove a surprise to those first visiting it with overdrawn ideas of China as a backward country. They find that in many ways it compares favorably with the large commercial cities in America or Europe. There are numerous differences that are particularly apparent upon first arrival, but these are soon found to be largely superficial after all. Being the chief banking and commercial center of China, a large percentage of the foreign and many of the Chinese business and trading houses maintain their head offices at Shanghai. Practically all of the important American firms have located their head offices for China at Shanghai. Recently—in fact, chiefly since the outbreak of the war—Shanghai has become an important American center and the American community has become an appreciable factor in Shanghai's cosmopolitan and complex life.

It would be wrong to convey the impression that Shanghai is China any more than to assume that New York is America. There are many other important ports and trade centers in China, which is as extensive in territory and as varied in resources as the United States, but Americans looking to the establishment of shipping and trade connections with China will find Shanghai a convenient center from which to reach the outports and back country.

Port Facilities

The wharves and landings are of the river side or quay type. The Whangpoo is too narrow to permit of the pier or jetty type of construction, except by the excavation of basin or slips out of the adjacent land. Under present conditions it is likely that the tendency to silt would prohibit such a type of construction; in any event, it has not been attempted. Outside of the customs landing and a few municipal landings along the Bund and at convenient street ends, there are no public wharves. These small public landings are for the convenience of launches, lighters and sampans. Most of the wharves are of ordinary timber pile construction, decked over with planking. A few are supported on concrete piling, notably the Holt's Wharf. Landing stages or pontoons are in extensive use, especially at river steamer berthings. Ocean-going vessels also berth at pontoon landing stages in some cases. There being an ordinary tidal range of from eight to twelve feet, these landing stages with bridge connections are very convenient in working cargo to and from river and local boats, junks, lighters, etc. Trucks are not in general use as in America, the goods being carried by the coolies, so that the steep grades of the bridge inclines at low water stages do not seriously interfere with cargo handling.

Recently high-powered, shallow-draft steamers have entered the run from Ichang and Chungking. Some of them go to Suifu, approximately 1500 miles above Shanghai

Labor Costs Are Rising

In America the high cost of labor practically has necessitated the placing of the sheds and warehouses as close alongside the ship as possible. At Shanghai, in common with most Oriental ports, the sheds and godowns are located some distance back on the shore. The cheapness of labor has made such a practice possible, although it has probably been carried to an extreme in some instances. La-

Above, working cargo on a pontoon wharf, Shanghai. Left, moving goods by wheelbarrow; and, right, carrying cargo across a pontoon into the side ports of a river steamer. Human labor still is very cheap in the Far East, although the cost is rising

Canal scene in the Yangtze delta, which is a veritable maze of canals, large and small. Canals largely take the place of roads in the delta

bor costs at Oriental ports are gradually rising, so that it is becoming an item to be more seriously considered in future terminal planning. Most of the wharves and landings are located in the upper harbor. Near Woosung, at the mouth of the Whangpoo River, the Shanghai-Nanking Railway maintains a very good, though small, terminal served with railway tracks. The sheds are located on shore, back of steel pontoon landing stages. At Woosung Creek a bund (seawall) has been constructed, together with landings for junks and small boats.

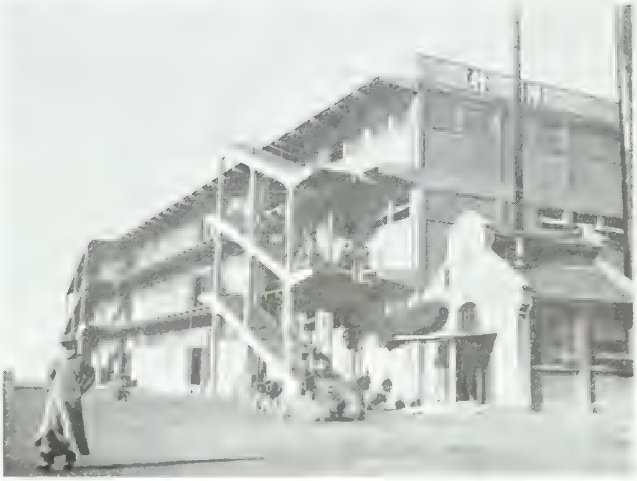
In the upper harbor the wharves and landings stretch along both sides of the river, a distance of approximately eight miles. Interspersed are dry docks, shipbuilding and repair yards, and a few industrial wharves. Soochow Creek is an important subsidiary element of the port. It virtually forms an extension of the Grand Canal from Soochow to Shanghai—a distance of about fifty-five miles. Soochow Creek is too narrow and shallow to be navigated by other than small steam launches and canal junks and lighters. For a distance of about six miles above the creek's intersection with the Whangpoo, it is lined with godowns, timber and coal yards and numerous industries served by light draft native boats and lighters.

Dry Docking and Repairing Facilities

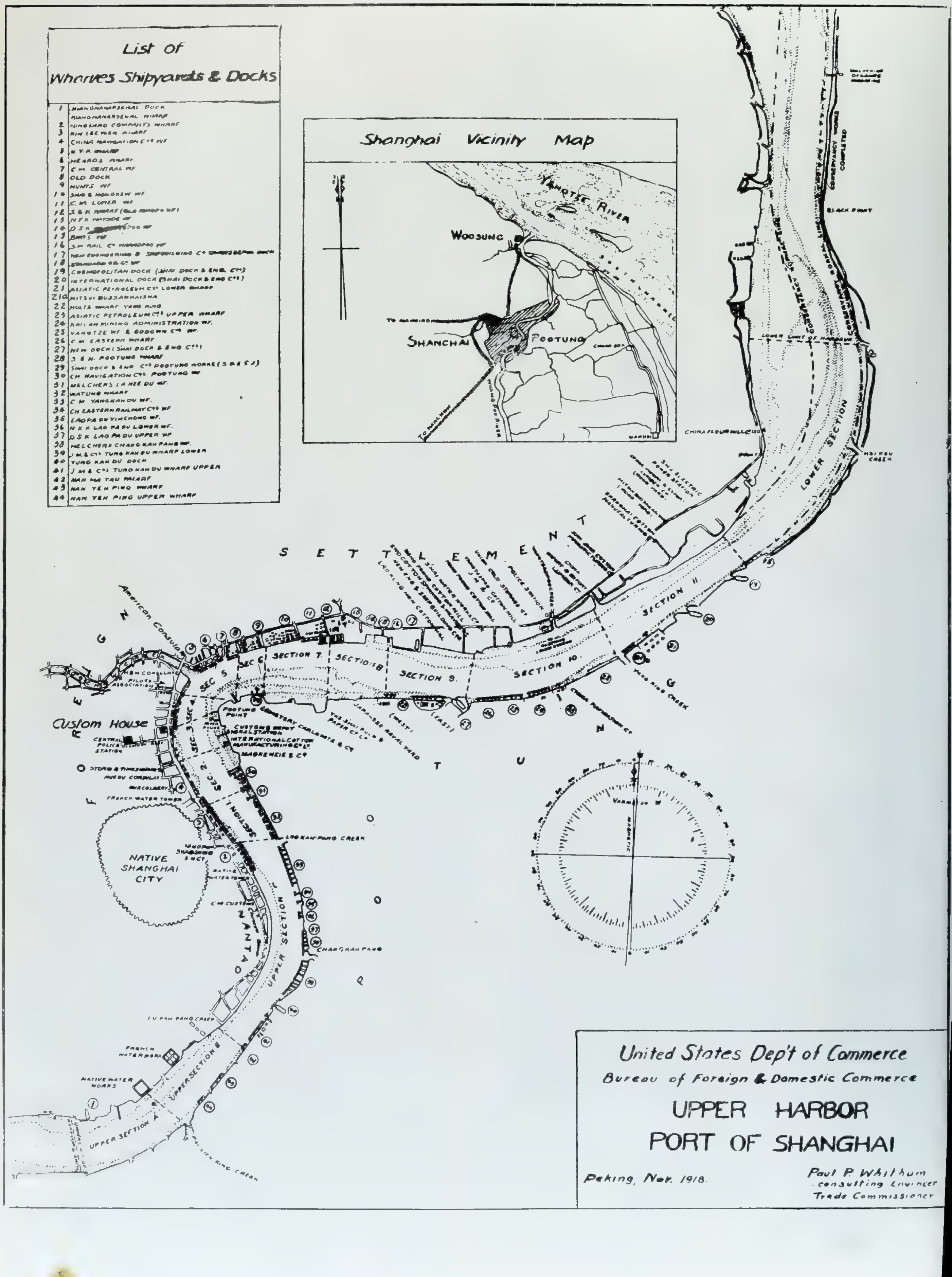
There are four shipbuilding and repair works equipped to handle both light and heavy repair work, namely: Shanghai Dock & Engineering Company, Ltd.; Kiangnan Dock & Engineering Works, Chinese government yard; Nicolus Tsu Engineering Works; New Engineering & Shipbuilding Works. In addition, there are several small Chinese plants that build and repair small steam launches.

The Shanghai Dock & Engineering Company operates five graving docks (for locations, see map, page 76). The dimensions of the dry docks are as follows:

Old Dock, Settlement Side, Section 6—
  Length on coping, 400 feet.
  Length on blocks, 399 feet.
  Breadth at entrance, 53 feet.
  Depth of high water on sill, ordinary spring tides, 16 feet.
  Height of sill above bottom of dock, 1 foot.
  One 40-ton shear leg.
  One 20-ton shear leg.
Tunkadoo Dock, Pootung Side, Section C—
  Length on coping, 362 feet.
  Length on blocks, 350 feet.
  Breadth at entrance, 69 feet.
  Depth of high water at ordinary spring tides on sill, 16 feet.
  Height of sill above bottom of dock, 1 foot.
  One 60-ton shear leg.
Cosmopolitan Dock, Pootung Side, Section B—
  Length on coping, 560 feet.
  Length on blocks, 532 feet.
  Width at entrance at coping, 79 feet 6 inches.
  Depth of high water at ordinary spring tides 77 feet 6 inches.



Above, timber rafts on the upper Whangpoo. Left, a sampan, Shanghai; and, right, a godown. Stairways, generally outside, are used instead of elevators, and the coolies are quite skillful in carrying heavy packages upstairs


List of
Wharves Shipyards & Docks
1 KIANGNAN ARSENAL DOCK
KIANGNAN ARSENAL WHARF
2 NINGSHAO COMPANYS WHARF
3 KIN LEE YUEN WHARF
4 CHINA NAVIGATION C°S WF
5 N.Y.K. WHARF
6 HEARDS WHARF
7 C M CENTRAL WF
8 OLD DOCK
9 HUNTS WF
10 SHAI & HONGKEW WF
11 C.M. LOWER WF
12 S & K WHARF (OLD HONGKEW WF)
13 N Y K WAYSIDE WF
14 O S K [illegible]POO WF
15 BUTTS WF
16 S M RAIL C° WHANGPOO WF
17 NEW ENGINEERING & SHIPBUILDING C° [illegible]
18 STANDARD OIL C° WF
19 COSMOPOLITAN DOCK (SHAI DOCK & ENG. C°)
20 INTERNATIONAL DOCK (SHAI DOCK & ENG C°)
21 ASIATIC PETROLEUM C°S LOWER WHARF
21a MITSUI BUSSAN KAISHA
22 HOLTS WHARF YANG KING
23 ASIATIC PETROLEUM C°S UPPER WHARF
24 KAILAN MINING ADMINISTRATION WF.
25 YANGTZE WF & GODOWN C° WF.
26 C M EASTERN WHARF
27 NEW DOCK (SHAI DOCK & ENG C°)
28 S & N. POOTUNG WHARF
29 SHAI DOCK & ENG C°S POOTUNG WORKS (S D & E J)
30 CH NAVIGATION C°S POOTUNG WF
31 MELCHERS LA NEE DU WF.
32 WATUNG WHARF
33 C M YANGKAH DU WF.
34 CH EASTERN RAILWAY C°S WF
35 LAOPA DU YIHCHONG WF.
36 N K K LAO PA DU LOWER WF.
37 O S K LAO PA DU UPPER WF
38 MELCHERS CHANG KAH PANG WF.
39 J.M. & C°S TUNG KAH DU WHARF LOWER
40 TUNG KAH DU DOCK
41 J M & C°S TUNG KAH DU WHARF UPPER
42 HAN MA TAU WHARF
43 HAN YEH PING WHARF
44 HAN YEH PING UPPER WHARF
Shanghai Vicinity Map
YANGTZE RIVER
WOOSUNG
TO NANKING
SHANGHAI
POOTUNG
WHANGPOO RIVER
TO HANGCHOW
S E T T L E M E N T
F O R E I G N
American Consulate
Custom House
CENTRAL POLICE STATION
PILOTS ASSOCIATION
FRENCH WATER TOWER
NATIVE SHANGHAI CITY
POOTUNG POINT
CUSTOMS DEPOT SIGNAL STATION
INTERNATIONAL COTTON MANUFACTURING C°
MACKENZIE & C°
JAPANESE NAVAL YARD
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SEC. 3
SEC. 4
SEC. 5
SEC. 6
SECTION 7.
SECTION 8
SECTION 9.
SECTION 10.
SECTION 11.
LOWER SECTION
UPPER SECTION
UPPER SECTION B
UPPER SECTION A
SECTION 1
NANTAO
P O O T U N G
LOO KAH PANG CREEK
CHANG KAH PANG
LU KAH PANG CREEK
FRENCH WATERWORKS
NATIVE WATER WORKS
YANG KING CREEK
CHINA FLOUR MILL C°
BLACK POINT
LOWER LIMIT OF HARBOR
CONSERVANCY WORKS COMPLETED
VARIATION W
United States Dep't of Commerce
Bureau of Foreign & Domestic Commerce
UPPER HARBOR
PORT OF SHANGHAI
Peking, Nov. 1918.
Paul P. Whitham
consulting Engineer
Trade Commissioner

Depth of high water at ordinary spring tides on sill, 24 feet.
Height of sill above bottom of dock, 2 feet 6 inches.

International Dock, Pootung Side, Section 11—
Length on coping, 540 feet.
Length on blocks, 528 feet.
On blocks to caisson, 460 feet.
Width entrance, bottom, 64 feet.
Width entrance, top, 79 feet 6 inches.
Width entrance, ordinary high water, 77 feet 6 inches.
Width in the dock bottom, 54 feet.
Width in the dock top, 128 feet.
Depth of high water at ordinary spring tides on the sill, 23 feet 6 inches.
Height of sill above bottom of dock, 1 foot 6 inches.
One 65-ton shear leg.

New Dock, Pootung Side, Section 9—
Length on coping, 473 feet.
Length on blocks, 450 feet.
Width on bottom, 50 feet.
Width on top, 134 feet.
Width entrance, pier heads, 75 feet 6 inches.
Width entrance, ordinary high water, 64 feet.
Depth of high water at ordinary spring tides on the sill, 21 feet 6 inches.
Height of sill above bottom of dock, 2 feet.
One 60-ton shear leg.

The plant is well equipped with ship, boiler and engine repair facilities.

Kiangnan Graving Dock

The Kiangnan Dock & Engineering Works possesses one graving dock, located on the Settlement side, Section A. The dimensions of this dock are as follows:

Length on blocks, 375 feet.
Width of entrance, top, 70 feet.
Width of entrance, bottom, 60 feet.
Depth on sill, high water at ordinary spring tides, 19 feet.
Height of sill above bottom of dock, 3 feet.

The plant is well equipped with ship, boiler and engine repair facilities.

This company, the Kiangnan Dock & Engineering Works (Chinese government yard) is now building some 10,000-ton ships for the United States government.

The New Engineering & Shipbuilding Works, Ltd., operates a dock of the following dimensions:

Length on blocks, 445 feet.
Length over all, 469 feet.
Width, top, 74 feet.
Width, sill, 64 feet.
Depth of water at ordinary spring tides on the sill, 19 feet.

This plant is likewise well equipped with ship, boiler and engine repair facilities.

Ocean Vessels Go to Hankow

Sea-going vessels occasionally go up the Yangtze River as far as Hankow. Quite a number of Japanese vessels of the coasting type ply between river ports and Japan. A number of these are iron ore carriers. The first four lines named extend their services by shallow-draft boats to Ichang, about 1000 miles above Shanghai. As the height of water permits, shallow draft steamers ply to Tung Ting and Poyang Lake points. Chinese steam launches and junks ply locally up and down the Yangtze and on the tributary streams. A few high-powered steamers capable of negotiating the rapids in the Yangtze gorges above Ichang ply between Ichang and Chungking. Some steamers have gone as far as Suifu, about 1500 miles above Shanghai.

Shanghai's premier position in the trade of China is due very largely to its favorable situation relative to inland waterway transportation. Its location in relation to the main steamship routes is favorable, as is also its central position on the China coast. The dawn of a great commercial and industrial awakening is approaching China, and, in fact, the entire Far East. What the future of Shanghai will be relative to the new order of things is dependent largely on three factors within the control of those directing the interests of the port—that is, the deepening of the Yangtze estuary, together with the provision of adequate port facilities; the improvement of the interior waterways based on the Yangtze River as the main artery; and the development of the railway system of China in a manner that will naturally centralize traffic at Shanghai.

In the center is a ship on the ways at the New Engineering & Shipbuilding plant, Shanghai. This plant, in common with the other leading yards of China, is well equipped for repair work

The Traffic Manager on Mr. Hurley's Proposal

By the Traffic Manager

In this article, The Traffic Manager discusses the "plan for the operation of the new American merchant marine," as proposed by Edward N. Hurley, chairman of the United States Shipping Board, in his pamphlet dated Washington, March 27. The Traffic Manager takes up in detail the various suggested plans brought forward by Mr. Hurley; and comes to the conclusion that Mr. Hurley's plan No. 3, government ownership and private operation for government account, should be adopted. It will be interesting to read The Traffic Manager's article in conjunction with that of Winthrop L. Marvin, published elsewhere in this issue, entitled "Chairman Hurley's Plan," for Mr. Marvin is well known on the Atlantic Coast, and The Traffic Manager voices the view of a Pacific Coast shipping man. Thus both sections of the country are represented. Other discussions of Mr. Hurley's proposal will be found on pages 151 and 152 in this issue.

THE public has been asked by the Shipping Board to vent its ideas on the momentous problem of American ships and their operation in competition with the rest of the world. It is truly a momentous problem, and our Shipping Board, being so newly created, could not and cannot be expected to have records of experience behind it, and its appeal to the public for expression therefore should be commended. Experienced men should express their thoughts in the press and on the platform for public consumption and for the benefit of the Shipping Board's clipping bureau, for we all cannot be heard in Washington. The American people are now awake to the necessity for an American merchant marine, and through the press are looking for a marine education, for they also know that they are paying the bill, and unless taught to think rightly on the problem, their votes soon can put an end to our merchant marine aspirations.

Power Ends Six Months After Peace

The Shipping Board and Emergency Fleet Corporation were created as agents of the President under the authority of the Emergency Shipping Fund provision of the Urgent Deficiencies Appropriation Act of June 15, 1917, to acquire and operate any and all vessels required for war emergencies, but all such power and authority so granted by the President ceases six months after a final treaty of peace is proclaimed. From present indications Congress will have but little more than six months to work out a solution of the merchant marine problem. Congressional action will reflect public opinion, and hence the urgent necessity for every experienced shipowner to come out in print, or through shipping organizations, with constructive ideas for public and congressional consumption.

Since the publication in Pacific Marine Review of five articles by the writer on "Our New Merchant Marine—The Problems of Its Future Existence and Growth," Edward N. Hurley, chairman of the United States Shipping Board, has submitted a printed plan for the operation of our new merchant marine, and states that the different plans considered by the Shipping Board range between government ownership and operation on the one hand, and unregulated private ownership and operation on the other, with different modified suggestions ranging between these two extremes. For the benefit of the general public who may not be on the Shipping Board's mailing list, the suggested plans are herewith printed:

1. **Government Ownership and Operation:** Under this plan, title to all vessels now owned by the government would remain in the government, and their operation would be conducted by government employes and agents. The adoption of this plan would necessitate the permanent establishment of a government operating force with branch offices and agencies in every port of the world. Cargoes and passengers would be booked by the government representatives, and the accounts would be cast up at the central operating offices in Washington.

2. **Government Ownership and Operation for the Benefit of the Government Through the Medium of a Private Corporation:** This, in effect, does not differ from operation directly by the government, except that under such a plan government operation might be more easily administered, and some of the inertia inherent in governmental undertakings might be overcome.

3. **Government Ownership and Private Operation for Government Account:** Under this plan the government would retain its ownership, but private companies would be employed as agents on a commission basis to operate the vessels for government account.

4. **Government Ownership and Private Operation for Private Account:** This would mean the retention of government ownership under a leasing system by which the vessels would be leased or chartered to private steamship companies. After paying the charter hire to the government, the operator would keep the rest of the earnings.

5. **Ownership by a Single Private Corporation:** Under this plan title to all vessels would be placed in one large private corporation, the stock of which would be sold to the public, the government, if it chose, guaranteeing a fixed return on the stock. This would entail the centralization of the ownership and operation of the ships now owned by the government in one large unit. If the government guaranteed a fixed return on the stock, the result would be that the machinery for the ownership and operation of the fleet would be practically identical with that suggested in plan No. 2, but with the modification that the government would carry any losses which might be incurred without receiving the benefit of any profits which might be earned.

6. **Private Ownership and Operation:** Lastly, the vessels can be sold to private companies, to be operated by them entirely for their own account, the government relinquishing all interest and control.

Before proceeding further with Mr. Hurley's report and recommendations, the writer has before him a printed report of an excellent address delivered by J. H. Rosseter, director of operations, Emergency Fleet Corporation, at the meeting of the American Manufacturers' Export Association, New York, March 4, 1919; and also an excellent address delivered by Admiralty Counsel Ira A. Campbell of the United States Shipping Board before the Export Managers' Convention of the National Automobile Chamber of Commerce regarding the shipping problem, and wherever opinions from either of these gentlemen are quoted as agreeing with or differing from Mr. Hurley, it will be understood that such opinions are quoted from the above addresses.

Mr. Hurley next prints in his suggested plan of operation the following recommendations, which are briefly set forth and commented upon as follows:

1. **Mr. Hurley:** "Ships should be sold to and operated by American citizens under no restrictions other than the terms of the bill-of-sale, and the fixation of maximum freight rates. I am personally opposed to government ownership, except as a last resort."

Comments: Mr. Rosseter believes government operation of ships to be utterly impossible.

Mr. Campbell states that the waste and extravagance attendant upon every government operation is common knowledge, and that private ownership and operation is to be desired, and to be the end for which all should strive; but he is not certain that private ownership is the proper thing during the present readjustment period.

The experienced shipping man believes in private ownership under conditions which will make his investment pay a fair return.

2. **Mr. Hurley:** "The ships should be sold at a price which fairly reflects the current world market for similar tonnage."

Comments: Mr. Rosseter does not make any suggestions in regard to the price at which our merchant marine should be sold to private American owners.

Mr. Campbell is quoted: "Eminent minds are suggesting private sale under a write-off of war cost. We all know that the ships have been built at an excessive cost, due to the prevailing high wage and high cost of material incident to the war. But until the people have spoken, it is impossible to say that they will sanction a wholesale disposition of the ships to private owners. And even if they do, have we any assurance that the ships, with all our individual efficiency, can be successfully operated to meet foreign competition? If they cannot be made to pay upon this investment, the American merchant marine will fade away under private ownership. Now, it seems to me, and this is purely a personal opinion, that it is impossible to fix upon an arbitrary write-off, and that this could only be determined after the prospective buyers could ascertain what they could afford to pay, and that the latter was entirely dependent upon future costs of operation. I put it to you, does it not appear reasonable that in these days of unsettled conditions, it is impossible for any one to say what is going to come out of the readjustment period? And until it can be forecast with some accuracy, no shipowner can calculate with such certainty upon the cost of operation, as to make it possible for him to say that he can afford to pay so much per ton for a ship and successfully meet competition and make his investment pay a fair return. Until such results can be arrived at with approximate certainty, it would seem that no private owner can afford to buy except at a price so low as to eliminate all speculation."

How to Eliminate Speculation

Probably no experienced shipowner could have stated the case as well as Mr. Campbell, but the element of speculation he mentions possibly could be avoided by giving the ship purchaser the benefit of a fall in prices during the life of his contract, and on the other hand by giving the government the benefit of a rise in prices. Prices fall when ships are plentiful and freight scarce, and go up under opposite conditions. The prospective purchaser in this way would be protected against a falling market and thereby keep on an even basic investment with his competitor, while the government would be the gainer should the cost of competitive shipbuilding increase. Many thinkers on this question look upon it as one of salvage. Ships, and more ships, were necessary to win the war. One writer has stated that the war was costing the United States $40,000,000 a day, and if through lack of ships the war had lasted one hundred days more, it would have meant an expenditure of $4,000,000,000; that by spending that sum in the creation of shipyards, and in the building of ships and their operation, even without salvage, our nation is no poorer, for the war certainly would have lasted one hundred days longer without ships, and we would have had great loss of life for which no money adequately could pay. Then why not regard these ships built to win the war as unused war material, and the money realized from their sale, regardless of loss due to war-time prices, as so much money saved?

3. **Purchase Terms: Mr. Hurley:** "Twenty-five per cent of each ship should be paid down, the remainder falling due and payable in graded annual installments over a period of not exceeding ten years. The government should take and hold a mortgage for the unpaid balance, charging interest thereon at the customary rate of 5 per cent. One-fifth of this interest, representing the difference between the customary commercial rate, should be paid into a merchant marine development fund to be described hereafter.

"If this fleet, built at government expense, were to be used now merely for the advantage of groups of ship operators, with sufficient capital to purchase the ships from the government, I would unhesitatingly advocate the retention of the whole fleet by the government. If there is to be any monopoly, it must be a government monopoly. If there is to be private initiative, the field must be kept open to the small operator, whose opportunity to compete with the large operator must be protected by the government. The mere possession of large capital must not give the larger operator an opportunity to drive the smaller man out of business.

"Private ownership unquestionably offers an inducement to American energy and skill, but one of the phases of unrestricted private control, which caused me considerable concern, was the possibility that under such control ships would be over-capitalized as were many of the railroads."

Comments: The first installment of 25 per cent no doubt will be considered quite reasonable, but subsequent payments could be made more easily by spreading the balance due over a period of fifteen years.

Many experienced men look askance at Mr. Hurley's "merchant marine development fund." The theory is good, but will it work out in practice? Mortgages are to bear an interest charge of 5 per cent, which Mr. Hurley states is higher by 1 per cent than the customary government interest. At the present time, and for years to come, the government will have to meet Liberty Bond interest at a higher rate than 4 per cent. The development fund probably is overestimated. Again, would the steamship lines delving into this development fund really receive any benefit or aid from it? Any aid received would be considered as an additional loan; or, in other words, another mortgage or overhead, to be paid back with interest as soon as the unfortunate lines show a profit.

Two Hundred Government Directors

And, again, the unfortunate shipowner may find himself in deep distress before his application for assistance from this fund is approved, for it is to be administered by the Associated Government Directors of Steamship Corporations, and these gentlemen are only to meet periodically in Washington. Assuming that Uncle Sam has two thousand ships to sell, and that, in order to prevent a monopoly, only ten ships are allotted to each corporation, there is a possibility of two hundred corporations, and therefore two hundred government directors. The members of this board of directors are to be named by the government, and are to draw no salary. They are to receive only a director's fee for each steamship meeting attended, but the amount of that fee is not specified. It is also left in doubt as to who is to pay the expenses of these gentlemen for their periodical meetings in Washington. The government is to name these directors, and their drawing no salary, according to Mr. Hurley, insures that no great number of them will be men whose interests are centered in the steamship business. Further, these associated directors without pay (where are they to be found?) are to divide themselves into committees to handle all the important problems of steamship operation. There is nothing said concerning the necessity for shipping experience on the part of these directors, nor that they are to be examined as to their fitness. Would any reasonably careful investor mortgage himself and his future to such a directorate?

4. **Insurance: Mr. Hurley:** "The government should carry in its own insurance fund, as at present, but for purchaser's account, hull and machinery insurance covering that part of the vessel for which payment has not been made. Our experience in operation shows that the government can carry this insurance for at least 1 per cent less than the open market rate. However, it is proposed that the open market rate be charged, and that the difference be paid into the merchant development fund."

Comments: For the benefit of the prospective shipowner, it should be written here that Mr. Hurley's statement is questioned by reputable American marine insurance companies. If Mr. Hurley is wrong, the merchant marine development fund will suffer. To experienced minds, the government has not been in this business long enough to determine the cost at which insurance can be carried on, having due regard for the prompt payment of losses.

5. **Transfer of Flag: Mr. Hurley:** "It is understood that no transfer of a vessel to foreign registry should be permitted without express permission by the government."

Comments: This is an important point for a prospective shipowner to bear in mind. Should he find himself in difficult circumstances, there is but a narrow market outlet for him.

6. **Federal Incorporation: Mr. Hurley:** "Each purchaser who wishes to operate in the foreign trade should be obliged to incorporate under Federal charter. Such a charter should provide that no stock shall be issued in excess of the money value actually paid in on vessel property, and that no stock can be issued or transferred to an alien."

Comments: This plan of capitalization leaves a company without working capital, and with the vessel already mortgaged to the government, what security would the small shipowner, starting in the shipping business, have to offer on which to borrow working capital?

Further, under this plan companies now operating in the foreign trade as at present organized could not seek Federal incorporation, for Mr. Hurley's plan limits them to the actual money invested in vessel property.

Alien stock ownership is barred. Will there be sufficient capital forthcoming to take over all government vessel property? There should be no objection to alien ownership of a minority interest, always provided the officers and directors were American citizens.

7. **Control of Rates: Mr. Hurley:** "In order to make sure that the American merchant marine will be operated with due regard for the interests of American industry and commerce, it is necessary to exercise control over the maximum freight rates which may be charged in regular trade limits."

Comments: This is a restriction of which a shipowner may well beware. Our railroads under private ownership have had to cope with this problem. It spells red tape, injury, and delay. Rates on American foreign ships will be all too well regulated by our foreign competitors; nor should our government attempt to dictate where an owner shall send his ship. The laws of supply and demand will take care of these two points.

8. **Over-Capitalization: Mr. Hurley:** "Private ownership unquestionably offers an inducement to American energy and skill, but one of the phases of unrestricted private control, which caused me considerable concern, was the possibility that under such control the ships would be over-capitalized, as were many of our railroads. We want initiative and skill of American ship operators, but we want no watered stock."

Comments: The citation of the over-capitalization of railroads hardly is a fair example. Our railroads do not extend beyond our boundaries and meet with no foreign competition. The expert shipping men know that participation in foreign shipping will not admit of over-capitalization, and that is why they are asking for a moderate ship investment to begin with. Any shipping firm attempting to operate in competition in foreign trade on any plan of over-capitalization will strike the rocks. Our competitors will regulate the matter of over-capitalization much more effectively than it can be regulated by our government.

9. **Shipbuilding Aspirations of Other Nations: Mr. Hurley:** "Great Britain. The net loss of Great Britain during the war was 3,443,000 gross tons and her tonnage at the close of the war was 15,814,000 tons. In 1917 they turned out 1,300,000 gross tons, and in 1918 mounted to a still higher total (total not mentioned by Mr. Hurley). I have heard the prediction made in general that the return of the shipyard workers from the army and

other additions to shipbuilding strength will permit a construction of nearly 3,000,000 gross tons in the present year.

"France is planning her first effort in modern times to secure a merchant marine commensurate with her foreign trade.

"Italy is reaching out for tonnage.

"Japan develops new strength and expects to build during the year 1919 181 steamers of 1000 tons and over, aggregating a total gross tonnage of 1,189,280.

"Sweden, yards busy."

Comments: The building aspirations of other nations are all cumulative miseries for that nation which is handicapped by high standards of living, high first cost and high operation, and that nation certainly is the United States. Statistics of the possible shipbuilding outputs of Norway, Spain, Greece, Holland, Belgium, Austria, and Germany—all heavy losers of tonnage during the war—have not been stated by Mr. Hurley, and no doubt were unobtainable by him in the time allotted for his European investigation. However, that output will have to be reckoned with, as these nations, through lack of food and supplies, have had the necessity of their own merchant marine rather strongly impressed upon them. China has been entirely overlooked, and yet what nation can build and operate ships more cheaply? The resourcefulness of these nations will not be overlooked by the prospective maritime investor. With peace throughout the world and the world's workers busily engaged in rebuilding and replacing, the laws of supply and demand will soon govern, and low freights will be with us again.

10. Operating Costs: Mr. Hurley: "My observations abroad convinced me that there are no adequate reasons why America should recede from the very high standard of wages and conditions of living she has adopted for her seamen."

Comments: A wage comparison by Mr. Hurley has only been made with Great Britain, and even in that case, definite figures are not cited—that is, the wage scale of an American steamer and a British steamer of about the same tonnage and class are not set out as a comparison; in fact, no real wage scale of any ship under a foreign flag is cited, and Japanese and Chinese wages are not even mentioned, yet the latter two nations are the ones which will be contesting in the future for the commercial supremacy of the Pacific.

Mr. Hurley: "The cost of operating vessels involves, in addition to the question of initial capital investment, the following points: (1) wages of officers and men, (2) insurance of hull and machinery, (3) bunkers and stores, (4) harbor fees, etc., (5) maintenance and repairs."

Comments: Other operating items have been omitted by Mr. Hurley; they are: Interest, depreciation, number of crew, food scale, overtime pay, high repair costs; and other handicaps are burdensome inspection laws, tonnage measurement, building and operating subsidies of foreign nations, and, last but not least, some of the burdensome provisons of our present Seamen's Law.

Conclusion: Under the suggested plan of private ownership, as submitted by Mr. Hurley, the writer can only come to the same conclusion as Ira A. Campbell, viz., that he is not certain that private ownership is the desirable thing under the present readjustment period, and probably the best plan at this time would be (until the shipping authorities in Washington have had sufficient experience to ascertain for themselves what expert shipping men have been trying to tell them) that plan No. 3 in the first part of this article be adopted, viz., government ownership and private operation for government account, private companies to be employed on a commission basis to operate the vessels for government account.

Suggestions by Mr. Albrecht

This article has been an endeavor to point out, as the result of experience, some of the possible obstacles under Mr. Hurley's plan for the private operation of our merchant marine. Some very good suggestions for something constructive, under which perhaps private ownership and operation would be possible, have been written by Emil P. Albrecht, president of the Philadelphia Bourse, and they are summarized on page 152 in this issue.

YARD AT PRINCE RUPERT

THE Prince Rupert Drydock & Engineering Company, Ltd., Prince Rupert, British Columbia, which is operating the Grand Trunk Pacific Railway drydock and shipbuilding plants there, and which has contracts from the Canadian marine department to build two steel cargo steamships, 8100 tons deadweight each, announces that it expects to lay the keel of the first ship, department's Contract 42, builders' yard No. 1, about May 15, and for the second ship, department's Contract 43, builders' yard No. 2, about October 15, the approximate launching dates being October 1, 1919, and February 1, 1920.

The officers of the company are: Chairman of board, Newman Erb, New York, New York; president, John L. Mullen, Pittsburgh, Pennsylvania; vice-president, F. F. Schellenberg, Prince Rupert, British Columbia; treasurer, H. M. Wadden, New York, New York; secretary, H. B. Blanchard, New York, New York; superintendent of drydock, J. H. Pillsbury, Prince Rupert, British Columbia. The vice-president and superintendent of drydock will be in charge of the shipbuilding.

MOTOR BOATS NUMBERED

According to a statement of the Bureau of Navigation, nearly 50,000 motor boats have already been numbered under an act of June 7, 1918, effective December 7, 1918, providing for the numbering of undocumented vessels propelled in whole or in part by machinery. These returns cover the winter months of December, January and February, during which in many districts motor boats are housed or taken out of the water, where they are not subject to this act or other navigation laws. The vessels numbered at Pacific Coast ports were: Seattle, 1685; Portland, 2326; San Francisco, 1523; Los Angeles, 953.

The President of the American International Shipbuilding Corporation

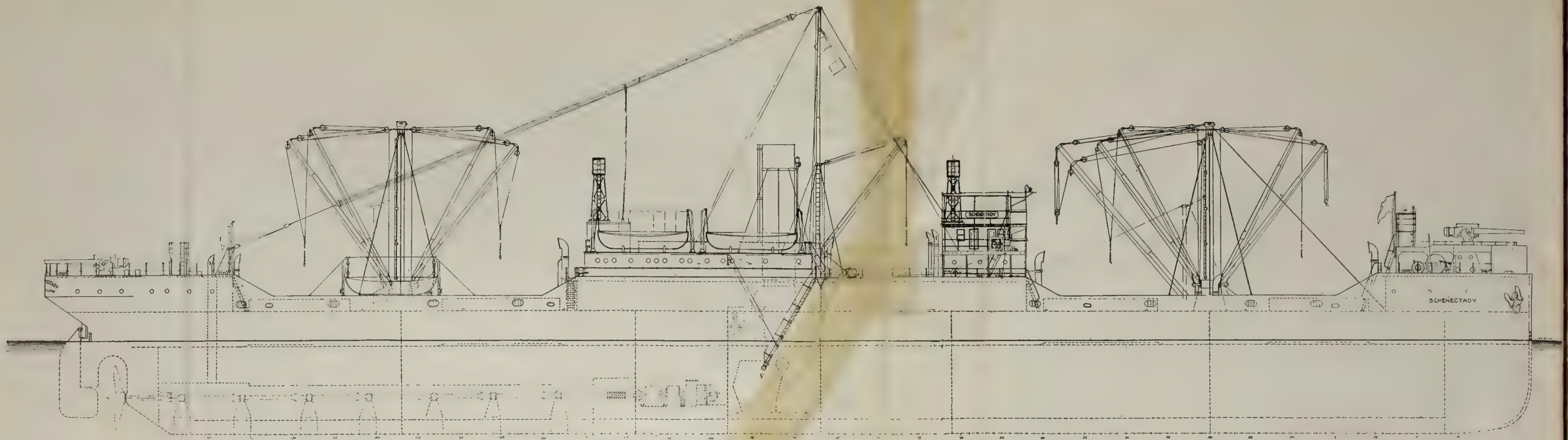
Matthew C. Brush

THE WORLD'S LARGEST SHIPYARD

The upper view shows shops and shipbuilding ways; the lower, outfitting basin. The two views form a complete panorama of Hog Island.

Above: Outboard profile, Hog Island Type A, 7500-ton deadweight cargo carrier.

Below: Rigging and deck plan, Type A vessel.



The Hog Island of Today

MUCH has been said and written about the Emergency Fleet Corporation's great shipyard on the Delaware, and its far from savory name has become a household word up and down the length and breadth of these United States. The present article sets forth technical data and description of some engineering features connected with the design and construction of the ships being built and the construction and management of the yard, which we believe will be of interest to many of our readers. The compilation of this information is made possible through the courtesy of the Emergency Fleet Corporation and of Matthew C. Brush, president of the American International Shipbuilding Corporation.

A Plant for Assembling Hulls

The original conception of the Emergency Fleet Corporation for the Hog Island shipyard was to build a plant for assembling into hulls material which should be fabricated at inland bridge-building and structural engineering works, material fabricated into parts of convenient size for shipment on standard railroad cars.

In September, 1917, the Hog Island site was an 850-acre tract, mostly swamp, roughly two miles long and three-fourths of a mile in its widest part.

Fifty Ship Fabricating Ways

The present shipyard contains fifty ship fabricating ways, twenty of which are 500 feet long and thirty 550 feet long; ten are of reinforced concrete on concrete piles, and the remainder are of wood on wooden piles. The ways are arranged in groups of ten, each group of ten ways being considered as divided into two yards of five ways each, for administration purposes. Each group of ten ways has a central air compressor house, and each five-way yard has an administration building, a tool house and a service building containing a cafeteria and locker facilities for employes.

Each yard is served by eight five-ton derricks, electrically operated, and on the ground at the head of each way is located one similar derrick, twelve-ton capacity, for bulkhead fabrication. The total number of electrically-operated derricks is 450. The ways derricks are placed on four steel derrick towers between adjacent ways, so that four derricks on each side can serve one ship.

Seven Piers for Outfitting

Ship outfitting space is provided by seven piers, each 1000 feet long and 1000 feet wide, all projecting from a marginal wharf approximately 4500 feet long, with a dredged basin having an average low-tide depth of twenty-three feet, except that on one pier the depth is thirty feet. The basins were dredged to these depths by suction dredges discharging into an impounding basin, and the sand from the latter later was used for filling purposes.

Each pier is equipped with four steam traveling gantry cranes of twenty-five and thirty-five tons' capacity—a total of twenty-eight gantry cranes—and one pier has a fixed bridge gantry crane of 100 tons' capacity with 110 feet clear span.

The piers and marginal wharf are of wood on wooden piles.

Storage facilities are provided for steel, boilers, etc., in classification and storage yards totaling approximately 153 acres and having a total mileage of standard-gauge tracks of eighty-two miles, including the tracks for delivery of material from the yards to the ways, piers and shops. Aside from the trackage, there is approximately twenty-one miles of plank and slag road through the yard for transportation by truck.

Material that cannot be stored in the open is placed in warehouses, of which there are 1,600,000 square feet of single-story wooden buildings, and one four-story, reinforced concrete warehouse, with 200,000 square feet of storage space.

Material is handled in the storage yards by sixteen locomotives, 467 flat cars, and seventy locomotive cranes.

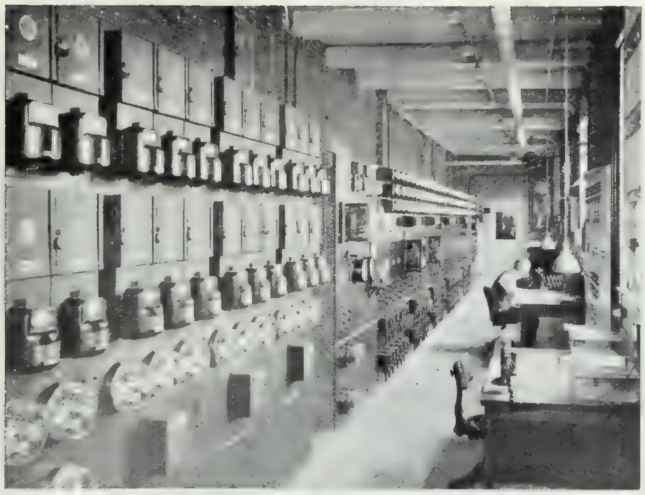
Drafting and Template Work

The "old-line" shipyards were filled up with work before Hog Island was ready to begin laying keels, and it was necessary for equipment, not before used in shipwork, to be brought into service. The ships were designed with special reference to using bridge shops and other structural shops for producing hull materials, and this called for laying out riveting so that "multiple-punching" system and tools could do the work. Templates of wood or metal were made carefully at the mold loft at Hog Island, and were shipped to distant shops in various parts of the country where the plates and frames were fabricated. The accuracy with which the templates and drawings were made is shown by the way in which plates from Montreal have matched up with those from Pittsburgh, Minneapolis, Cleveland, etc., some eighty-eight fabricating shops having contributed parts. Drawings are required in much larger numbers and in much greater detail for such work than is the case where the shearing and punching and riveting are all done at one place.

3000 Firms Engaged

Similar remarks apply to the production of machinery drawings and information. Upward of 3000 firms are engaged in fabricating machinery, piping and equipment, and the most complete plans and specifications are required for their direction. Approval of all drawings has been obtained from the various registration societies, the United States Steamboat-Inspection Service and from the Emergency Fleet Corporation officials, and time has, of course, been required for this feature of the work. The average output of blueprints a day is about 10,000, and the number has at times reached 18,000. The number of draftsmen has been as high as 1600 and as low as 200. The force is being cut down as rapidly as consistent with the progress of the work.

The requisitioning and ordering of material have required a force of 200 to 300 in the purchasing department, and a large force of inspectors and expeditors has been constantly employed and stationed at manufacturers' works. Large numbers of checkers have been required to assure the accuracy of work both at the plant where made and at the yard as received. The most difficult work to fabricate outside is piping and fittings. From fifty to 100 tons of pipe are required on each ship and much of it requires bending and flanging to given dimensions and templates, while a great deal must be fitted to suit the ship after arrival at Hog Island.



Switchboard room, main substation, on the left; and, right, outdoor 66,000-volt bus structure, main substation

Certain kinds of material are worked up in the yard shops, which comprise 283,000 square feet of floor space, the largest being the plate and angle shop, consisting of three sections, each section 600 feet long, 75 feet wide and 50 feet high—a total area of 135,000 square feet. Each section has three ten-ton electric traveling cranes (a total of nine), and the entire shop has sixty two-ton jib cranes. All electric cranes in the shop are 440 volt, three-phase, sixty-cycle, except the jib cranes, which are 220 volt D. C.

The original intention in the design of these shops was that a possible 5 per cent of the material for the ships would be fabricated there, and the machines installed were largely for the purpose of making alterations and correction to the work done in outside shops. As the shipbuilding work progressed, the proportional amount of fabrication allotted to these shops steadily increased. In January, 1918, the output was about 900 tons; in January, 1919, this had increased to about 5000 tons.

Power from Individual Motor Drive

Power is furnished to all tools through individual motor drive, the details of which are given elsewhere in this article. Hydraulic mains for the presses carry a pressure of 1500 pounds a square inch, and air at 100 pounds is furnished for the pneumatic riveters and other tools.

Plate and angle shop No. 1 has three bays, one used for plate, the other two for angles and channels. The shop is equipped with six hydraulic presses, ranging in capacity from forty-five to 350 tons, and with oil-heated furnaces for both plates and angles. There is also a set of thirty-foot bending rolls, and in front of each furnace bending slabs and beveling machines. Where possible, all shapes are handled on the beveling machine, but in many special cases hand labor on the bending slab is necessary. After being shaped, the material passes to the lay-out tables and, after being marked, to the shears and punches. For handling large flat plates roller tables are installed, permitting one man to manipulate the material very rapidly.

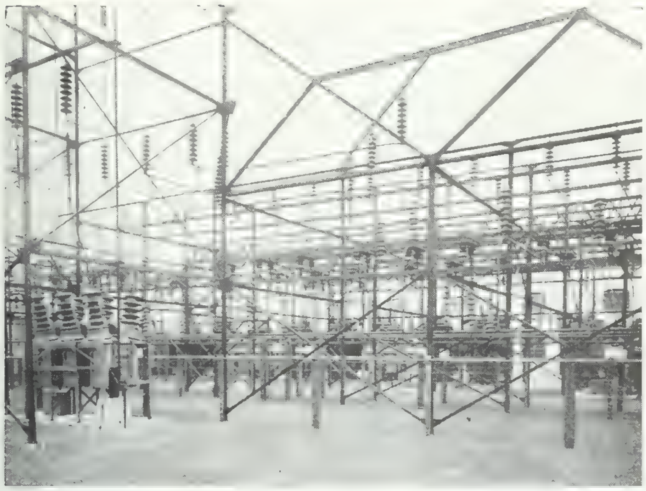
Large Oil-Burning Plate Furnace

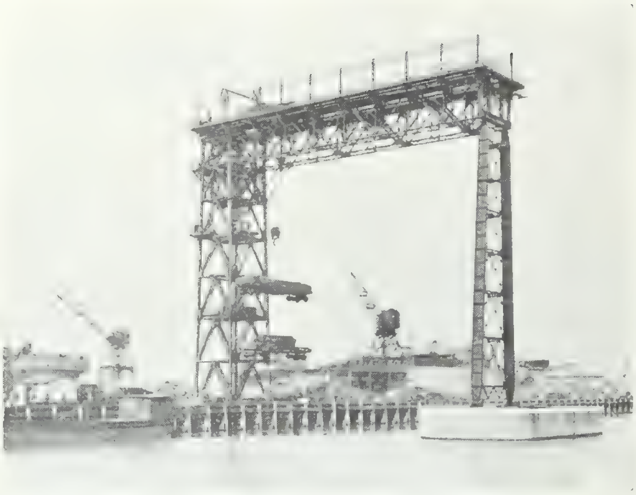
Plate and angle shop No. 2 handles the majority of the heavy bent or formed plates and is equipped with a large oil-burning plate furnace and a 700-ton keel-bending hydraulic press surrounded by a very large bending slab. The punches and shears in this shop are especially designed to machine plates that have been bent to shape. A straightening roll and a small bending roll used for mast work, and the usual riveting machines for fabrication, complete the establishment.

Just west of the plate and angle shops are the smith shops and welding shops, smith shop No. 1 doing the anglesmithing; smith shop No. 2 doing the solid smith work, and smith shop annex doing the machine forging, rivet and liner work.

Smith shop No. 1, originally equipped with the usual type of coke forges, has now been partially equipped with oilburning forges, and these are

Left, the transformer bank and high-tension oil switches, main substation. On the right is the main substation, west from Second street





On the left is the outdoor 66,000-volt bus structure, main substation; and on the right, a 100-ton test of a bridge crane

working so satisfactorily that the old type of forge will soon be supplanted with the oil-burning forge in order to speed up the work. In the northern portion of the shop is a horizontal hydraulic press, which is used for cutting notches in the angles, crimping them and bending them in preparation for the electric welding. Some of the angles are formed in this machine and some by the usual hand methods.

Five Women as Welders

After proper forming, the angles are passed to the welding shop, adjacent to smith shop No. 1. In this shop direct current is supplied for the welding by a motor-generating set of sufficient size to supply twelve welders. At present five women and seven men are regularly employed as welders. The staple angles which are notched and bent in the smith shop are welded electrically instead of the more usual method of hand forging. The portions of the angle to be welded together must be chipped to proper shape and then welded and ground smooth. About 100 angles are welded each day. The angles then pass to the plate and angle shop for punching and assembly with the other material.

From the air tool shop, which cares for the repairs and maintenance of some 7000 air riveters, reamers, drills and grinders, there comes to smith shop No. 2 a large amount of work. Tools such as reamers, drills, rivet sets, chisels, countersinks, etc., must be heat-treated and tempered, and this shop is furnished with small furnaces, forges and oil and lead baths necessary for doing this sort of work. In this shop, as in the others, the endeavor has been made to furnish the ways and other portions of the island with whatever was necessary to properly do the work required of them. In spite of the difficulty at times in securing proper small tools for treating and tempering, the shops have been able to keep the ways supplied.

Smith shop No. 2 also does miscellaneous solid smith work. This may be work directly for the ships or repair and maintenance jobs for both the shops and other portions of the island. The shop is fitted with steam hammers, the larger being a 2000-pound hammer, and with motor-driven hammers for the more rapid work. These hammers are served with oil furnaces, and coke forges are supplied for the hand work which must supplement the work of the steam and power hammers.

Rivets Made in Smith Shop Annex

In the smith shop annex are made the rivets which may be necessary in addition to those purchased from the rivet manufacturers. The one machine already installed makes from 25,000 to 40,000 rivets a day. This machine is equipped with a continuous rod furnace for heating the material which is fed to the machine. A second furnace has been installed and a second machine will be delivered in the near future. The liners are made in this shop, some of them by means of a taper forging roll and others by helve hammers. Roll

The photograph on the left shows Hull 492 at Pier B; and on the right is the steamship Quistconck, the first Hog Island vessel, loading cotton at New Orleans for Italy and hammers are served by oil-fired furnaces. From 1000 to 1500 liners a day are made. An overhead traveling crane is installed for properly handling the raw material, the buckets for the rivets and the completed work. Probably this shop has been called upon to deliver more emergency orders than any other shop.

Machine and Pipe Shop

Directly south of the smith shop are the machine shops, each of which is served with a traveling crane and equipped with lathes, boring mills, planers, shapers, grinding machines, milling machines, and other similar equipment. The largest lathe is 48 inches by 36 feet. The machine shops have more miscellaneous work than the other shops, being called upon for repair jobs, not only to equipment in various places in the shops, but also in other portions of the island. They are called upon to do whatever adjustment and fitting has been necessary on the equipment being installed in the ships. Some of this work requires extreme accuracy. Small tools such as punches and dies and forming dies for the presses are machined here.

Directly west of the machine shops is the pipe shop, which is equipped for the bending of steel pipe and for coppersmithing. In the pipe shop annex, which is the northern half of machine shop No. 2, are located nineteen pipe-threading machines ranging in size from two to twelve inches, and three pipe-expanding and flanging machines. There are two machines in the pipe shop for bending the pipes to the required shapes; one is a motor-driven machine capable of bending cold-steel pipe up to six inches in diameter. There also is a hydraulic bending press for correction work and for more special bending.

Pipe Fabricated at Other Shops

As in the case of the steel plate and angle work, the majority of the pipe was fabricated in shops at a distance from the island. The pipe shops do some little correction on pipe already fabricated and a considerable amount of original fabrication. The pipe must be cut and threaded and the flanges screwed on. For some of the piping it is necessary to have the steel pipe expanded into the flange, and this must be done by the expanding machines.

From the pipe shop the work passes to the galvanizing shop, where it is passed through the pickling and washing tanks and then dipped in the galvanizing tank. From this shop it passes to the ships for installation.

Interior of the air tool shop

Electric Power Supply

One of the most interesting problems in the planning and construction of the great shipyard was the supply and distribution of electric power. This feature has been worked out in very complete detail, especially in the matter of illumination for night work, and is here technically described by one of the experts who engineered the installation.

The power supply for the undeveloped plant was a problem of uncertain dimensions. It was early determined to buy power from the Philadelphia Electric Company, and arrangements were made for immediate supply of 600 kilowatts from a temporary 13,200-volt service and 12,000 kilowatts as soon as possible by a tap to a two-circuit 66,000-volt, three-phase, sixty-cycle transmission line passing near the plant and connecting the Chester and Philadelphia generating systems of the latter company.

Cable Under Schuylkill River

To accommodate this, a two and one-half mile, 13,200-volt single circuit transmission line, on wooden poles, was built to the plant, with a 1000-foot submarine cable section crossing the Schuylkill River, and a steel tower line one and one-third miles long was erected from the Philadelphia Electric Company's 66,000-volt line to the site of the main substation in the shipyard. The tower line has an average span of 550 feet, and supports two three-phase circuits, each having 2/0 stranded copper conductors with two 7/16-inch stranded steel ground cables.

Severe short circuit possibilities were imposed on the high-voltage line equipment at the shipyard, due to the position of the tap to the Philadelphia Electric Company's 66,000-volt line tying the Chester and Philadelphia stations with the addition then proposed at these points. Under certain conditions a short circuit of more than 600,000 kilowatts might be produced.

For this reason much care was taken in the selection and arrangement of the switching equipment busses.

Main Substation

The main substation has an entirely outdoor high-voltage installation. The 66,000-volt busses are of one and one-half-inch iron pipe; they are in duplicate, unsectionalized and suspended from a steel structure with seven unit disc insulators. In this type of bus structure, no part is in tension, thus allowing a moderately light supporting framework and consequent saving in cost and time of completion.

The lines and transformer banks have selective connection to the busses through air-break disconnecting switches.

The oil switches are G. E. Co. type KO-26, electrically operated, with overload trip on the incoming lines only.

The step-down transformer equipment includes four 6000-k. w. banks, each 66,000/2400 volt, oil-insulated, self-cooled, external radiator type, with three 2000-k. w. single-phase units a bank. The transformers are connected delta on the high-voltage side and star with grounded neutral on the low-voltage side.

With this arrangement 4150 volts is available for distribution, and standard distribution transformers with 2400-volt primary can be used connected in star with grounded neutral. A distribution voltage of 4150 was desirable in view of the estimated load and its distribution over the waterfront of nearly two miles. Furthermore, the emergency of the situation made necessary the selection of a type of distribution transformers that could be obtained in the quantity required.

The 4150-volt bus is open, in duplicate and consists of 3-inch by ¼-inch copper bar supported on pipe framework on pedestal insulators over a concrete switch cell structure. Each bus is divided into two sections—one section is fed by three transformer banks, and the other is served by one bank of transformers. The two sections of one bus are tied together by a sectionalizing oil switch, which is normally open. To the bus section served by three transformer banks the power feeders are connected, and from the other section the lighting feeders are served. With this arrangement, one to three transformer banks can carry the power load, including all motors and other equipment tending to produce a fluctuating load, and the lighting service can be carried on a separate transformer bank, thus being free of the regulation of the power transformers. By means of the bus tie switch the lighting load can be carried on the power bus section, in case of failure of the lighting transformer bank.

Duplicate Bus in Two Sections

The duplicate bus is in two sections, like the main bus, but has no section tie switch. Selective connection for the feeders and transformer banks to the main and duplicate busses is obtained with air-break, disconnecting switches separated by asbestos lumber barriers.

The transformer and feeder switches are the General Electric Company's Type H-6 and H-3, electrically operated, bottom and rear connected. The feeder switches only are automatically tripped.

The 4150-volt busses and switches are enclosed in a fire-proof switch room, with an adjacent operating room containing the control board, which includes control for two 66,000-volt transformer banks, two 600-k. w., 13,200-volt transformer banks, eight 4150-volt lighting feeders, sixteen 4150-volt power feeders and two storage battery, and charging motor generator, panels. All panels are of marine finished slate.

Temporary Power Supply Retained for Safety

As stated, the initial power supply was at 13,200 volts. This was for temporary lighting and construction power requirements. Conditions made necessary the increase of the temporary capacity from 600 to 1200-kilowatt capacity for construction power and in order to give sufficient lighting for night operations. When the permanent transformers were received, it was decided to retain the 13,200-volt service as an emergency relay, so that in case of malicious injury to the 66,000-volt line, sufficient capacity would be available completely to light the streets and principal buildings, and provide for operation of the fire-pumping stations. Switching arrangements were therefore made, so that two 600 k. w. 13,200/2400-volt outdoor transformer banks could be connected in star to the 4150-volt lighting section of the main substation bus after the power section of the bus and the 6000 k. w. lighting transformer bank had been disconnected from the 4150-volt bus. No attempt was made to operate the 13,200 and 66,000-volt transformer banks in multiple.

A 200-ampere- hour, fifty-five-cell storage battery, in a battery room adjacent to the operating room, energizes the control circuits for the oil switches, and in a similar room is located an 80-ampere-hour storage battery for the time-clock system.

Underground Conduit System

On account of overhead interference from locomotive cranes handling material between the storage spaces and the ways and piers, an underground distribution system was adopted. The low elevation and swampy nature of the ground made trenching for the conduit, water and sewer lines very difficult, especially with the severe winter conditions under which the work had to be executed, as the soil had to be thawed as well as drained.

For the main conduit line, three and one-half-inch fiber duct was used, with concrete encasement and concrete manholes.

The conduit system includes about 27,000 trench feet with a total of about 200,000 duct feet of fiber conduit and about 160,000 feet of iron service conduit. The conduit system contains sixty-six concrete manholes—the standard manhole being approximately 6 feet by 8 feet.

The distribution system is a combination of tree and radial distribution. From the main substation twelve power cables serve the ways, two cables for each of the five compressor houses, and one cable serving as a starting feeder for the motor-driven compressors, and a common relay for the compressor houses and pumping stations, and one other feeder serving the pumping stations.

Power Feeders in Wet Basins

In the wet basins, two power feeders serve the two compressor houses and two feeders serve the shop substations.

The lighting along the ways is carried on three primary feeders, with one for the wet basins and two for general building lighting.

All of the foregoing cables are 4/0 three-conductor, with 3/32-inch by 3/32-inch varnished cambric insulation and lead sheath, with a total length of about twenty-two miles. A common neutral is carried for the lighting and power primary, consisting of weatherproof insulated cable grounded at the main substation and at distributing transformer banks.

Interior of the galvanizing shop, looking north

A typical yard time office, Hog Island

The street lighting is carried on one feeder switch and is divided into four circuits with sectionalizing potheads at the main substation.

Five Transformer Houses

For power distribution along the ways, the compressor house of each ten ways serves as a center of distribution. From each compressor house a three-phase feeder with automatic oil switch serves five transformer houses located at the head of alternate ways, and each transformer house serves two ways.

The primary lighting feeders are tapped into the ways transformer houses, each feeder serving two or one group of ten ways.

In the wet basins, two similar centers of distribution are established for the power primary at each of the two compressor houses, with transformer houses at the head of each pier.

Five compressor houses along the ways supply compressed air for ship work. Each compressor house has two 5300 cubic foot and one 2300 cubic foot compressor. In the wet basins two compressor houses, each with two 2300 cubic foot compressors serve this section. All compressors are connected to common air mains and have a combined free air output of 74,000 cubic feet a minute, maintaining an air pressure of 100 pounds a square inch.

Drive for Air Compressors

All air compressors are driven by direct connected, 4000-volt, three-phase, synchronous motors with belted exciters, and are self-started from auto transformers. The motor sizes are 1040 and 450 kilowatts, respectively, with 2 per cent power factor correction. This gives a total air compressor connected load of 14,500 k. w.

Each compressor house has a double open 4000-volt bus with air-break selector switches with asbestos board barriers, K-12, hand-operated, remote controlled, oil switches, mounted on pipe framework. All main connections between the compressor motors and the control equipment is non-leaded single-conductor cable in fiber ducts.

Secondary Distribution to Ways

At the head of the alternate ways is located a wooden transformer house containing a power bank of three 100-k. w., 2400/440-volt transformers connected star with grounded neutral on primary and delta on the secondary, for power supply to the 440-volt derrick motors and portable motor equipment on the ways. The connected load of derrick motors on each group of ten ways is 3400 horsepower, making a total of of 17,000 horsepower connected for the fifty ways.

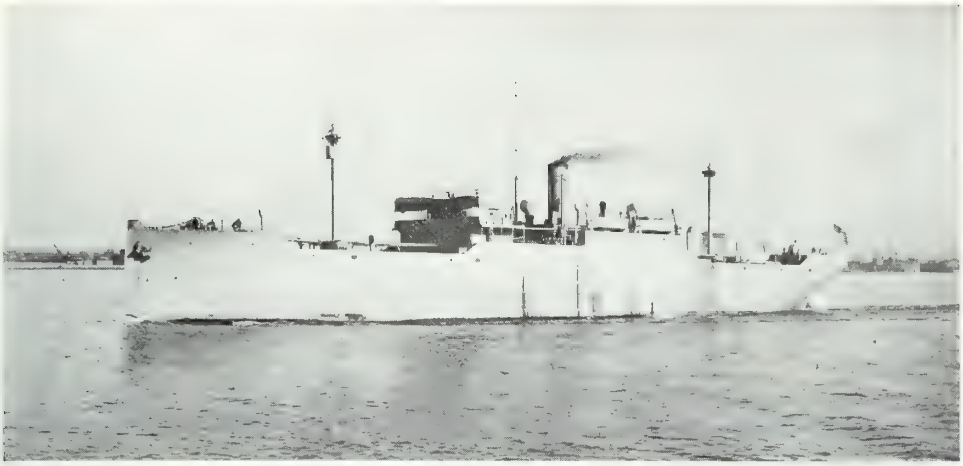
Each transformer house also contains one seventy-five and one fifty-k. w., 2400/220-110-volt transformer connected in multiple for lighting service on two ways.

The transformers have automatic primary oil switches, secondary fused air break switches for the power transformers, but no secondary fuses for the lighting transformers. The power transformers in each five transformer houses of a group of ten ways may be multiplied on the secondary, but are normally operated separately. This provision was made in view of the uncertain load factor of the derricks, no parallel case ever having been presented. In practice it has been found that the power demand for two ways served by one power bank has not exceeded 200 k. w., which is well within the capacity of the bank. The average maximum power demand for one group of ten ways is about 600 kilowatts.

Mains from Transformer Houses

The power and lighting secondary mains from each transformer house consists of 4/0, rubber-insulated, lead-sheathed cable, carried in iron conduit, three cables to the conduit, to the derrick towers of each of the two ways served by each house. At each tower a wooden cabinet divided into two sections, one unlined for 440-volt and one sheet-iron-lined for 220-110 volt service, contains the distri-

Night lighting of the template shop, 8 p. m.



Hull 494, the Sacandaga, leaving Hog Island

bution switches for the respective towers.

The 440-volt, three-phase main is tapped at each tower through a 600-volt, three-pole fused switch in a steel box. The leads to the derricks on the towers are carried in iron conduit, and each derrick motor has a series tripped oil switch which can be locked open.

The 220-110-volt, single-phase, three-wire main similarly is tapped to a fused, non-enclosed switch at each derrick tower, and fused cutouts and switches serve the several lighting circuits on each tower. All wiring on the towers is carried in rigid conduit.

Portable Armored Cable

Relay for the lighting primary service on the ways can be obtained from the power primary by jumper connections and double throw selector switches. The power feeder for a group of ways transformer houses can be relayed by a portable armored cable made up with disconnecting potheads so that connection can be made quickly between a compressor house and the central transformer house of a group.

Disconnecting potheads in the transformer houses permit sectionalizing of the lighting and power primary and isolation of parts of a group of transformer houses in trouble.

Wet-Basin Wiring

In the wet basins a similar distribution plan was adopted, with two central primary distribution centers and a transformer house at each pier, with a bank of three 50 k. w., 2400/440-volt transformers for three-phase power and one 150-k. w., 2400/220-110-volt transformer for lighting service. Each transformer house has auto oil switches on the transformer primaries and fused knife switches on the secondaries.

Unleaded conductors in iron conduit are carried under the decking of the piers to the four berths on each pier; each berth has four weatherproof fuse boxes and three pole-attachment plugs, two for 440-volt, three-phase power, and two for 220-110-volt lighting service. Portable cabinets with branch circuit switches and fuses are set up on the pier or on the ships, for service connections.

Shop Group

In the shop group power service is supplied from two centers, one substation containing 1350 k. w. of 2400/440-volt transformer capacity and 165 k. w. of 220-volt, direct current motor generators; the second substation containing 900 k. w. in 2400/440-volt transformers. The shops are grouped on the two substations as circuit regulation dictates, the service connections being made overhead where possible.

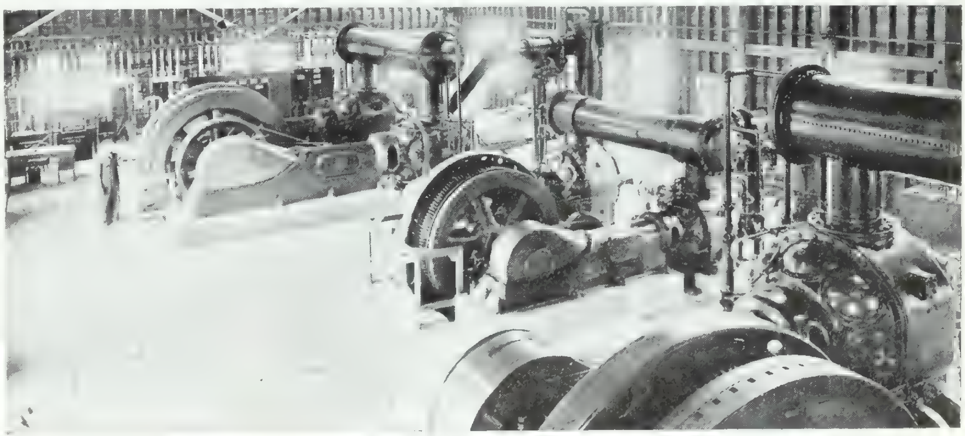
In each shop the service connection is brought into a steel cabinet with fused main switch, and an open three-phase, 440-volt main, consisting of 600-volt rubber insulated cable is carried on one or both sides of the buildings, as the arrangement of the machines requires. The total connected motor load in the shops is about 3000 horsepower. Each motor-driven machine has a 600-volt, three pole oil switch or steel enclosed fused safety switch.

Wide Range of Motor Equipment

The motor-driven equipment in the plant covers a wide range, from 1040-k. w., 4000-volt synchronous motors driving air compressors to fractional horsepower motors for portable tools. Excluding motors of less than one horsepower, there are about 1150 motors in service, aggregating more than 37,000 horsepower. All motors are either 440 or 220-volt, three-phase, or 220 or 110-volt, single-phase, except about sixty jib cranes in the shops, which have 220-volt, direct current motors.

The lighting service for the shops is taken from a general lighting primary with individual transformers for respective buildings. Services are carried in overhead with the usual cutouts, open mains and wooden cabinets lined with asbestos, containing branch cutouts and switches.

Water for drinking, sanitary purposes, testing, fire protection, drainage, etc., is obtained by motor-driven pumping stations, and likewise the drainage



A typical compressor house, supplying ten shipbuilding ways and sewage stations are electrically operated.

For drinking and sanitary purposes, the water is filtered and treated, but for fire and testing use the water is taken directly from the river. Six pumping stations with an aggregate of 1800 horsepower capacity of motor-driven pumps, and a pumping capacity of about 3,500,000 gallons of water daily, perform this service. The fire service stations have an aggregate capacity of 14,000 gallons a minute at 125 pounds pressure. The domestic service system can handle 2,000,000 gallons of water daily.

Pumping station motors range in size from seven and one-half to 150 horsepower; all are 440-volt, three-phase, squirrel-cage induction type. Each pumping station has primary oil-switch control for the incoming feeders and the transformer banks and slate switchboards with open busses and open-fused knife switches for motor control.

Top, typical night-lighting of shipways, group 1; middle, template ship foundations, A and B; bottom, shop group, northwest from Shipway 41

Interior Illumination

Service for building lighting is taken from primary feeders on the tree system, with transformers for individual buildings or building groups where possible.

Transformers for general lighting total about 10,000 kilowatts. Transformers of twenty-five kilowatts and less are installed on poles wtih brackets. Fifty and 75 k. w. transformers are placed on raised scaffolds, except the ways and piers transformers, which, as stated, are enclosed in houses for mechanical protection.

For all general building lighting, exclusive of one main drafting room and the shops, direct lighting fixtures with metal or prismatic glass reflectors are used, with about .5 watts a square foot. In one drafting room, semi-indirect fixtures are used, consisting of 400 watt Mazda lamps with fourteen-inch Sudan reflectors and R. I. diffusers. For this type of illumination about 1.6 watts a square foot is used.

Considerable study was given the lighting arrangements, and, as a result, uniform illumination of working space is produced, and desk lamps are unknown.

Direct Lighting in Shops

In the shops, direct lighting is also employed, with a higher intensity of illumination. A typical example is the plate and angle shop, containing 1000-watt direct fixtures with metal reflectors placed over the cranes, forty-two feet over the floor and requiring about .75 watt a square foot of floor space. In this shop, portable lamps are used only on machines where punch marks are concealed by the overhanding part of the machine.

Another example of good lighting is the template shop, where 300-watt direct fixtures twelve feet over the floor require about 1.6 watts a square foot, and shadows are well equalized.

The total building floor area lighted is about 103 acres, or 4,500,000 square feet, with a connected load of about 2700 kilowatts. This gives an average of about 0.6 watt a square foot.

Yard and Street Lights

The storage yards and the streets are illuminated by Mazda lamps in Novalux fixtures, having a clear globe and prismatic refraction. All lamps are 1000 watt, except a few 300-watt lamps for outlying streets. The standard unit consists of four lights placed one on each side of a pole about fifty-seven feet above the ground with individual transformers on each pole. The transformers are connected to a sectionalized primary consisting of triple or single-conductor, leaded cable with weatherproof neutral carried in pump logs and wooden hand holes. The lighting poles are spaced approximately 500 feet apart in each direction. With this spacing, practically uniform illumination is produced. On isolated streets, single 300-watt lamps, spaced about 300 feet apart, are mounted on thirty-foot poles. In the classification yards, sufficient illumination is produced to enable storage yards crews to read the markings on steel at night without other means of lighting. In the two main classification yards this result is produced with about one-half watt a square foot of yard area.

The total number of lights required for yard and street illumination is about 800, with a combined demand of 660 kilowatts.

This system of lighting has produced excellent results at a lower installation and operating cost than if a series system, with constant current transformers, had been used. For the particular conditions at the yard the chance of a considerable part of the yard being in darkness is minimized with this multiple system. Each light unit gives a greater amount of light than any series incandescent unit available.

Building Ways, Lighting

The illumination of the ways and the outfitting piers was given careful study, to enable work on the ships to be pushed at night as well as by day.

On the ways, three types of lighting fixtures were finally adopted for general illumination.

Two 1000 watt General Electric L-12 projector flood lights with ribbed glass fronts were mounted near the top of derrick stiff legs, so that each derrick has two flood lights bearing on the way it served, making sixteen flood lights for each way. These flood units were adjusted and placed so that their illumination alone on the hull was without sharply-defined shadows, and of sufficient intensity to make portable lights unnecessary until decks and flats were in place, and then only for spaces below decks.

To illuminate the other sides of the hull and the scaffolding, 500-watt Mazda lamps in enameled steel angle reflectors were hung under the derrick platforms; two on each tower and two between the two middle towers, making twenty of these units for each way.

To fill in the space at the bow and stern, not fully covered by other units, a 1000-watt Novalux unit was placed under the derrick scaffold on the end towers of each way, and five-angle type enameled steel reflectors with 500,-watt Mazda lamps were placed on the temporary scaffolding about the stern and shifted as required by the changes in scaffolding.

For lighting under the hull and below decks, temporary strings of fifty-watt lights and portable plugging strips were resorted to. Service for portable and inboard temporary lights was obtained from weatherproof plug receptacles on the way floor and derrick towers.

Plugging Strips

The plugging strips used were developed for the plant by a local concern under the plant's direction. The strip consists of a wooden block containing two copper bus rods with a sheet fiber cover, both treated to limit absorption of moisture. The cover and busses are drilled accurately to receive five two-point plugs in the top and one at one end; one end of the busses is fitted with terminals for feeder leads to the busses.

The plugs are of hard rubber, each containing one three-ampere cartridge fuse, and made up to a thirty or sixty-foot length of No. 14 packing house cord and a weatherproof receptacle and locked on guard for a fifty-watt carbon lamp. This type of plugging board and extension lamp has given good service.

Another type of portable lamp that gave good results is a standard, made of pipe with an adjustable arm supporting a metal reflector and containing a 100-watt Mazda lamp.

The permanent lighting units for each way have a consumption of about one-half watt a square foot with very satisfactory results.

The permanent lighting load per way has a demand of about 30 kilowatts, with a total for the fifty ways of 1500 kilowatts. The temporary lighting is variable.

Another problem was the illumination of a space 105 feet wide by sixty-five feet deep at the head of each way for bulkhead fabrication in the range of a twelve-ton ground derrick. After experiment this was accomplished with two 1000-watt angle units similar to those used on the ways, placed on

Top, the plate and angle shop; middle, typical way group compressor house; bottom, plate and angle correction shop, looking northwest from fire station the derrick's stiff legs about thirty feet above the ground. These, with the light from the street units, gave ample illumination for steel working, except under the bulkheads, where portable lights were necessary.

Lights at Outfitting Docks

On the wet-basin piers two features of illumination were required—first, to illuminate the piers for general handling of material; and second, to illuminate the upper decks.

General pier illumination was accomplished with twelve Novalux 1000-watt units, placed four on a pile at the upper and lower ends and middle of each pier. These fixtures, like those for street lighting, were placed on four sides of the pole about fifty-seven feet above the pier and were connected to the yard and street lighting system.

The upper decks and hull sides were illuminated by 100-watt projector flood lights placed on the same poles as the Novalux units and arranged in batteries of three, so that the two ships on one side of any pier received light from twelve flood lights on each side of the ship. The flood units were of two types—one with a ribbed glass front for moderate throw and another type giving a more concentrated beam with clear glass front for the long throws. The beam throw varied from 300 to 600 feet, with the exception of the projectors on the timber dike at the west side of the basin, where the average throw was 700 feet. The results were fairly satisfactory, but the possibilities have not been fully developed, due to changed working conditions on a peace basis.

Fire Alarm System

In connection with the fire protection equipment, a Gamewell, closed series, fire-alarm system, with separate horn circuits, was installed. This system includes a central fire station with three sub-fire stations, twenty-four master boxes and about 400 auxiliary boxes with about fifteen miles of interconnecting cable.

The master boxes were located closer together than in usual city practice, in view of the amount of wooden construction and the unusual importance of minimizing the fire damage.

Master boxes were located in prominent positions on streets and each equipped with a permanently-burning red-light marker and a motor-driven siren horn. Auxiliary pull boxes were placed between each shipway and elsewhere about 300 feet apart and on each floor of each building. No general fire alarm whistle or gong is sounded, but, for the assistance of traffic officers, the alarm system is divided into zones and the siren at each master box in any one zone sounds only when an alarm is pulled in that zone. In this way the tendency to a general halt in labor on the occasion of a fire alarm is limited to the zone from which the alarm is sent in.

The alarm and horn circuits are operated from a storage battery located in the central fire station. Connection between stations and alarm boxes is made with lead-sheathed, rubber-insulated cable made up of two, four and six No. 14 conductors.

Telephone Exchange

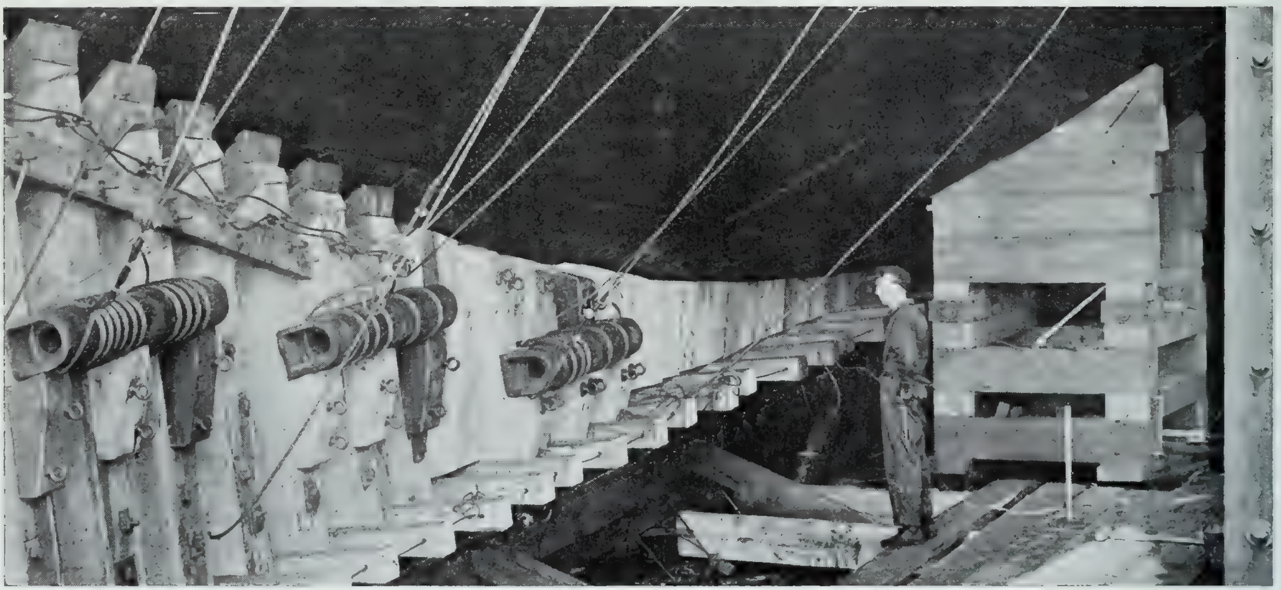
The original plans contemplated an interyard telephone system with a moderate amount of traffic outside. When this plan was formed the administration, engineering, purchasing and accounting divisions were located in Philadelphia. The Emergency Fleet Corporation later decided to concentrate these divisions in the shipyard, and this required a greatly enlarged telephone system.

The present system has a central exchange with space for sixty-two positions ultimately, of which twenty-two are now in use; a cable system consisting of nineteen miles of aerial and underground, and fifteen miles of aerial, twisted-pair construction, giving 4200 pairs of wire leaving the exchange and a present service list of about 2000 telephones.

Underground telephone cables in general are drawn in pump log conduit lines with wooden handholes and iron service duct.

Service at the Shipways

Telephone service is provided at each shipway by means of a cable looped under the ways in iron conduit to a telephone booth between each pair of ways. From this booth extension telephones are


The sand jacks used in Hog Island launchings may be seen back of the man, parallel with his shoulders. In the center of the boxes are the two and one-half inch pipe plugs

served with twisted pair on the derrick towers.

On the outfitting piers similar booths are provided and extension telephones are carried on temporary leads on board the ships while at the piers.

In addition to the central telephone exchange a forty-five-instrument separate switchboard is installed in the main substation for service between sub-stations, and a thirty-instrument switchboard is provided in the guard headquarters for police service. These branch exchanges are connected into the same cable system at the main exchange, but service does not pass through the main exchange board.

Time Clock System

For the purpose of keeping workers' time, an electrically operated system of time clocks was provided. A central master clock, master relay and fifty-five-cell storage battery actuate secondary relays, operating groups of time recorders placed at intervals over the yard convenient for checking in and out. The standard recorder unit consists of twenty recorders with a secondary relay installed under a shelter with railed runways for entering and departing employes. A number of secondary time clocks and time stamps are also operated from the central system. The system is connected up with leaded rubber, insulated cable drawn in pump log or iron conduit.

Additions to the System

The problem of the electrical system was to anticipate where and in what amount electric service would be required in the yard at a time when the plans for the plant were developed in a general way only. This was different from the usual public service or industrial plant problems, due to the speed required to construct. It amounted to forecasting the distribution requirements for a city that was to grow up in a few months with only partially-known plans. The need of not overestimating the requirements was not less important than not committing the sin of underestimating in view of the fact that such materials as cable, wire, transformers, switchboard equipment, etc., were becoming increasingly difficult to get even on a priority basis, and the available supply was being drawn on far above normal demands for use overseas and at home.

During several months' operation of the developed plant the electrical system has been sufficiently flexible and the fixed units of its several component parts have been adequate to meet changing and growing needs.

Time Keeping System

There are approximately 30,000 men and women employed at the plant, the great majority of whom are, of course, engaged on ship construction; or, in other words, some 24,000 employes are ship workers and the remainder are engaged on the operation and maintenance of the plant, the material-handling yards, the operation of the stores and commissary departments, the engineering, purchasing, auditing and accounting departments, etc.

So that the employes may check in and out at a point as near as possible to their work, there are thirty time offices along the shipways and wet basins and about the yard. Each time office along the fifty shipways handles the timekeeping work for the men engaged on five of the ways. There is a time office for each outfitting pier in the wet basins and each pier accommodates four boats. In addition, other time offices are located throughout the plant to serve the departments engaged on work other than ship construction.

Five Runways to Each Office

Time clocks are located at each runway at each time office; there being five runways to each office so as further to reduce the length of time in passing the employes to and from their work.

Each employe wears a badge which bears his employment number, shows his occupation and the section in which he is employed.

On reporting for work, the employe receives from his time office a clock card bearing his name, his number, his occupation and rate of pay and he punches this card at the time clocks to register the time of his arrival and then reports to his foreman. Each foreman collects the time cards from the workmen under his supervision and retains the cards until the end of the shift, when he signs each card, places on each the information showing the work performed by each man and then returns the cards to the workmen, who register them out at the time clocks and present them to their timekeepers.

Men Checked at Work

From the time cards the payroll for each division is compiled and also from these cards, by means of accounting machines, the payroll distribution and other statistical information is obtained.

A field auditing division of the timekeeping department is maintained to check the men at their work, to see that they are working at the occupations at which they are rated and, in general, to protect against fraud.

The timekeeping and payroll schedule is so arranged that different sections of the job are paid on different days of the week, instead of paying the entire 30,000 employes on one day. This tends to speed the pay-off and at the same time reduce the cost of this operation. The average length of time required to pay off the job is twenty minutes and it requires four or five minutes to pass the 30,000 employes through their time offices to and from their work.

Launching Methods

As would be expected in so large a ship factory as Hog Island, we find some new methods used in preparing hulls for their initial dip in the Delaware. The most outstanding feature in originality is the use of sand jacks in lowering the ship onto the launching cradle.

This is merely a more complete application of a very old mechanical principle; that is, the digging of sand from under an object which is to be lowered.

The application in this particular case is effected by the use of cast-iron boxes, 12 by 24 inches and approximately four inches deep, into each end of which is fitted a two and one-half-inch pipe plug. Into each of these boxes is fitted a block of wood with about one-fourth-inch clearance all around. A few days before a launching date, all of the bilge cribs and about one-fourth of the keel blocks are fitted up with these sand jacks, the boxes filled with sand within about one inch of the top, the block placed on the sand, and the upper end of the block wedged up against the bottom of the vessel. The filling, of course, is then applied around the crack between the block and the side of the cast-iron box to prevent moisture getting into the sand

and causing any possible sticking when it comes time to lower the ship.

When the launching day arrives, the intermediate keel blocks and shores are removed, allowing the vessel to rest completely on the sand jacks. When all other preparations are completed, two men are stationed at each jack and the signal is passed to remove the plugs. As each plug is removed the man puts his hand over the hole and prevents any large quantity of sand from running out until the signal has been passed telling that all plugs are out. The order is then given to remove the sand, which is done by means of curved iron spoons made with long handles especially for the purpose. As the sand is removed the block settles down in the boxes and allows the weight of the ship to come down in the cradle on the launching ways, thus releasing the blocks and boxes entirely. They are then removed and the vessel is cleared to be released, which is done in the ordinary way by dropping the dog-shores and sawing the planks.

The Standard Ships

Some features of the design are very unusual.

These vessels have a deadweight capacity of 7500 tons; there are 380,000 cubic feet of cargo space and the gross tonnage is estimated at 5400.

The hulls are constructed on the transverse system of framing and are subdivided into nine watertight compartments by eight bulkheads, all of which extend to the upper deck. There are four cargo holds served by five hatches in the upper and second decks and one hatch in the bridge deck.

Midships Section Rectangle

Deadrise, tumblehome, shear and camber are all zero, the midships section being a perfect rectangle with the two lower corners removed to form a bilge. This latter was not considered necessary from the naval architect's viewpoint, but was a concession made to drydock practice in case of possible repairs. The perfectly flat decks give an old salt the impression of something lacking, but so far have worked out very nicely at sea.

The stern design is unique in that the conventional cast-steel or forged-steel stern post is discarded for a stern built up of heavy pressed plates. This idea was adopted because the forge and foundry capacity of the country was taxed to the limit, and it would have been impossible to get deliveries of castings or forgings within any practical time limit. Although this is the first use of plate sterns of this type in the United States, the idea is largely taken from designs made by Worthey for steam ships of the Lamport & Holt lines some twenty years ago. This construction is considerably stiffer than that ordinarily used, but cannot be advocated except in cases where there is a great number of duplicate hulls, as the expense of the heavy dies for pressing the steel parts is very great.

The use of this built-up stern involves a partially-balanced rudder. This, too, is made almost entirely of steel plate. The maneuvering qualities of these ships have proved in actual service to be exceptionally good, the rigidity of the stern making possible a very much better alignment of stern tube and rudder stock.

The high-speed gears and the low-speed pinions have a speed of 425 r. p. m., and for the low-speed element the speed is further reduced to ninety r. p. m. The total speed reduction from the turbine speed of 3234 r. p. m. to the low-speed gear or the propeller speed of ninety r. p. m. gives a ratio of 35.9 to 1.

The G-E turbine and the one-plane, flexible type, speed-reduction gear form a single power unit for the propulsion of the vessel. The feature of this General Electric gear that renders it specially suitable for the transmission of large amounts of power is its flexibility, which permits it to yield at points under excessive pressure. This flexibility is secured by building the gear of plates between which there is a small clearance, this clearance allowing a slight lateral movement of the periphery, which relieves the stress on the helical teeth. A very small amount of this lateral deflection is sufficient to afford the desired distribution of load, and this amount can easily be given without approaching dangerous periodic strains.

Other electrical equipment on these vessels consists of two fifteen-kilowatt, steam-driven, standard G-E lighting sets; a blinker light controller and an eighteen-inch d. c. Emergency Fleet searchlight with pilot-house control.

Propulsion by Single Screw

Propulsion is by single screw, driven by a General Electric marine-type geared turbine of 2500 shaft horsepower, supplied with steam at 200 pounds a square inch pressure from three oil-fired watertube boilers, with a total heating surface of 9075 square feet, operated under natural draft.

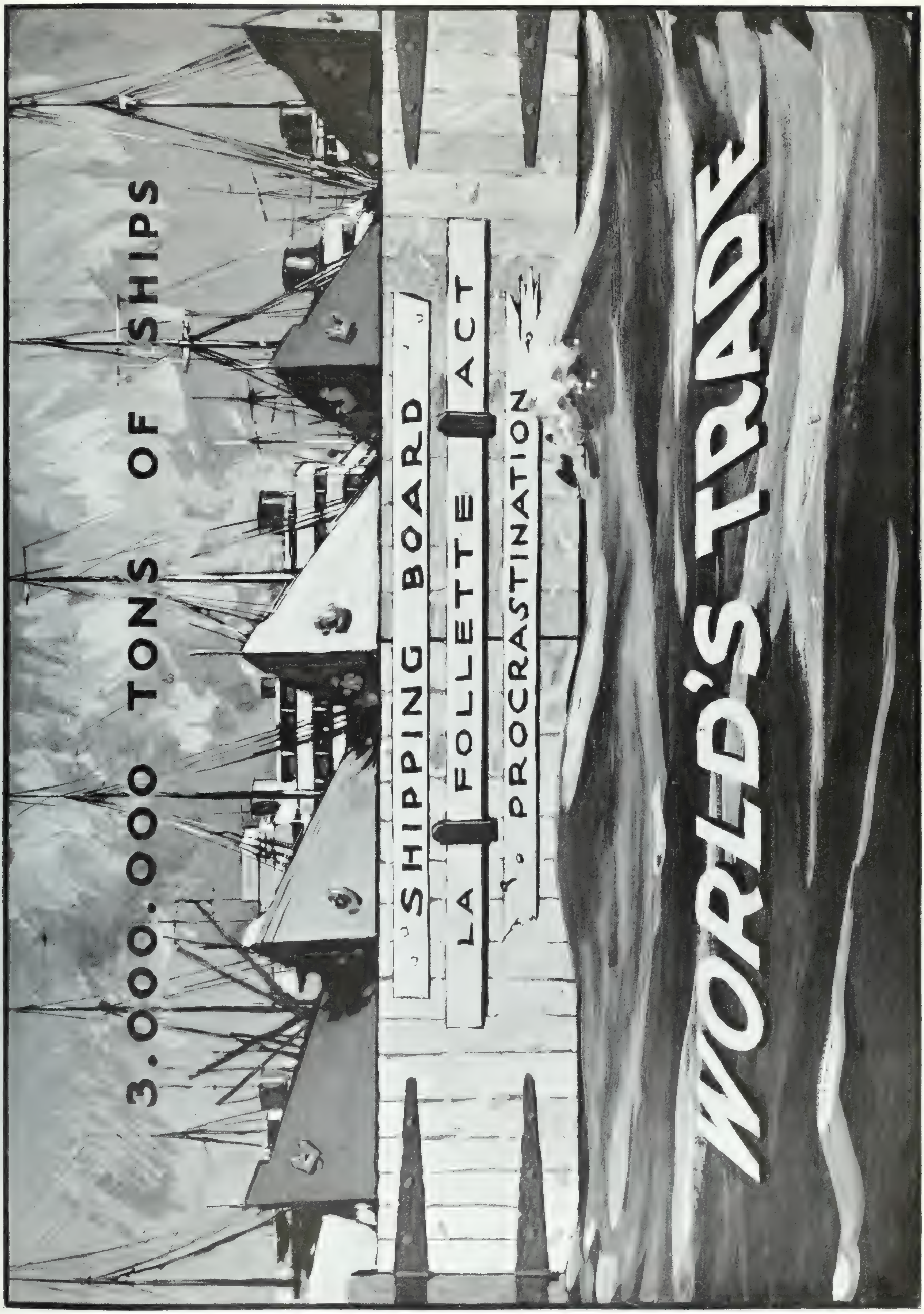
The main turbine is designed to operate at 3234 revolutions a minute, driving the main propeller shaft through a double-helical, double-reduction gear at a speed of ninety revolutions a minute. With dry saturated steam at 180 pounds gauge pressure at the throttle, a twenty-eight-inch vacuum referred to a thirty-inch barometer in the condenser, the steam consumption of the turbine, when developing its rated horsepower, is guaranteed not to exceed twelve pounds a shaft horsepower. The vessel has a fuel capacity of about 1100 tons, and with an estimated fuel consumption of twenty-nine and one-half tons in twenty-four hours, will have a cruising radius of over 10,000 nautical miles.

Impulse Type Turbines

The General Electric steam turbine is an impulse turbine, i. e., the rotating element is actuated by the impact of the steam passing through the buckets at relatively high velocity, but without actual expansion in them. The steam is expanded in the stationary nozzles, acquiring high velocity, and then passes through rotating buckets without further expansion.

The turbine is so arranged that the ahead turbine and the astern turbine are carried on the one shaft and in the same casing and consists of five stages for the forward turbine and two stages for the reversing unit. The maneuvering is done by hand and is interlocked in such a manner that it is impossible to open the valve for the astern turbine, if the valve for the ahead turbine is not closed, or vice versa.

The turbine and the high-speed pinion are designed to operate at a full power speed of 3234 r. p. m. when supplied with steam at 200 pounds pressure and exhausting into twenty-eight and one-half inches of vacuum.


3.000.000 TONS OF SHIPS
SHIPPING BOARD
LA FOLLETTE ACT
PROCRASTINATION
WORLD'S TRADE

Mr. Piez Answers Mr. Slechta

UNITED STATES SHIPPING BOARD
EMERGENCY FLEET CORPORATION

Philadelphia, Pa.

Mr. A. J. Dickie, Editor,
"Pacific Marine Review,"
San Francisco, California.

Dear Sir:

My attention has just been drawn to an article in your March issue headed "Reconstruction in Foreign Trade and Merchant Shipping," by Joseph J. Slechta.

I do not in the least resent criticisms made of the policies of the Emergency Fleet Corporation, insofar as these criticisms are founded upon fact, but in this article the author has written regarding various matters of which he seems to have very little knowledge and the article tends wholly to misrepresent the state of shipbuilding in this country, and do international injury to our shipping trade and to our shipbuilders.

Figures of Table Inaccurate

We particularly object to the statement of "Comparisons Between British and American Vessels" given on Page 78, because at the time of submitting this table to you, the author of this article must have been aware that the figures had previously been submitted to this corporation, and had been proved to be quite inaccurate.

You will note in this table that the estimated **net** steel in a British single-deck ship is compared with the **gross** steel weight of the two-deck Hog Island type of ship. Similar discrepancies in weight comparisons run right through the table. On an equal basis of comparison, it can be shown that the British standard steel ships, and our several fabricated ships, when compared, indicate that the steel in our vessels averages 99.6 per cent of the weight of the steel in the British standard vessels. As a matter of fact, both sets of ships have been built to similar rules, and shipbuilders are not in the habit of paying for more steel than is necessary to construct their ships according to the rules of the classification society under which they are working.

Designed by Naval Architects

The designs of ships built by fabricating plants were not designs prepared by bridge and skyscraper builders, but were designs laid down by naval architects of the highest standing, and experimental tank results show these to be as easily propelled vessels as any such freighters on the ocean.

Everyone knows that it was necessary, in order to put these vessels afloat at as early a date as possible, that such steel as was already manufactured should be employed, and that a great deal of the work on that steel had to be done by bridge-builders and others fully equipped with steel working tools. It was recognized that, for the emergency, certain handicaps had to be faced, such as, in certain cases, absence of sheer and deck camber, which would have introduced curves very difficult for the bridge-building yards to handle; but, had these features not been faced, enormous delay would have been experienced in getting out the ships; and in war, time is the essence of all things.

309 Ships Requisitioned

At the time Mr. Slechta's article appeared, 506 steel ships had been delivered by the Emergency Fleet Corporation; 309 of these were requisitioned ships, i. e., they had been ordered by private companies prior to the war. They were designed by the architects and engineers of the old shipyards in consultation with the experts of the established ship operating companies and in agreement with the rules of the various classification societies. The Emergency Fleet Corporation had nothing whatever to do with the design. We accepted the designs as they were and completed the ships in accordance with the original specifications, with such changes as were necessarily added as a result of war conditions.

It is interesting to know in this connection that 156 of these requisitioned ships were under construction for the Cunard Line, that the plans and specifications were prepared to their satisfaction, and a number of them had been inspected during the early stages of construction by Cunard inspectors. In addition, thirty-two of the remaining requisitioned ships were for Norwegian owners and three for Russian.

Few Designs Originated

As a matter of fact, while the Emergency Fleet Corporation's engineering section reviewed and passed upon all designs submitted by shipbuilders, in very few cases did they originate designs. In the majority of cases less experienced shipbuilders purchased the designs outright from the older yards. We might add in this connection, however, that several of the ships that have proved most satisfactory in service have been designed and built by the new yards.

One would imply from Mr. Slechta's article that we entirely overlooked Lloyds' Register and made no use of their undeniable ability. Let us recite some of the facts.

Three hundred and seven of the 309 requisitioned ships delivered at the time his article was published were designed under Lloyds' rules and inspected and classed by Lloyds' surveyors.

Five hundred and thirty-four of the contract ships of three and one-third million tons have been, or are being, designed under Lloyds' rules, inspected and classed by Lloyds' surveyors. A letter in the Emergency Fleet Corporation's file, dated February 26, 1918, from Mr. French, chief surveyor of Lloyds' Register of Shipping, contains a list of Lloyds' surveyors which shows that at that time there were eighty-three men on Lloyds' staff surveying Emergency Fleet Corporation ships. These men were, in addition to their staff, located at the New York office and with which the Emergency Fleet Corporation's engineering section has been in frequent communication.

Best Shipbuilding Talent Used

We need not refer to the aspersions upon the activities of the United States Shipping Board throughout the article, because anyone who has any familiarity with such activities is aware that the very best shipbuilding talent was constantly made use of in connection with designs, construction and supervision of ships as controlled by the United States Shipping Board Emergency Fleet Corporation.

For your information there is attached a memorandum giving some facts regarding the organization of the Emergency Fleet Corporation in charge of technical matters.

I request that this letter be published in your next edition in order that the very wrong impressions created by the article in question may be removed.

Very truly yours,
CHARLES PIEZ,
Director-General.

The memorandum to which Mr. Piez refers follows:

ORGANIZATION EMERGENCY FLEET CORPORATION IN CHARGE OF TECHNICAL MATTERS

Mr. Slechta would have the maritime world believe that the Emergency Fleet Corporation had not made use of the prominent naval architects, or of the architects and engineers of the old-established yards, in designing the ships built for the United States Shipping Board. The following facts speak for themselves:

The design and review of all ship and ship equipment plans for the Emergency Fleet Corporation have been executed by the Engineering Section, which is (a department) under the direction of the manager of the division of ship construction. The first manager of ship construction was Admiral Francis T. Bowles, who when appointed assistant general manager was succeeded by Mr. Daniel H. Cox, and upon these two men has fallen the responsibility for the general approval of types and designs of ship construction.

Who Officials Are

The engineering section is in charge of (and directly responsible to) the naval architect and consulting engineer. Mr. Theodore E. Ferris was the first to hold this position for the Emergency Fleet Corporation and it was under his supervision that such few original ship designs as were prepared by the Emergency Fleet Corporation were developed.

Mr. Ferris' work was continued under Dr. H. C. Sadler, as naval architect and consulting engineer, with Mr. Axel Rossell and Mr. H. H. Thayer as assistant naval architects.

A brief history of these six men will serve to show whether they had sufficient experience to qualify them for these very important positions.

Admiral Bowles and Mr. Cox both are graduates of Annapolis. They secured their knowledge of English shipbuilding methods at a post-graduate course at the Royal Naval College of Greenwich, England, where they were sent by the United States government as honor students from Annapolis.

Chief Constructor of Navy

After Admiral Bowles returned from England he served in the construction corps of the bureau of construction and repair of the navy and was finally appointed chief constructor of the United States Navy. He resigned from this position to accept the presidency of the Fore River Shipbuilding Company, which position he held for thirteen years. This happens to be one of the yards which Mr. Slechta includes in his preferred list of American shipbuilding yards.

Mr. D. H. Cox, after nine years' service in the construction corps of the bureau of construction and repair of the United States Navy, joined the firm of Cox & Stevens of New York City and continued with this firm until he rejoined the navy at the beginning of the war and was later assigned to the Emergency Fleet Corporation for duty.

Mr. Theodore E. Ferris has spent all his life in shipbuilding and ship designing, and is recognized as one of the most successful naval architects. He is particularly well-known for his merchant ships. There are probably more merchant ships of his design operating successfully than of any other American naval architect.

Professor at Glasgow and Michigan

Dr. H. C. Sadler is a graduate from, and later held a professorship at, the Glasgow University, Scotland. He is also professor of naval architecture and marine engineering at Michigan University and has been called in consultation by many prominent shipyards in the United States.

Mr. Axel Rossell was with William Cramp & Sons Ship & Engine Building Company for twenty-five years, the last twenty years of which he was their chief hull constructor.

Mr. H. H. Thayer has been connected with the Townsend & Downey, Harlan & Hollingsworth, and Pusey & Jones plants. He was naval architect for Pusey & Jones for five years and has to his credit the design of a number of merchant ships which have proved very successful in operation.

In addition to these six men there are a number of exceptionally well-informed naval architects and engineers in our engineering section. We would be only too glad to have any properly accredited person examine the personnel files of the engineering section to review the experience of these various engineers.

From the above it will be seen that not only have the men in charge of the design of the Emergency Fleet Corporation's ships been particularly well qualified to incorporate the best in American practice, but three of the responsible officers have been through the best schools in England.

Pacific Marine Review
The National Magazine of Shipping

576 Sacramento Street
SAN FRANCISCO, CALIFORNIA U. S. A.

Official Organ of the Shipowners Association of the Pacific Coast

Subscription Price, per year (Domestic) $3.00
(Foreign) $3.50
Single Copies . . . . 25 cts

J. S. HINES . . . . Publisher
B. N. DeROCHIE . . . . . . Business Manager
A. J. DICKIE . . . . Editor
ANDREW FARRELL . . . . . . Associate Editor
J. G. BRAY . . . . Pacific Coast Adv. Mgr.

NEW YORK OFFICE
339 Hudson Terminal Bldg.
30 Church Street
M. B. STEWART, Manager

NORTHWESTERN OFFICE
560-561 Empire Building
Seattle, Wash.
J. A. KENNEDY, Mgr.

Pacific Marine Review is sold at all leading News Stands
Entered as second class mail matter at Postoffice
San Francisco, California

Published on the First of Each Month. Copyright
1919 in the United States by J. S. HINES

IS THIS CAMOUFLAGE?

THE United States Shipping Board has published a bid said to have been made by the Submarine Boat Corporation in which they offer to build standard freighters for the Shipping Board at a basis price of $149 a deadweight ton. The Philadelphia Record is authority for the statement that President Piez of the Emergency Fleet Corporation says this bid is not bona fide and that it would be impossible for any shipbuilder to build ships at that price on the present material market and wage scale.

Should Know Shipbuilding Costs

President Piez should know shipbuilding costs. So should the Shipping Board. Is the latter trying to bluff the shipbuilders into a low figure for future contracts on the showing of this bid? If so, they are taking a very unfair advantage of the shipbuilders.

Another illustration of the same method of doing business is shown in the advertisement of wooden ships for sale after the propaganda by which these vessels were discredited to such an extent that they were classed as unfit for ocean work. This campaign of misinformation was evidently issued with the idea of preparing the way for cancellation of contracts. The now published advertisements call attention to the consistenly good records of these ships in carrying perishable cargoes and to their adaptability for **trans-Atlantic** and **trans-Pacific** voyages. It is worthy of note, also, that the terms of sale will allow transfer to foreign register.

Bad Influence on Merchant Marine

If this were a matter affecting simply the relations between Shipping Board or Emergency Fleet Corporation as operating owners and the shipbuilders as contractors, it would be a poor enough exhibition of business methods, but in its wider application it has a very bad influence on the very existence of the American merchant marine.

The war has brought to the American people a keen appreciation of the need of ships. They are looking to the Shipping Board for correct information as to the building, equipment and operation of ships, and have supplied the Shipping Board and Emergency Fleet Corporation with immense sums of money to be expended on ships. If the Shipping Board and the Emergency Fleet Corporation cannot get together and give the people reports which will be based on substantial fact, and give the shipbuilders a square business deal, then the American will lose interest in the merchant marine and let foreign bottoms carry his trade overseas. The war is over. There is no more need for camouflage. Let us have the truth.

THE FOREIGN TRADE CONVENTION

THE big delegation of San Francisco business men certainly are to be congratulated for their achievement at Chicago. There has been with the Foreign Trade Council a decided precedent in favor of inland cities for the national convention. It has always been considered that in coast cities trade influences might prevent open-minded discussion of matters coming before the convention. The San Francisco men have succeeded in breaking this precedent and the convention has agreed to come to us in 1920. This in itself is a very great achievement for San Francisco and the convention will be of great benefit to the Pacific Coast. Some enthusiasts go so far as to say that the 1920 convention will be the biggest thing for San Francisco since the Panama-Pacific Exposition. Certainly, first-hand knowledge of Pacific Coast conditions will be of great benefit to the business men of the United States and should bring a closer co-operation between Eastern and Western interests.

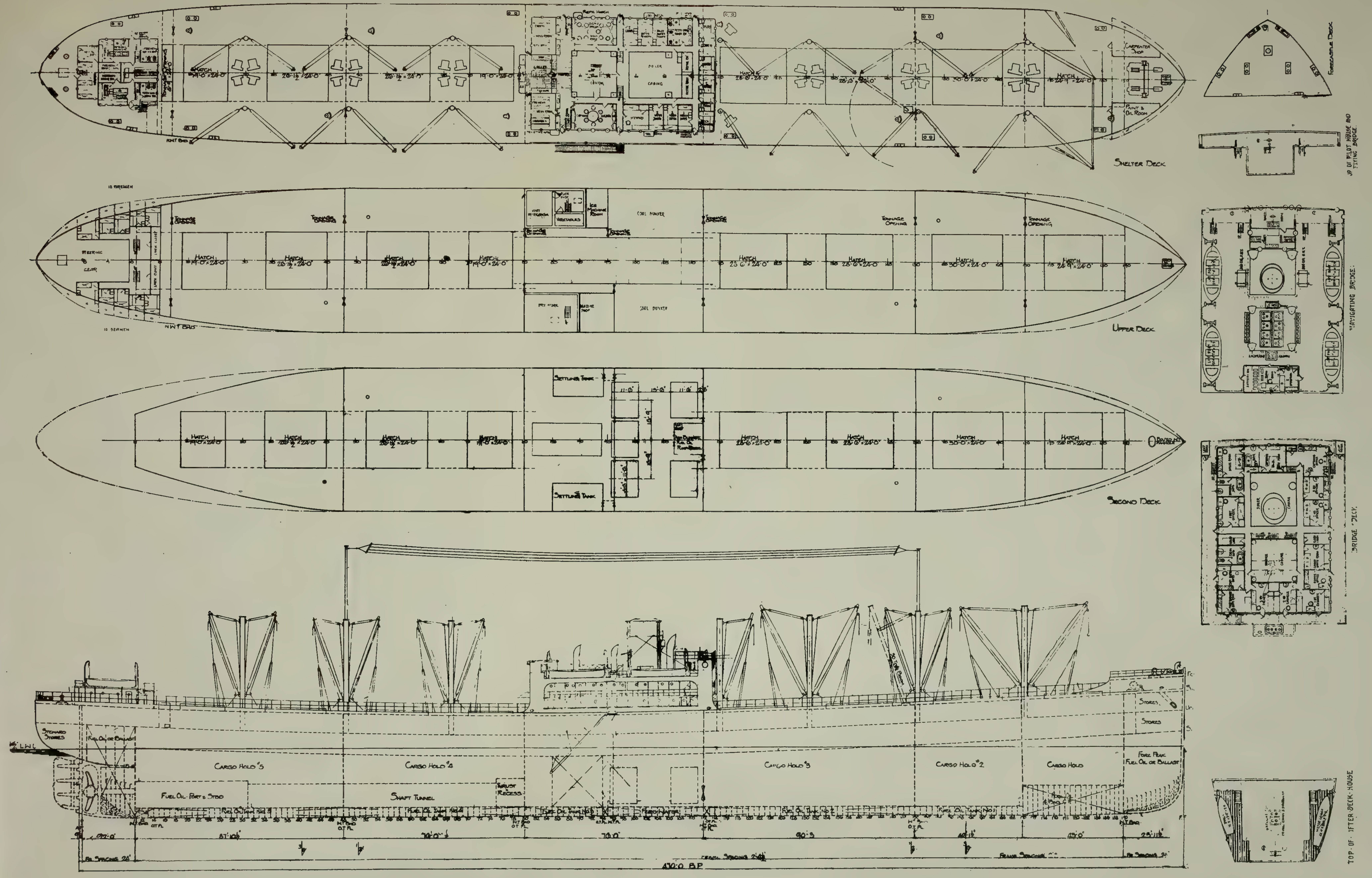
If this were the only plum secured at the Chicago convention, it would be a very notable meeting from San Francisco's viewpoint; but much more was accomplished, and perhaps the greatest achievement of the Pacific Coast delegations is the decision that all the great industrial and commercial bodies on the Pacific Coast shall unite in one coordinated organization which shall bring united action to bear wherever and whenever Pacific Coast interests need representation.

United Action Necessary

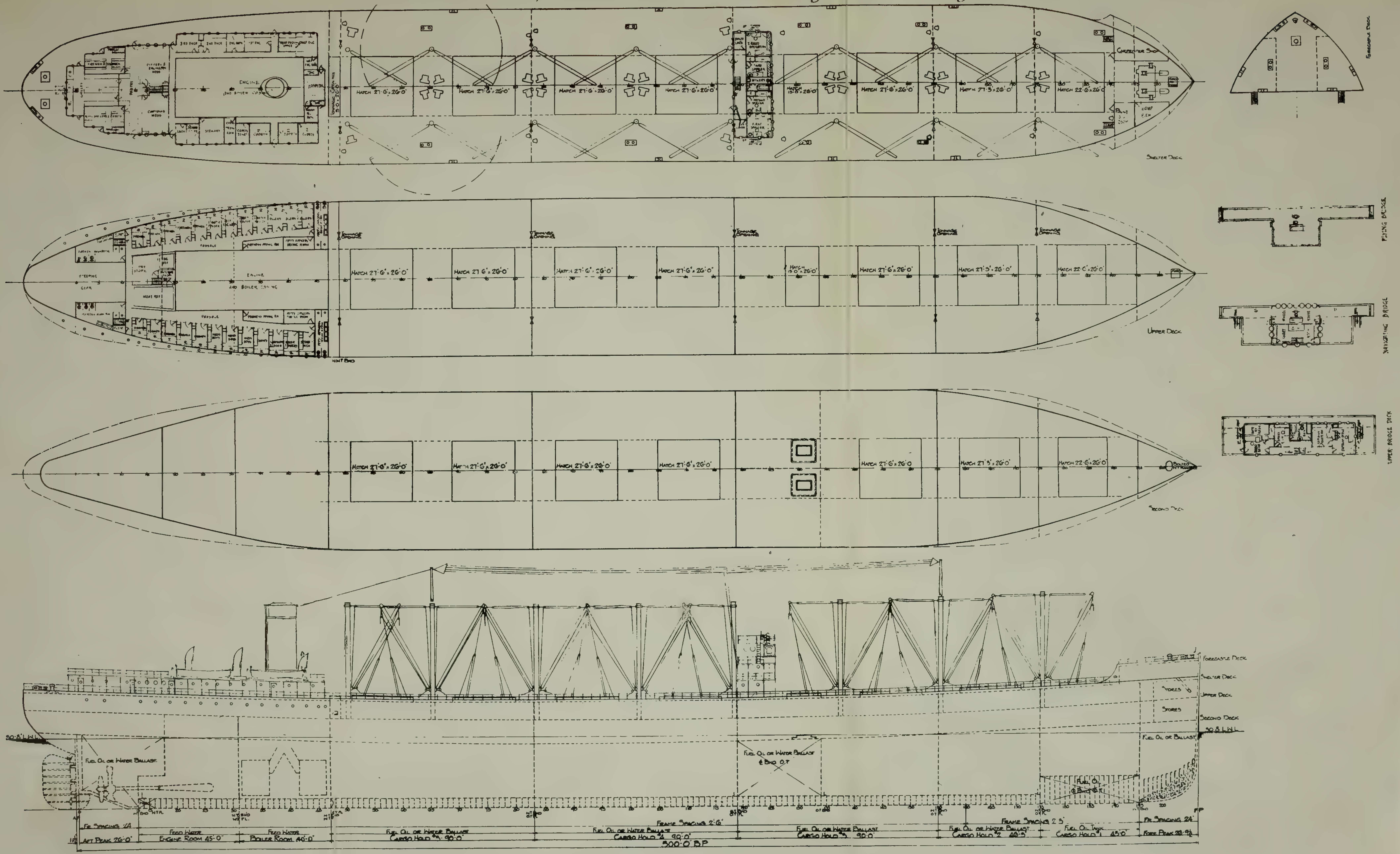
There are many very vital matters which need immediate attention and are of common interest to every port on the West Coast of the United States. On all these matters action should be united. In the past there has been much senseless pulling and hauling at cross-purposes and we sincerely hope that the proposed organization may overcome that tendency and unite all of our ports in a forward march toward substantial co-operation. San Francisco will have to settle her local disagreements and get ready to lead the way in this movement if she is to reap the full benefit from the Foreign Trade Council Convention in 1920.

(Editorial Section continued on page 151)

Mr. Rosseter's 12,500-ton Single-Screw Freighter with Engines Amidships



Mr. Rosseter's 15,000-ton Twin-Screw Freighter with Engines Aft



Rosseter's New Steamers

By John K. Bulger,
Supervising Inspector, United States Steamboat-Inspection Service

THE upbuilding of the United States merchant marine depends upon many things for its ultimate success. I am satisfied that there are conditions facing us that need explanation. For instance, the new vessels recommended by the operating department of the United States Shipping Board, namely, the 9800, the 12,500 and the 15,000-ton deadweight freight-carrying vessels with an average speed of not less than thirteen knots an hour, to compete for world commerce, at this time must be given full consideration.

John K. Bulger

Can Compete with World

I have taken the matter up with a number of shipping men on different lines; for instance, in the matter of construction, operating, stevedoring, dock facilities, dock charges, manning vessels, bunkering for either coal or oil for fuel for motive power, facilities for drydocking, and cost of operation in competition with foreign tonnage.

My opinion is that, considering the cost of construction of first-class freight vessels of 9800, 12,500 and 15,000 deadweight tonnage, making thirteen knots an hour, with a steaming radius of not less than 13,000 miles, using oil as fuel, with such vessels we can compete with any nation in the world, provided we can obtain full freights. To do this we must establish agencies in all the principal cities of the world, which can be done by American companies, as is now done by foreign companies. There is not a city of any importance in the United States today, having a population of more than 100,000 people, but has an agency for all foreign steamship companies, soliciting both passenger and freight business.

Why Foreign Lines Succeed

The establishment of these agencies, often in cities 1500 miles from the nearest port of call of their steamers, has been one of the main factors of the success of foreign companies in the United States.

Answering the questions propounded as to operation, I will state that the stevedoring can and will be reduced to a minimum, owing to the construction of hatches and the number of large winches provided for hoisting heavy freight from the vessel's hold.

The dock charges will be less on account of the quick facilities for discharging cargo, which are better than are found on any vessel operating today. There will be no off-shore bunkering necessary, as the vessels can carry oil fuel enough for motive power to carry them to any port and return where vessels operate today. At no place would they have to replenish their fuel more than once, unless they were making a trip around the world.

Drydocking Facilities Ample

The wage cost of crews for manning of vessels burning coal is considered as only 6 per cent of the operating expenses of steam vessels. With oil fuel it is less. The bunkering can be taken care of on any voyage of any distance. When these new vessels are built, there will be no trouble in getting drydocking facilities for repairs. On the Pacific and Atlantic Coasts there are ample facilities for docking vessels of 20,000 tons deadweight. The Bethlehem Shipbuilding Corporation at San Francisco; the Todd docks at Seattle, Washington; the Mare Island navy yard; the Bremerton navy yard, and Portland, Oregon, can accommodate vessels of the class proposed for sea service by the operating department of the United States Shipping Board.

Command Low Insurance Rates

These vessels, if approved, will be so constructed to meet all the requirements of the United States Steamboat-Inspection Service and all classification societies, and will command at all times the lowest rates of insurance obtainable either at home or abroad.

The proposed new freight steamers of the United States Shipping Board consist of three different classes—the 15,000-ton deadweight, the 12,500-ton deadweight, and the 9800-ton deadweight. These vessels were designed by the operating department of that bureau, with John H. Rosseter at its head and with an organization of first-class naval architects and marine engineers under the supervision of Robert L. Hague, late naval constructor of the Standard Oil Company, and A. Allen of the Bethlehem Shipbuilding Corporation at San Francisco. These three classes of freight vessels for overseas and South American trade have all the desirable features for speed, combined with economy, and for the speedy loading and discharging of freight, and are equipped with comfortable living quarters for all on board, making it attractive for our young men again to follow the sea as a vocation. Perhaps the foremost features are speed and the use of oil fuel for motive power.

The 15,000-ton deadweight cargo-carriers are of the following dimensions:

Length, O. A., 526 feet.
Length, B. P., 500 feet.
Beam moulded, 68 feet.
Depth moulded to shelter deck, 45 feet 6 inches.
Depth moulded to upper deck, 37 feet 6 inches.
Depth moulded to second deck, 27 feet 6 inches.
L/D to shelter deck, 10.97.
L/B, 7.4.
Draft, 30 feet 8 inches.
Freeboard to shelter deck, 14 feet 10 inches.
Block coefficient, .73.
Displacement at 30 feet 8 inches, 21,700.
Deadweight, 15,000.
Rise of floor, 6 inches.
Radius of bilge, 5 feet.
Inner bottom depth at center line, 50 inches.
Tumblehome, 0 inch.
Camber, shelter deck, 17 inches.
Camber, upper deck, 17 inches.
Camber, second deck, 0 inch.
Sheer forward, 10 feet.
Sheer aft, 4 feet 6 inches.
Engines, twin screw, 24 inches by 34 inches by 51 inches by 74 inches by 54-inch stroke; 6600 h. p., 80 r. p. m.
Boilers, six, 15 feet 6 inches by 12 feet, 220-pound w. p., 3180 square feet heating surface.
Sea speed, 13 knots.
Hatches, one 20 feet 3 inches by 26 feet; one 34 feet 9 inches by 26 feet; four 30 feet by 26 feet; one 20 feet by 26 feet; one 35 feet by 26 feet.
Winches, 28.
Booms, 28, 43 feet long, 5-ton capacity.
Fuel oil capacity, 21,400 barrels.
Steaming radius, 13,400 miles.
Stern, cruiser.
Stem, straight.
Tonnage opening, 5 feet by 26 feet.

And the 12,500-ton cargo-carrier:

Length, O. A., 489 feet.
Length, B. P., 470 feet.
Beam moulded, 62 feet.
Depth moulded to shelter deck, 43 feet.
Depth moulded to upper deck, 35 feet.
Depth moulded to second deck, 26 feet.
L/D to shelter deck, 10.9.
L/B, 7.6.
Draft, 29 feet 2 inches.
Freeboard to shelter deck, 13 feet 10 inches.
Block coefficient, .73.
Displacement at 9-foot 2-inch draft, 17,750.
Deadweight, 12,500.
Rise of floor, 6 inches.
Radius of bilge, 5 feet.
Inner bottom depth at center line, 49¼ inches.
Tumblehome, 0 inch.
Camber, shelter deck, 15½ inches.
Camber, upper deck, 15½ inches.
Camber, second deck, 0 inch.
Sheer forward, 9 feet 6 inches.
Sheer aft, 4 feet 6 inches.
Engines, 29 inches by 43 inches by 63 inches by 89 inches by 60-inch stroke; 80 r. p. m.; 5600 h. p.
Boilers, six, 15 feet 6 inches by 12 feet, 220-pound w. p., 3180 square feet heating surface.
Sea speed, 13 knots.
Hatches, one 24 feet 9 inches by 24 feet; one 30 feet by 24 feet; two 28 feet 6 inches by 24 feet; two 19 feet by 24 feet; two 26 feet 1½ inches by 24 feet.
Booms, 5-ton capacity, 43 feet long, 26.
Booms, 30-ton capacity, 1.
Winches, 5-ton capacity, 26.
Fuel oil capacity, 17,400 barrels.
Steaming radius, 13,200 miles.
Stern, cruiser.
Stem, straight.
Tonnage opening, 4 feet 9 inches by 24 feet.

Day of Slow Freighter Gone

There seems to be a diversity of opinion among many operators as to the feasibility of making such ships a commercial success. In my opinion, the day of the slow freight steamer has passed, for the reason that bunkering facilities are now available that a few years ago were not obtainable; also, that with oil as fuel on a vessel of this class, it would not be difficult to obtain a steaming radius of 10,000 to 15,000 miles and reduce the operating expenses over coal as fuel by a gain of not less than 35 per cent on the cost of operation. Moreover, the saving of bunker space and discharging cargo and taking on fuel at the same time without any interference and without additional men, as would be required if coal were used for fuel, will effect a great saving in port dues. The preservation of the boilers, which are relieved from the expansion and contraction caused by the opening of the doors for firing and cleaning of fires necessary on vessels using coal for fuel, is an element of economy in the maintenance of these ships. Various critics maintain that these vessels will draw too much water and will not be able to obtain full cargoes; that the smaller 8800-ton vessel, making ten knots an hour, is a more economical vessel than the larger steamers proposed. The following comparison of a 15,000-ton vessel with 300 steaming days, making thirteen knots an hour, and two 8800-ton vessels with a speed of ten knots an hour, with 300 steaming days each, gives the data which show the fallacy of these claims:

Two 8800-ton steamers have 17,600 tons deadweight capacity.
At ten knots an hour, 240 miles a day.
For 300 days' steaming radius, 72,000 miles.
72,000 miles for trips of 6000 miles, 12 trips, or 300 days.
One 15,000-ton steamer has 15,000 tons deadweight capacity.
At thirteen knots an hour, 312 miles a day.
For 300 days' steaming radius, 93,600 miles.
93,000 miles for trips of 6000 miles, 15.5 trips, or 300 days.
The two 8800-ton steamers would carry 211,200 tons.
The one 15,000-ton steamer would carry 232,500 tons.
Or a difference in favor of the 15,000-ton vessel of 21,300.

21,300 at $10 a ton would be $213,000 net gain of one 15,000-ton vessel over the two 8800-ton vessels, for 300 days; or, enough to pay part, if not all, of the operating expenses of a vessel of this class for a year.

There is but small difference between the operating expenses of an 8800-ton vessel and a 15,000-ton vessel, so far as manning is concerned.

One 8800-ton steamer making ten knots an hour, 240 miles a day, in 300 steaming days on a 6000-mile route, would carry 105,600 tons, and with coal as fuel would require bunkering.

Savings Made by Larger Vessels

A 12,500-ton steamer making thirteen knots an hour, 312 miles a day, in 300 steaming days on a 6000-mile route, would carry 183,750 tons without bunkering, or 78,150 tons more than one 8800-ton steamer making ten knots an hour or 240 miles a day. At $10 a ton this 78,150 tons would equal $781,500 a year.

The 9800-ton steamer, making thirteen knots an hour, 312 miles a day, in 300 steaming days on a 6000-mile voyage, would carry 151,900 tons, or 46,300 tons more than a steamer of 8800 deadweight tons, making ten knots an hour. At $10 a ton this 46,300 tons would equal $463,000 a year.

The following data will show that, aside from its splendid management of operation, the success of the American-Hawaiian Steamship Company was due to the use of crude oil for motive power on its large fleet of steamers:

The Nebraskan left New York August 7, 1902, touching at the ports of St. Lucia, British West Indies, and Coronel, Chile, for coal. She arrived San Diego in 57 days 5 hours and 43 minutes. On that voyage 2267 tons of coal of poor quality were used and a fireroom crew of fifteen men was found necessary. The ship was kept at full speed during the entire voyage.

Only Six Men in Fireroom

On the voyage from San Diego to New York with a greater cargo in her hold, the voyage was completed in 52 days, 7 hours and 26 minutes. There were consumed in the furnaces on this voyage 8826 barrels, or 1260 tons of California fuel oil. Only six men were required in the fireroom. Their wages approximated $50 a month each.

On the outward passage from New York to San Diego the ship steamed 13,280 miles, while on the homeward passage between San Diego and New York she steamed 12,760 miles, the increased distance on the outward passage being due to the fact that she called at both St. Lucia and Coronel for coal.

Four hundred and fifty-seven tons of measured space for cargo was saved by reason of the oil fuel being of less bulk. The resulting financial gain to the company from all causes was at the rate of $500 a day. While five days were saved on the eastward journey, it must be remembered that the voyage was 520 miles shorter.

No Increase in Insurance

The insurance risks, both on the vessel and the cargo, were not increased with the installation of liquid-fuel appliances. The underwriters made careful examination of the arrangements for storage of the oil fuel, as well as the general character of the oil-burning installation, and after special investigation regarded the equipment as one not constituting an element of danger sufficient to demand higher insurance rates.

An examination of the logs of two intermediate voyages of this vessel, one from San Francisco to Seattle and one from San Francisco to Honolulu, will establish the fact that practically uniform results are secured in marine installations when using oil as fuel.

The engine room complement of the steamship Nebraskan when using oil consisted of one chief engineer, three assistant engineers, six oilers, three furnace men, three wipers to assist furnace men, one deck engineer. The regular watch when the ship was under way consisted of one engineer, two oilers, one furnace man, one wiper.

When using coal on the voyage from New York there were five men on a watch in the fireroom instead of two, as in the case with oil fuel.

Better to Carry Wipers

Although it is possible to do without wipers in the fireroom, it has been considered safer to carry these extra men. There always was a probability of one of the three furnace men becoming incapacitated and therefore the work would have been too onerous if the furnace men had ever been compelled to stand watch and watch. The wiper rendered efficient service in helping to look out for the compressors and various pumps; and as it requires some practice to operate the burners efficiently, the best interests of the company were served by having such a rating included in the complement of the fireroom force. As the pay of the wiper is about double that of a coal-passer, the actual gain as regards the pay of the fireroom force when using oil and coal is more apparent than real.

The proposed 9800-ton deadweight vessel for general cargo and quick despatch with a steaming radius of 15,000 miles, at thirteen knots an hour, or 312 miles a day, is hailed with considerable satisfaction among experienced ship operators for South American and Pacific and Atlantic trade through the Canal and the Hawaiian Islands and Manila. And in my opinion the 12,500 and 15,000 deadweight ton types will prove of even greater usefulness in overseas freight traffic. Every port of any consequence already has, or is planning for, harbor improvements that will enable vessels of this size to load and discharge promptly at the pier, and Mr. Rosseter and his associates have planned wisely in recommending these big, fast, oil-burning freighters.

Not Suited for All

The writer of this article does not wish to be understood as claiming that the type of vessel described should be imposed upon all trade routes. He knows that there are many other types of special freight carriers, and combined freight and passenger steamers, which are required on certain routes in certain trades.

The managers of the various steamship companies operating from the different ports of the United States are the most competent judges of the type of vessel which is best suited to their special requirements. The problem of establishing the American merchant marine is very complex and must be approached from many angles by many minds, but upon Mr. Rosseter's suggestion, as a sort of focal point, the lines of approach may be made to converge and perhaps we will get appreciably nearer the true solution.

Seattle's Mechanical Handling Equipment

By **G. F. Nicholson,** Chief Engineer

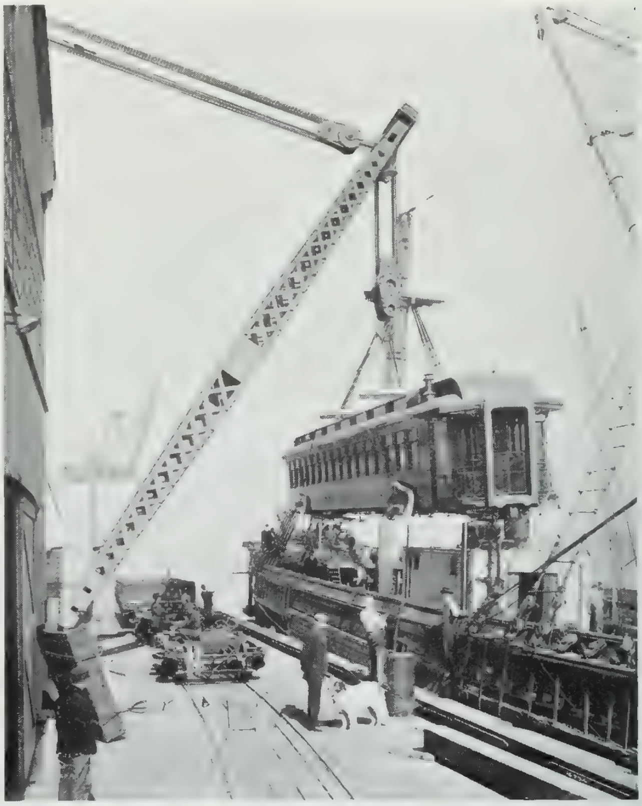
THE port of Seattle has more mechanical handling equipment than any other port in the United States, with the exception of New Orleans, and that city is able to use more specialized equipment of this type for the reason that it handles cargoes of similar commodities, such as cotton, bananas, etc. In the expeditious and economical handling of miscellaneous freight, however, the port of Seattle has outstripped all other ports in this country. This condition is largely due to the pioneer work of the Port Commission.

Valued at $827,946

The mechanical handling equipment as installed by the Port Commission includes heavy and light handling machinery of a total value of approximately $827,946. All this equipment is operated by electricity. Cheap power has been a great factor in furnishing service for the shipping interests at this port. The operation of the electrically-operated equipment is simple, clean, and economical. All that is necessary for an operator in starting such equipment is to turn on a switch. There is not the dirt and filth there is in connection with steam plant equipment with coal or oil used as a fuel. There also is less fire hazard and very much less valuable dock space taken up by electrically-operated equipment.

The following list gives a brief description of the most important mechanical handling equipment as installed by the Port of Seattle Commission on the six public terminals:

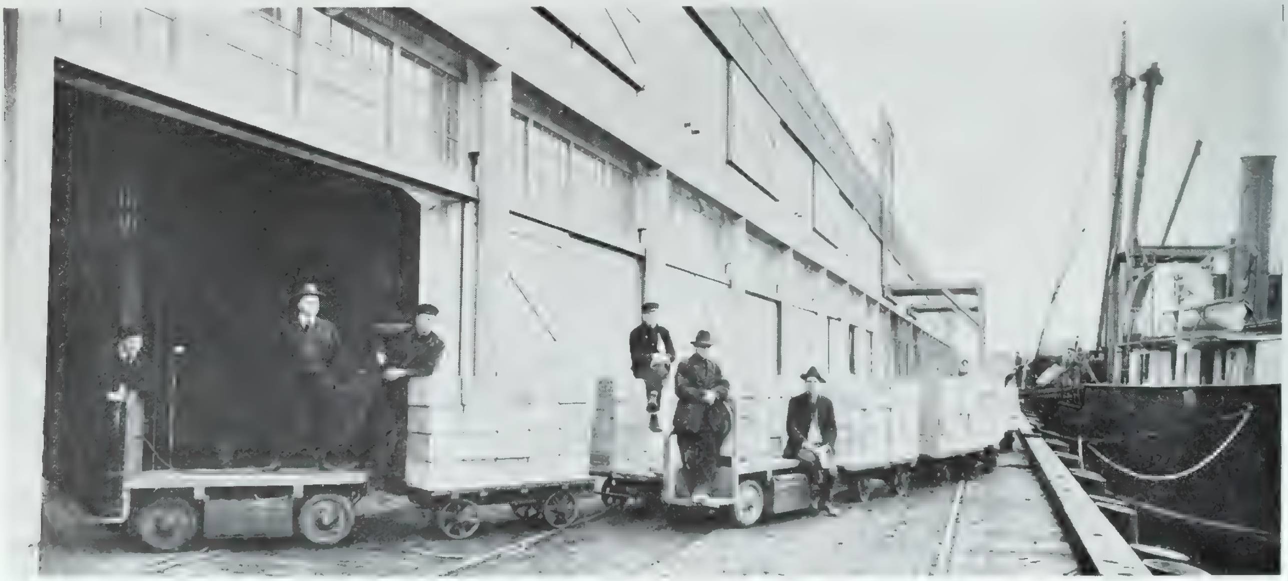
(1) Shear leg derricks. At the Smith's Cove pier there is located a gigantic structural steel derrick for heavy handling purposes, costing $25,000. This is capable of lifting as much as 125 tons with safety. It has a seventy-five-foot boom and is able to reach into the hold of the largest vessel afloat, and being arched over a shipside track can load or unload direct from railroad cars. This crane has proved to be one of the best solicitors that we have, and brings an immense amount of business to the Smith's Cove terminal. It is one of the best cranes of this character and size in the United States. All of the steel railroad coaches for the United States government railroad in Alaska were loaded on boats with this equipment. It is also used for the lifting of large motor trucks, immense boilers, and heavy machinery.



Steel sheer-leg derrick handling railway coach, Seattle

Efficient for Heavy Lifts

A seventy-five-foot wooden shear leg derrick, together with railroad trackage, has been installed at the Salmon Bay terminal, at a cost of $19,000. This has been used almost continuously since its installation, and has been found very efficient in the

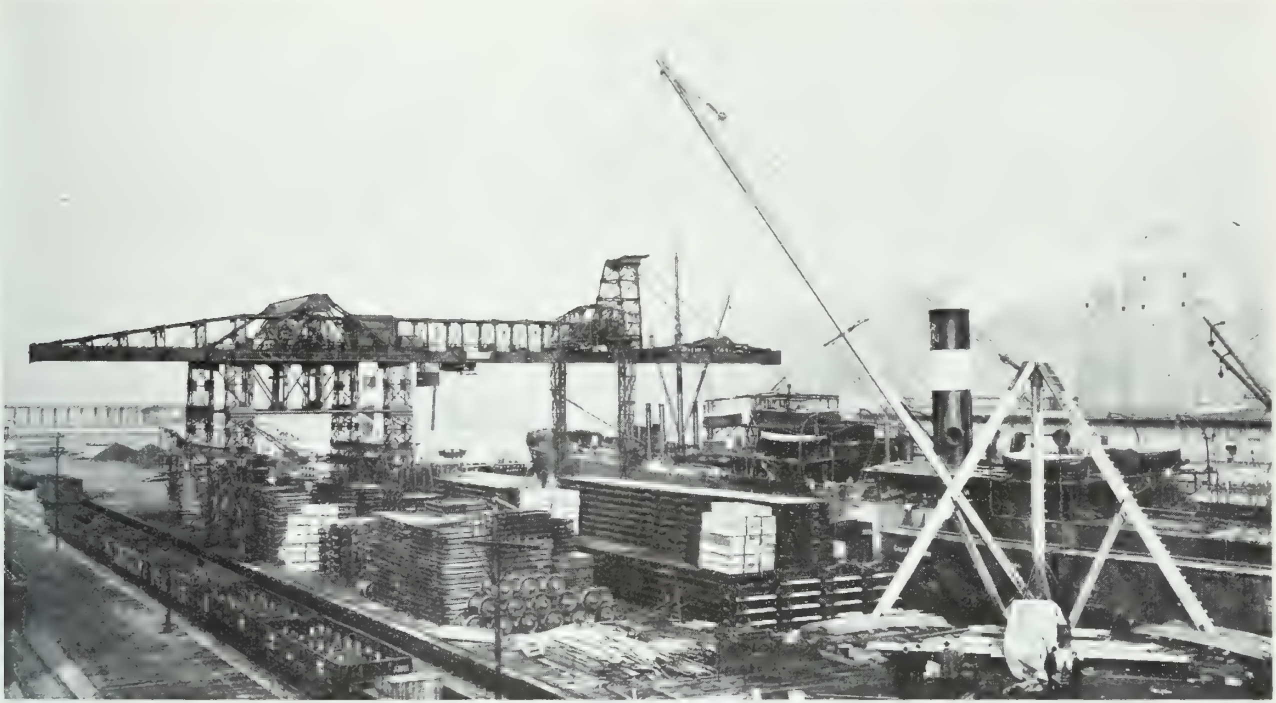


Electric tractor and trailers operated by Seattle Port Commission handling of heavy lifts in shipments between car and ship.

It is contemplated to install a 100-ton revolving shear leg derrick on the new Smith's Cove Pier B, so that heavy cargo can be lifted from a ship and deposited on a large area of the wharf in the vicinity of the derrick, and it will be capable of taking heavy commodities from cars on four depressed tracks in the vicinity of the ship. This derrick will be installed in the Seattle harbor within a year.

Lighted for Night Work

(2) Gantry cranes: The Smith's Cove pier is also equipped with a huge structural steel 325-horsepower gantry crane, costing $60,000, which is electrically-driven and lighted for night loading. It covers a section of the open pier approximately 200 feet wide by 1000 feet in length. This crane, with its extended aprons, serves the depressed tracks in the center of the pier and also extends forty feet out over the channel alongside, so that cargo can be loaded direct from car to ship and vice versa. This crane has a capacity of five tons, and is capable of piling freight on the open wharf forty feet high. At times we have been able to handle as much as 110 tons of knocked-down boxcars an hour with this piece of equipment.



Gantry crane at Smith's Cove pier, Seattle

Bids have been received for the furnishing and erection of two immense gantry cranes in connection with our new Smith's Cove Pier B. These cranes are of twelve and one-half tons' capacity and are of special design, capable of handling the heaviest of cargo in this port with speed and economy. This contract will be awarded soon, and the cranes represent a cost of possibly $90,000 each.

Locomotive Cranes Are Cheap

(3) Locomotive cranes: Locomotive cranes have demonstrated to the port their ability to handle cargoes cheaply as much as any other equipment we now have. Two cranes are in almost continuous operation at the Smith's Cove terminal, one with a maximum capacity of thirty-five tons and a seventy-five-foot boom, and the other having a rated capacity of fifteen tons and a fifty-foot boom. A fifteen-ton locomotive crane also is being used in connection with our Hanford street terminal. Such cranes have been found almost indispensable in assembling cargo for trans-shipment.

Will Purchase Two More Cranes

Arrangements are now being made to purchase two additional forty-ton locomotive cranes, which could be used at the present moment, but have been delayed on account of making the final arrangements with the United States government.

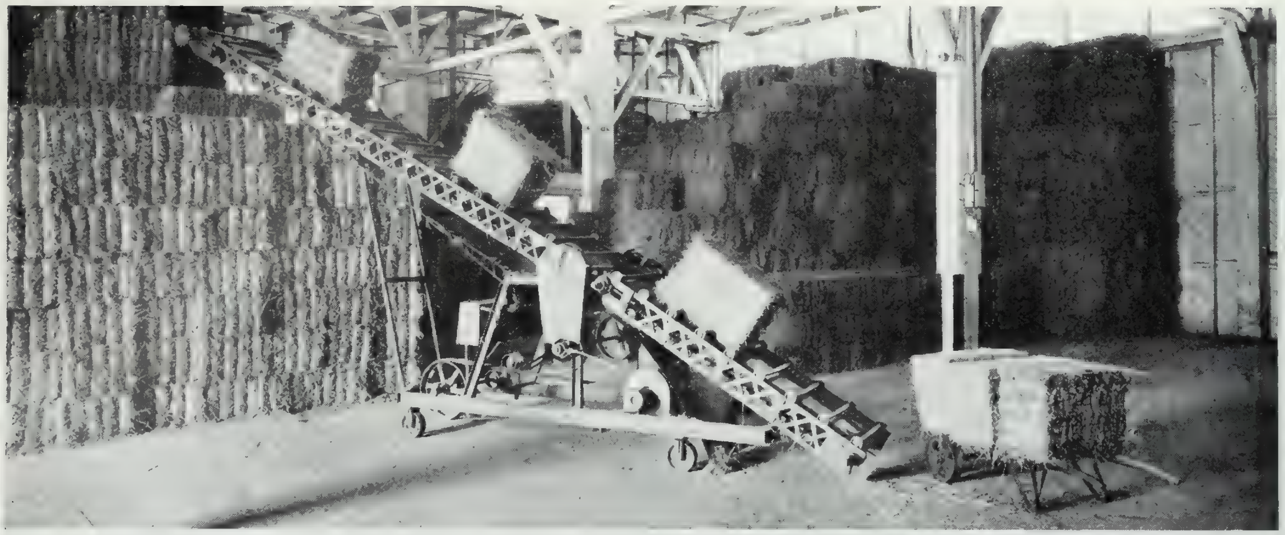
(4) Stiff-leg derricks: At the several terminals there are five stiff-leg derricks, ranging from one-ton capacity to twelve-ton. These derricks have proven themselves very valuable for assembling cargo from the open wharf to ship, and the small types have proven their worth in connection with handling fresh fish shipments from Alaska.

(5) Marine ways: At the Salmon Bay terminal are located two marine ship-ways, one of 300-ton capacity and the other 100-ton capacity, which have been a great accommodation to the fishing fleet that operates in Alaskan and Puget Sound waters. The Port Commission hauls these vessels out of the water for the fishermen, who do their own repairing at a low cost.

Twelve Miles of Railway Tracks

(6) Public railway tracks and spurs: The Port Commission has twelve miles of public railway tracks installed in connection with its terminals, which are all common user tracks. This trackage is so located that freight is handled with the utmost economy.

(7) Electric elevators: Sixteen electric elevators, ranging in capacity from one ton to nine tons each, are located in the warehouses and transit sheds. The nine-ton elevators are the largest in the Northwest, and are especially built for the accommodation of electric tractors and trailers, having long, narrow platforms. It is possible to accommodate six large four-wheel trailers in handling freight between floors. Six new elevators of nine-ton capacity will be installed in the new Smith's Cove Pier B sheds and will facilitate the handling of our cargoes greatly.



Electric tiering machinery piling hay, Seattle

(8) Electric tractors and trailers: This equipment consists of ten electric tractors, of the four-wheel steer and drive type, of two-ton load capacity and seven and one-half-ton trailer capacity, and are capable of hauling a long string of trailers, as many as twelve in number, which increase the handling efficiency in our cargo sheds. We have at present 250 four-wheel trailer trucks and are constantly ordering more to meet demands.

(9) Portable incline conveyors: Eight Brown Hoist stacking conveyors have been found very valuable for the piling of freight in the cargo sheds and warehouses, especially sacked goods, such as wheat, sugar, beans, etc., and also bale and boxed goods, such as baled hay and canned salmon. Several hundred feet of gravity roller conveyors have proven very efficient in handling cargo where it was not necessary to use the power conveyors.

Elevators Good Investment

(10) Barlow marine elevators: Three large ten-ton elevators, with platforms ten feet wide and twenty-four feet long, operate from tide water to the first and second floors of the Bell street transit shed and can be used as incline slips or straight elevators, according as tide or boat may demand. In our domestic commerce in handling freight to and from side port steamers, these elevators have paid for themselves over and over again.

(11) Second-floor loading platforms: Eight portable second-floor loading platforms have been installed in connection with our two-story sheds. It is possible with this equipment to land cargo at the second floor level with just as much ease as on the first floor, and with the use of this equipment in the two-story shed it is possible to handle a ship's cargo with much greater speed. Recently the Protoselus unloaded at our Spokane street terminal from her seven hatches. Three portable platforms of the above type were used, and this boat beat by eight hours all her former records for discharging.

Eight Loading Platforms

There will be eight of these loading platforms in connection with the new Smith's Cove cargo sheds. Efficiency in handling cargo at this pier on a tremendous scale is a special feature in the new design, and will facilitate the handling of the large Japan and China trade and the vast shipments expected from Russia.

(12) Oil-handling equipment: Reservoir, tank, pipe and pump installations have been made for the handling of approximately 9,000,000 gallons of vegetable and fish oil at the Smith's Cove terminals. Concrete underground storage tanks have been installed with a capacity of 400,000 gallons, and a steel oil tank is located to the rear of the oil dock with a capacity of 2,500,000 gallons. Additional steel oil tanks, with a capacity of 1,000,000 gallons, will be erected at once, bringing the total storage capacity to approximately 4,000,000 gallons, which, together with the storage area for 5,000,000 gallons of case oil at the terminal, makes up the total 9,000,000-gallon capacity. An overhead pipeline running the full length of the oil dock, approximately 1000 feet long, is used for the purpose of pumping vegetable oil into tank cars. A six-inch oil pipeline connects this dock with the storage tanks in the rear of property, and there are six powerful rotary oil pumps with a maximum capacity of 350 gallons a minute.

Rooms for Liquifying Oils

Large heating rooms, together with boiler plant, have been installed for the liquifying of cocoanut, peanut and heavy oils. The underground concrete oil tanks are also piped with steam, giving additional facilities for the bulking of these heavy oils.

(13) Refrigerating equipment: The Port Commission has two large coldstorage plants—one, the Spokane street plant, the largest plant in the West, consists of a seven-story concrete fireproof warehouse with 25,000-ton capacity; also a fish-freezing plant with a capacity of 125,000 pounds of fish a day, a fish-storage warehouse with a capacity of 4,000,000 pounds, and an ice-storage room of 5000 tons' capacity.

To Quadruple Ice Storage

These cold-storage plants are operated by three 110-ton and three thirty-ton ammonia compressors and auxiliary equipment.

Plans and specifications have been drafted for an addition to the Spokane street fish and ice storage plant, which will quadruple the present capacity. Plans have just been completed and this building work will most likely be done this summer.

(14) Electric motors: In the operation of the above electric equipment 150 electric motors are in use, with a total horsepower of 3500, and ranging in capacity from one horsepower to 450 horsepower.

(15) Miscellaneous equipment: Besides the

above equipment there is an immense amount of miscellaneous equipment, such as railroad track scales, electrically-operated bridges connecting buildings, portable piling elevators, second-floor loading-out chutes and like equipment.

Both Light and Heavy Equipment

The port of Seattle expects to solve the problem of handling miscellaneous freight by the use of a variety of heavy handling and also light handling mechanical equipment. With the use of gantry cranes, shear leg derricks, large-capacity revolving cranes, and stiff-leg derricks, it will be possible to handle our export cargoes expeditiously, which consist chiefly of steel, iron and lumber.

The engineering department has recently designed and built a portable stacking elevator, which is now a perfected machine and performing very valuable service. It consists of a structural "A" frame mounted on an electric tractor and looks like a small piledriver, except that in place of the hammer there is a small platform two and one-half feet square which operates in the leads and drops to the floor level. This machine is operated by an electric hoist and is controlled by the operator of the electric tractor. This stacking elevator is also removable from the electric tractor, so that it does not tie up the tractor when the stacking operation is not needed. This machine originally was designed for handling gunny bales, but is found useful in the handling of all our baled and boxed freight. In discharging a recent cargo of gunnies at our Smith's Cove terminal, fourteen men were eliminated from one hatch, and the machine worked three piles, making a saving of six men to the pile. A total saving of $712 was made alone on this cargo, which practically paid for the machine. The boat having five hatches, if five of these machines had been worked, a total saving of approximately $3500 on this one cargo would have been made. Several additional machines are now being constructed, and we expect to have at least six in operation within the next few months.

Installing Electric Circuits

The Port of Seattle is now equipping all its transit sheds and warehouses with electric power circuits to handle miscellaneous freight with great rapidity with the operation of light-handling equipment, such as electric tractors, incline power conveyors and portable stacking elevators, as have been described. In case sacked cargo comes in at any one of the terminals the eight incline power conveyors can be shifted to that particular terminal, and in case of box and baled goods several portable stacking elevators can be used in handling those cargoes.

By the progressive program outlined above, the Seattle Port Commission expects not only to retain the present trade of the port, but also to attract new commerce through the enhanced economy in discharging cargoes gained by the use of modern, up-to-date handling equipment.

New Type of Motorship

HITHERTO there have been three main types of standard motorships constructed, omitting auxiliaries, these having respectively a cargo carrying capacity of 5000, 6500 and 9500 tons and a speed ranging from nine to ten and one-half knots. Of the three classes about forty ships have been built in Holland and Scandinavia, while another thirty or forty craft are on order, says Lloyds' List Weekly Summary.

Higher Speed Desirable

Norwegian shipowners have, however, come to the conclusion that a higher speed is desirable, at any rate on a good many routes, and orders have been placed for several standard vessels of 7200 deadweight tons and a normal sea speed of twelve knots. All of these ships are being built in Norwegian shipyards, but the machinery is to be obtained from Holland, since the only Norwegian firms engaged in the manufacture of marine Diesel motors are fully occupied for two or three years to come, while the Danish builders are in a similar position, and are unable to supply.

The names of the first five vessels of this type to be put into commission are the Salerno, Athene, San Paolo, Tosca and Geisha. They have a length between the perpendiculars of 375 feet, with a beam of 51 feet 3 inches and a moulded depth of 34 feet. Twin screw machinery built by the Werkspoor Company of Amsterdam is fitted.

More Than Twelve Kinds

Each engine develops 1500 i. h. p., and this power will give the ships a speed of well over twelve knots. The motors are of the four-cycle type, with six cylinders, each cylinder having a diameter of 560 millimeters, while the stroke is 1000 millimeters, the speed of revolution being 115 r. p. m. These engines have been built for the past six or seven years practically without any modifications being made, and they are generally recognized as representing one of the most satisfactory types of Diesel motor constructed. The fuel consumption of the ships will be in the neighborhood of ten tons per day of twenty-four hours.

In one of the vessels (the Geisha), however, two engines, each of 2000 i. h. p., of the same design, will be fitted, having six cylinders, each with a bore of 670 millimeters, and a stroke of 1200 millimeters (26⅜ inches by 47¼ inches). These motors are the highest powered of their class that have yet been built, the only other four-cycle Diesel engines of 2000 horsepower used for marine work being those of Messrs. Burmeister & Wain of Copenhagen and Messrs. Harland & Wolff, Ltd., of Glasgow.

Machinery of 6400 Horsepower

The speed of the Geisha when loaded will be about thirteen to fourteen knots. This policy of building motor cargo vessels with fairly high speed is of particular interest, in that it has been adopted by the Glen Line in their latest motor ships, their last completed vessel having a speed of fourteen knots and a machinery installation of 6400 horsepower.

It is understood that some of the vessels mentioned are to the order of Mr. F. Olsen, the well-known Christiania shipowner, who already has a number of motorships in his service, while about half-a-dozen craft of 9500 deadweight tons are being built for him, with oil engines of the Burmeister & Wain type.

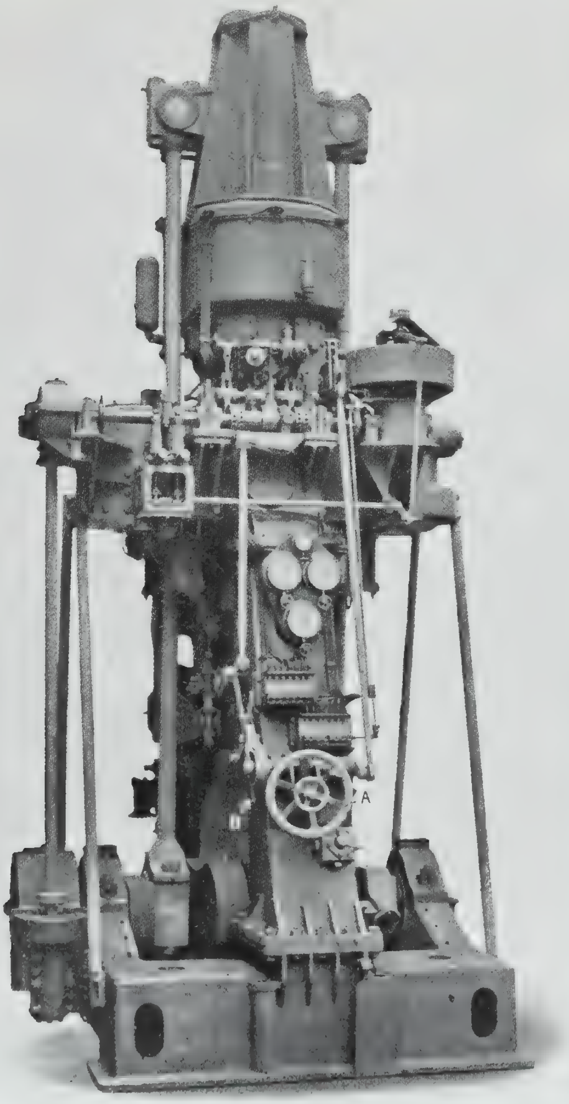
The Doxford Opposed-Piston Marine Oil Engine

THE opposed-piston, or Junkers, type of heavy oil engine had found little favor in marine work previous to the war. Only two firms, both German, had made any attempts at large installations. Both of these firms had worked out designs which were totally unsuitable for marine work, and the results were far from satisfactory. When, however, William Doxford & Sons, Ltd., of Sunderland, England, built an experimental engine of this type and tried it out for a five-weeks' full-load run under supervision of the chief surveyor of Lloyds, the opposed-piston type of heavy oil motor began to make an impression in the marine field.

Through the courtesy of this firm we are giving here a description of the salient points of this engine and some of the results obtained in fuel economy and mechanical efficiency.

Cylinder Is a Long Tube

For those who are not aware of the main points in the design of this type of the Doxford opposed-piston marine oil engine motor, a few remarks may be made regarding the general method of operation. The cylinder really consists of a long tube, which, in this instance, nowhere has a thickness of more than one inch. Within the cylinder are two pistons which move inwards and outwards together, forming the combustion chamber when they are closest together in the center, being then about two and one-half inches apart.



Full view of Doxford opposed-piston oil engine. Dimensions: Cylinder diameter, 500 mm.; stroke of each piston, 750 mm.; speed, 120-130 r. p. m.; b. h. p., 500-550

The fuel valves, of which there are two, are arranged horizontally so as to inject fuel into this combustion space at the correct moment, the air having been compressed during the closing up stroke to the requisite pressure for combustion. There is no cover to the cylinder, either top or bottom, which is naturally an advantage, and the scavenging air enters directly from the scavenging pump into a scavenging trunk, thence through ports at the bottom of the cylinder which are uncovered by the bottom piston at the lowest point in its stroke. The exhaust ports are arranged at the top of the cylinder, and these are uncovered by the top piston at the top of its stroke, so that the scavenging air sweeps right through from the bottom of the cylinder to the top and effectually scavenges the whole cylinder.

Bottom Piston Drives on Crankshaft

The bottom piston drives direct on to the crankshaft in the center through an ordinary connecting rod and crank, and the top piston is fixed to a beam which moves with it, being guided on two sides by semi-circular guides. This beam has attached to it coupling rods and connecting rods on each side, and thus drives on to the crankshaft by the connecting rods on each side of the central crank. This can be clearly followed in the illustrations.

It is easy to see that in principle such a machine is almost ideal, but there are practical points in the construction which have been found out only by experimental work, which render the actual application by no means so simple. The method of injection of the fuel needs special precaution, while in the cooling of the pistons and cylinder there must be maximum efficiency if the danger of cracks is to be avoided; and, perhaps most important of all, very liberal dimensions have to be given to the big end bearings, which in this engine are made spherical in shape so as to allow slight bending in the crankshaft.

The engine illustrated has a cylinder diameter of 500 mm., and the stroke of each piston is 750 mm. The speed of revolution is normally 120 r. p. m., although the machine can run up to 145 r. p.m. quite conveniently and develop as much as 650 b. h. p. to 670 b. h. p. at this speed. At 120 r. p. m. the b. h. p. is in the neighborhood of 500. It will be seen from these figures that the output is relatively large for the dimensions, and the working pressure is certainly higher than is allowed in many two-cycle machines. It is usually about 120 pounds a square inch (mean indicated pressure), corresponding to a mean effective pressure of about 90 pounds a square inch. The motor has run for prolonged periods at a considerably higher pressure even than this figure, and the claim seems to be borne out that this type of engine is suitable for rather higher working pressure than the ordinary two-cycle engine, and therefore for higher specific powers.

During the whole period of day and night running the brake horsepower never fell below 470, nor did the consumption of fuel ever rise above .43 pound a b. h. p. hour. When it is mentioned that the machine was running on Mexican fuel oil, with a specific gravity of .91, it will be agreed that the trial was a fairly comprehensive one. The speed of revolution varied from 110 to 120 r. p. m., and the indicated horsepower averaged about 630 i. h. p. to 650 i. h. p. This gave the efficiency of the engine about 75 to 77 per cent, which is, of course, remarkably high for a two-cycle machine, being about 7 per cent more than in the ordinary type, and approximating to that of four-cycle engines. It is probable that in a four-cylinder machine the efficiency would reach nearly 80 per cent.

Here is an interesting reading, vouched for by Lloyds:

Revolutions a minute, 128.5.
Shaft horsepower, 515.0.
Indicated horsepower, 672.
Pounds fuel a s. h. p. hour, .465.
Pounds fuel an i. h. p. hour, .356.
Injection air pressure, 110 atmospheres

Remembering that this is a single-cylinder engine, the following overload figures are rather remarkable—35 per cent overload test gave:

Revolutions a minute, 130.
Shaft horsepower, 625.
Indicated horsepower, 828.

A casual extract from the log shows a lubricating oil consumption for the whole engine of one and one-fourth gallons for twelve hours at 620 indicated horsepower.

Engine Control Simple

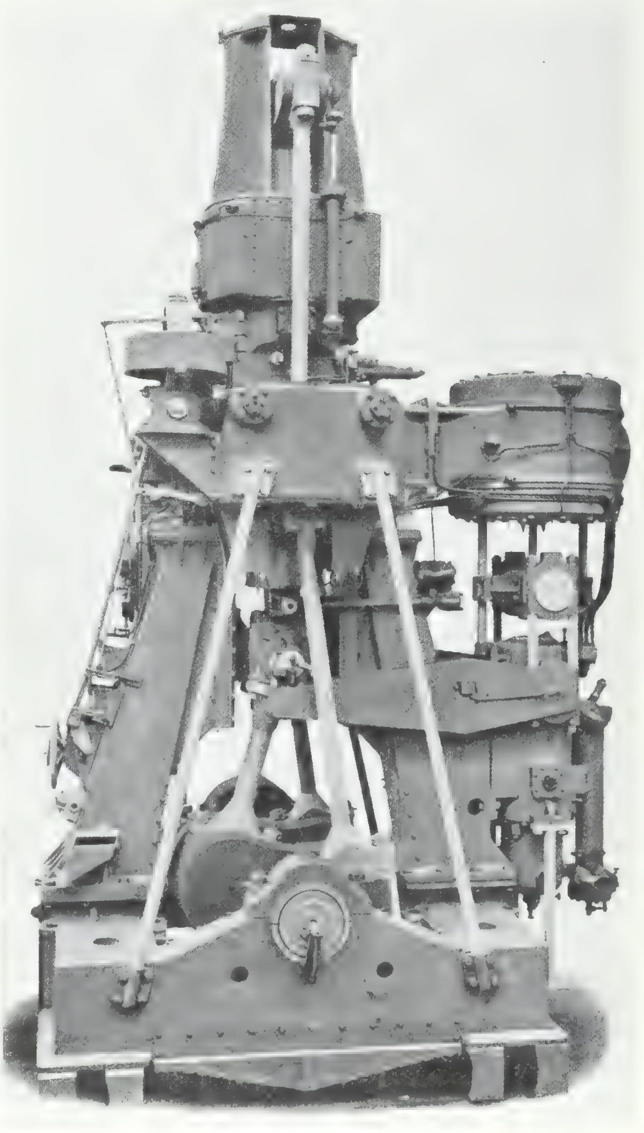
The control of this engine is simple, and the flexibility is remarkable. The motor will run quite comfortably at about 35 r. p. m., and even below this speed. All the control is carried out by the hand wheel (A)—see front view,—while reversing involves a movement of the lever (B). There are two fuel valves opposite each other, one at the front (C)—see valve gear—and one at the back. These are actuated respectively from the cams (E and F), in the latter case operating by means of a lever that transmits the motion to the gear at the back of the cylinder. The starting valve is at G, and the cams for its actuation are indicated at H. There are thus six cams in all, since one is provided for ahead and one for astern motion in each case, and all these are mounted on a sleeve of the camshaft (K), which sleeve is moved along the shaft (K) by the lever system (L), operated from the main reversing lever (B) previously referred to. The camshaft (K) is driven from the crankshaft through a vertical intermediate shaft in the ordinary manner, and is provided at the opposite end with a governor.

In reversing, before the sleeve can be moved along, the rollers of the valve rocker levers (M and N), and also that for the starting air valve, have to be clear of the cam, and this is arranged so that the sleeve cannot be moved until the wheel (A) operating the valve rocker levers is in the neutral position. In starting up, the wheel is first turned, and this, through the rod (O), causes the shaft (P), on which the valve rocker levers are mounted, to turn and bring the lever actuating the starting air valve down on the cam while keeping those actuating the fuel valves away from the cams. When the engine has run up the hand wheel (A) is turned in the opposite direction, which causes the levers (M and N) to come in contact with their cams and the starting air valve lever to be lifted off its cam.

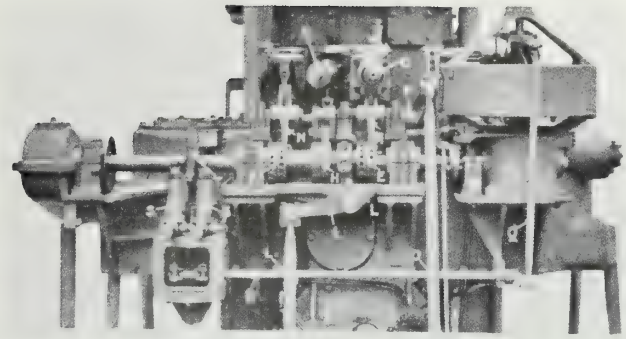
Fuel Pump for Each Valve

The motor is then in the ordinary running or firing position, and is speeded up by a further rotation of the wheel (A), which, by turning the levers (M and N), increases the lift of the fuel valves, and at the same time through the rod (Q) and spindle (R) causes the time of the opening of the suction valves of the fuel pumps (S) to be decreased, so that more fuel is pumped to the valves. It will be noticed that there is a fuel pump for each valve, and that these are actuated from one eccentric and plunger driven off the camshaft, this being indicated by T. Any movement of the governor due to vibration of speed also acts upon the suction valves of the fuel pump, and so reduces or increases the speed.

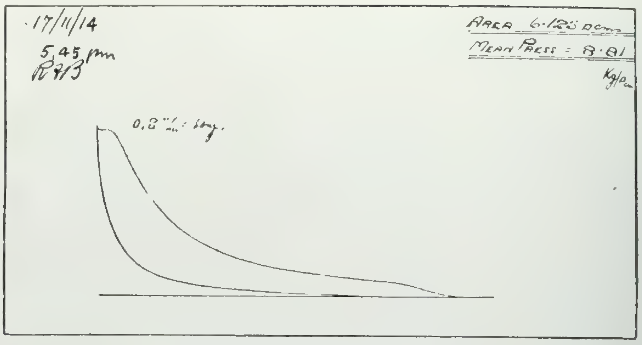
The cooling of the bottom piston is carried out by means of a semi-rotary pump actuated from the crosshead by means of rocker tubes on each side, one being for the inlet and one for the outlet of cooling water. For the top cylinder there are



Side view of Doxford engine



Valve gear of Doxford engine



Indicator card of Doxford engine

telescopic pumps with dipping plungers in fixed tubes attached to the beam at the top of the piston.

Engine Starts Smoothly

The engine starts with the greatest smoothness and the reverse control is as rapid as in any other type of Diesel engine. The injection air pressure is rather high, being in the neighborhood of 100 atmospheres, but the engine normally starts on a pressure of 70 atmospheres, and there is no difficulty in running on twenty atmospheres in case of necessity. Perhaps it is worth recording that since the time the engine started there has been no trouble at all with bearings. Gravity feed lubrication is employed, being taken from a tank overhead.

One of the special features of the engine lies in the design of the fuel valves. From each valve the oil is injected into the cylinder from two jets, one just below the top piston (when at its inmost position) and one just above the top of the bottom piston. Moreover, the jets on the opposite sides of the cylinders do not spray into each other, but are arranged so that the fuel spreads out through the whole combustion chamber.

By this design the oil is very well atomized and the compressed air, as it expands when the pistons move apart, becomes permeated with the fuel, so that very efficient combustion results. It will be gathered, too, that the shape of the combustion chamber, being almost purely cylindrical, is extremely good from the point of view of engine efficiency, since the presence of pockets which are unavoidable with many types of Diesel engine, is always a considerable disadvantage. As with other designs, the combustion chamber forms the chief source of weakness, but it is only penetrated by the two fuel valves, the starting air valve and the relief valve, all of which are small.

NEW DEVICE FOR RIVET FURNACE OIL TANKS

A DEVICE for filling rivet furnace oil tanks more than ten times as rapidly as with the old method has been invented by an employe of the Pacific Coast Shipbuilding Company, whose yard is on Suisun Bay, thirty-five miles east of San Francisco.

Fills Tank in One Minute Eleven Seconds

The invention, which has been on trial at the yard some time, is described thus in Full Speed Ahead, the yard paper:

"Frederick Dieken, of the riveting force, has invented a simple but ingenious time-saving device for filling oil tanks on oil rivet furnaces. It will fill a ten-gallon tank in one minute and eleven seconds, against fifteen and one-half minutes for the old method, according to records kept by the inventor. These comparative times are based on the use of the same oil in both cases and the same screen. While a tank is being filled through an open funnel, the full riveting crew stands idle for twenty-five minutes, the rivets having to be reheated after the tank has been filled. The time saving in the aggregate is considerable, especially as Dieken's appliance makes it possible to fill the tank without cooling the rivets.

Simplifies Cleaning Out Burner

"The device also simplifies cleaning out the burner, for the same connection that speeds up the oil intake makes it possible for air to be backed through the burner.

"The first example of the invention has been in operation for several weeks at Park 1, Fire 1, and has attracted a good deal of attention. It is a simple connection for the air hose. The hose is taken from its usual connection and attached to an extra T-valve with half or three-quarter inch coupling. This gives a vacuum suction on the filler and the oil is drawn into the tank almost as fast as it can be poured into the funnel. Dieken, who lives at 728 Tenth street, Oakland, has taken steps to protect his invention by communicating with the patent office."

CHINESE-AMERICAN SILK COMPANY

REALIZING the large business done by the Japanese in the importation of silk piece goods into the United States, the Chinese-American Silk Company, with offices at 313-316 Boston Block, Seattle, Wash., has decided to obtain a share of this business by importing Chinese silk piece goods from Canton, Consul Albert W. Pontius of Canton reports. This company is incorporated in the United States with a capital of $1,000,000 gold, half of which is to be subscribed by Chinese in South China. A Chinese, long resident in the United States and familiar with this class of goods, has been appointed manager in Canton, and has recently purchased a large site at Honam, an island opposite Canton, for the purpose of erecting factories for the weaving of fine grades of plain and fancy silks. A plan for the factories is being prepared, and a set of up-to-date machinery has been recently ordered from the United States. The company expects to start work in the course of a few months. From twenty-five to fifty weaving machines with 100 workmen will be accommodated in one factory at the beginning, and if everything turns out satisfactorily another factory will be erected and more machines ordered. A graduate from a silk factory in France will be supervising engineer.

Ship-Minded

By Ralph E. Cropley

The phrase used as a title for this series of articles is represented therein as descriptive of that mental state which is necessary in any people in order that they may become greatly successful as a maritime nation. The author shows how the lack of "ship-mindedness" has imposed many handicaps upon our merchant marine in the past, and offers various suggestions toward better conditions in the future. The series presents a rather refreshing treatment of an old subject, and will well repay careful reading. R. E. Cropley is a New York shipping man and a very prolific writer on marine subjects, who has devoted a great deal of his time trying to bring ships and ship operation into the mind of the American public.

THERE is nothing more important in the work which the Shipping Board has ahead of it than to educate the American people to the importance of the merchant marine in relation to the industrial welfare of the country. For if there is any doubt in my mind as to the future of our shipping problem, it is that lack of knowledge on the part of the American public will befog government legislation. It is this lack of knowledge which has had a great deal to do with the decline of our merchant marine in the years since the Civil War. Certainly if we as a nation had been "ship-minded"—had appreciated how we were out of pocket by allowing foreign ships to coin money in carrying our goods—long ago we would have legislated in tune with our pocket and the costly experience of the last few years never would have been forced upon us. Since the Civil War we have prospered as a nation because of the great Western empire our railroads built up, and we developed it industrially and commercially. For years we thus were able to do without overseas markets, or at least with our exports practically restricted to those commodities which we produced exclusively and in the sale of which abroad we encountered no competition. But now we have grown so large the situation is changed. We must have foreign markets for goods of our manufacture to be sold in competition with the products of other countries; therefore we must have an "even break" for our exporters in getting goods to overseas markets, or continue to live off ourselves, not only marking time so far as the net worth of the nation is concerned, but deteriorating.

Tariff Enters Into Question

Many persons are inclined to think it simply a question of getting the ships. Others say: "Repeal the LaFollette Seamen's Law, as it is that which makes it unprofitable to operate American ships in face of foreign competition." If this were all of the problem it might be adjusted readily. Unfortunately, it is not so, for our much kicked-about friend "tariff" enters largely into the consideration, as we must revise our laws in this respect so that our overseas customers can afford to do business with us rather than only with our competitors. Then, after we get the ships we must man them, and that can be accomplished only by making the sea attractive as a profession to the youths of the country. And last, but not least, we must operate our ships efficiently in spite of the many handicaps imposed on American ships by the fact that as a nation we are not "ship-minded."

As to tariff there is an old law in the Bible called "barter." It holds today. Goods are paid for in goods. Exports are paid for by imports, not in gold. For example, we are all talking about the wonderful opportunities open to us to increase our South American trade. Yet when industrial Europe is once more in operation our trade will go back to pre-war status, simply because of our tariff. Unless we take South America's goods in payment for our goods she cannot deal with us to any great extent, because to pay us South America must get gold in Europe, and Europe is not going to pay South America gold for South American products in order that she may pay the United States for goods which she can obtain as readily in Europe. It is no wonder we Americans were panicky in October, 1916, over the exploits of the U-53 off Nantucket lightship; for the U-53 struck at the very pillars of our prosperity of 1914-1917—prosperity rather than bankruptcy because we were the commissariat of the belligerents while our usual overseas trade suffered from lack of ships to carry what few goods South America and other neutral lands could buy from us, because we have a tariff wall of protection which prohibits their paying us in goods.

In speaking of our tariff, Dr. Eliot, president-emeritus of Harvard University, has said:

"Protection is beginning to have for the majority of Americans the ugly aspect of an unfriendly, keep-out, touch-me-not, charity-begins-at-home policy, while free trade seems to be a mutual-benefit, love-thy-neighbor, peace-promoting policy. Great Britain has been the great examplar of the advantage of unrestricted trade and has profited enormously by her stout adherence to that practice."

It may be added that it was the principle of free trade which gave Great Britain the industrial and financial strength to cope with her four and one-fourth years of war.

The sooner the American mind is divested of the idea that tariff duties, elastic or otherwise, will play a large part in the commercial reconstruction of the world, the better it will be for our continued prosperity. The emergency cannot be met by any legislative program of which the "protective" principle is the basic and informing spirit.

High Wages Must Come Down

The strikes taking place here are conspicuous examples of the blind way in which labor, organized or unorganized, in various places is facing the inevitable situation of a return to peace activities. Employment necessarily is lost for the time being where war industries have to subside and those of peace cannot be made instantly to take their place. High wages caused by the urgent demands for war supplies have to come down more or less to insure employment in the same or other lines. Striking affords no relief, but makes the case worse. Men employing labor cannot create a demand for it unless there is a demand for its products.

Men in charge of productive industries are striving to get things working on a normal basis as fast as possible, and surely if labor is to be kept employed we must have a market for our goods outside the country as well as in it. For the exhausted European nations are not going to pour a great surplus upon us, any more than they are going to keep up a large demand for our war-time products. To get this needed outside market in order to keep capital and labor employed, a more intelligent interest in industrial organization does not involve the dislocation of trade relations with other nations or the closing of our ports against them.

Now that we have the ships we can no longer be compared, as we were two short years ago, to a department store that had to depend upon the equipment of a rival store for the delivery of its goods. Yet it is not enough to have the ships. How are we going to keep our new-born merchant marine intact as a basis of commerce in times of peace and a protection in event of war?

Reasonable Profit for Capital

The operation of American ships is fundamentally a question of reasonable profit for invested capital and is as much a matter of competition as is dealing in articles of commerce. A policy for the return and successful operation of our merchant marine fleet under the American flag must be founded upon the principle that those operating the vessels must be assured conditions which will enable them to meet the competition of other maritime nations upon an equal basis.

It has always seemed to me that the League of Nations idea could be best financed and kept in power by an absolute control of international trade and possibly ownership of all international merchant ships. The possibilities for mutual acquaintance and an increased friendship among the nationals in such an international control of their trade relations would seem to be boundless, and from the better understanding that should follow there might be some hope of doing away with the necessity of any wars in the future. Yet the operation of an international merchant marine, for efficiency, would have to be under private control, as, from the experience both Great Britain and the United States have had during the war with government operation, the world either would go bankrupt in short order or governments be overthrown because the people refused to pay the increased taxes to make up the needless loss.

For the Good of All

The successful operation of a merchant marine is not for the benefit of any one man or class of men, or any one branch of business, but for the good of every individual in the nation. American ships always will cost more to operate than foreign ships, because we insist on better living conditions and wages for American crews. And this is just, for our workers ashore live under better conditions than laborers in other countries, and on the sea the men of our navy fare better than the men of any other navy in the world. We pay more money for the support of our navy, ship for ship and ton for ton, than other nations, and we pay this money out of our pockets in the form of taxes. We are glad to do that because we want the men of our navy to live better than in any other service of the kind. And they do live better and are better men than in any other navy.

As the merchant marine is so vital to our prosperity it is logical that out of taxes we compensate the American ship operator, for we cannot reasonably expect him to pay higher wages and to provide more expensive food for his seamen while competing with foreign ship owners for freight at the same rate a ton. We must do this if we are to have a merchant marine, and if we do it we will have the best manned merchant marine in the world. If we don't we will be in a similar position as in October, 1916, when a single U-boat off Nantucket lightship showed us how it could burst our national prosperity as if it were a toy balloon.

Government Assistance Necessary

It is obvious that the relationship of the government to the merchant marine must be close. No nation in recent years has ever developed a strong merchant marine without governmental assistance. The British government set the pace in governmental support when in 1834 it granted a subsidy of $85,000 a year to the Rotterdam and Hamburg steam packets of a British company, and a subsidy of $150,000 to a British packet service to Gibraltar. Great Britain was acting upon the same principle that our own government adopted in granting land rights and other valuable privileges to railroads to induce them to build roads into territory not sufficiently developed to warrant necessary investment. Congress considered that the opening up of the great unsettled territories of our vast Western empire was a national benefit for which the nation well could afford to pay. Similarly Great Britain, realizing, as we ourselves should long ago have realized, that industrial development must be beyond the sea, granted subsidies to steamship companies to induce them to open up and improve trade routes to foreign markets, that British manufacturers might have the advantage of those markets.

Some persons, notably Mr. Schwab, have stated that in their opinion it is unessential to the net worth of the nation whether the government operates the ships and operates them at a loss, or whether the ships are operated by private concerns and a loss accrues which is made up in some form of subsidy. What I think the gentlemen really mean is that we must have American ships by hook or crook. They certainly do not mean that it is not essential to the net worth of the nation as to how they are operated. We have the brilliant example of our railroads before us as to government operation. The loss in millions never occurred under private operation. Let the government own the railroads or ships, but hands off in operation, because the real development of any great enterprise depends on the individual initiative of the business man. No nation, especially the United States, ever will get the full economical development of any branch of industry that is not developed under private enterprise and by private capital.

The Case of the Cristobal

To show how inefficient government operation in times of peace can be, it is on record that the government-owned and operated steamship Cristobal, of about 20,000 deadweight tons, arrived in New York December 8, 1915, and did not sail again until January 10, 1916, because "bad weather," lack of government lighters and workmen held her up. Yet docks at either end of her route were bulging with freight which American merchants were in need of, because most of the British ships heretofore depended upon had been commandeered for war service.

A week is more than ample to unload and reload a ship carrying twice as much cargo as the Cristobal. The White Star, Cunard and other lines privately operated, even in winter and under the worst climatic conditions, unloaded and sent to sea again in five or six days, far larger carrying vessels than the Cristobal.

Under private operation the Old Dominion Line and others on our coastwise routes unload and reload a ship carrying 29,000 packages of potatoes and dispatch the ship again with a full cargo in less than twenty-four hours. This is done six days a week, and seven during the rush season. If the various examples of government operation which have come to my attention can be taken as criteria, the Old Dominion Line, governmentally operated, would be fortunate to sail a vessel every four days. And from examples of American or British government operation, efficiency seems to be a dead letter where politics can slip in. I have no doubt that the superintendent of the government line operating the Cristobal would have operated her efficiently under private management, but official red tape had seen to it that he lacked lighters, tugs and other things which private lines like the Old Dominion have at their command.

Three Men for One

It is a matter of record that a government-owned and operated line took over a New York pier temporarily and employed three men for every one which the owners of the pier employed—employed at less wages per capita than the government men received. It also has been reported to Washington that government-operated vessels have brought into port merchandise not on the ship's manifest—goods manifested at sixty pounds when they weighed a hundred. This is not written as a criticism of any government — just to get the American people "ship-minded."

The following is a record of the British Admiralty muddling the schedule of a ship manned by a civilian crew:

The steamship Carmarthenshire, carrying about 10,000 tons of cargo, arrived New York, Tuesday, July 3, 1917; left New York, Sunday, July 21, 1917; in port three weeks unloading. (Although a fourteen - knot ship she crossed in a six - knot convoy instead of a twelve-knot.)

Arrived Liverpool Sunday, August 12, 1917. (It was nearly three weeks before the government began to unload her.)

Left Liverpool Friday, September 14, 1917.

Arrived New York Tuesday, September 25, 1917. (Came across as she would in times of peace. Again spent three weeks in New York, due to government management of both railroads and shipping.)

Left New York Saturday, October 13, 1917.

Arrived Liverpool Thursday, October 30, 1917. (Again was held in port needlessly, in the matter of unloading.)

Four Days for Six Hours' Convoy

Left Liverpool Thursday, December 6, 1917.

Arrived Belfast, Ireland, Friday, December 7, 1917.

Left Belfast, Ireland, Tuesday, December 11, 1917. (Was held at anchor for four days awaiting convoy and then was convoyed only six hours instead of three days.)

Arrived at Galveston Friday, December 28, 1917. (Took fifteen days to load her against the twenty-one on previous trips,)

Left Galveston Saturday, January 12, 1918.

Arrived Norfolk, Virginia, Wednesday, January 16, 1918. (Took two days to get to coal piers.)

Left Norfolk Friday, January 18, 1918.

Arrived New York Saturday, January 19, 1918. (For five days she anchored in the bay awaiting convoy, having missed her convoy due to delay at Norfolk.)

Left New York Thursday, January 24, 1918.

Arrived Liverpool Sunday, February 10, 1918. (Again took nearly four weeks to unload her.)

Left Liverpool Wednesday, March 6, 1918. (For eleven days anchored in Irish ports awaiting convoy.)

Arrived New York Friday, March 29, 1918. (Loaded in just one week.)

Left her New York pier Friday, April 5, 1918. (Anchored in bay overnight and sailed the next morning.)

20,000 Tons of Supplies Less

The Carmarthenshire under private operation in peace times would have made a sailing from New York every five weeks. From the schedule she made only four round trips in thirty-five weeks, instead of six, which, translated into war supplies, means that she got abroad 20,000 tons less than she should have. Even though labor conditions in England and government transportation management here had to do with the delay, there should have been no reason to hold her in port for ten days, except for repairs. That, when every effort was being made to increase tonnage, a vessel under government orders should be compelled to make only one round trip in the time she could have made two, certainly does not argue well for government operation of ships in times of peace, when there is no tension.

I but mention these things in order that the mind of the public may be set to thinking on the situation facing us in the matter of how we shall handle our shipping problem. An educated public mind means that laws will be enacted in Congress for the benefit of the nation. Government control of shipping means that we would have jobs for political reasons instead of efficiency reasons; political discipline instead of business discipline, and a new management after each election. The government control of our railroads, after a single period of twelve months, has been shown to be the most dismal failure in all history. It is out of the question to find any parallel to it anywhere in human experience. The monthly returns of railroad earnings as they came in furnished evidence of failure with a vividness and conclusiveness which is impossible to avoid. With this example before me and the knowledge of needless delay to shipping during the war, I can but reach the conclusion that government ownership and operation of merchant vessels is absolutely unthinkable without international control of shipping.

PACIFIC MACHINERY

One Boiler a Day

ONE Scotch marine boiler a working day is the remarkable pace to which the Willamette Iron & Steel Works of Portland, Oregon, is holding itself. This represents its production schedule for the first three months of 1919, March not being finished at the time of this writing, but with the middle of the month showing the boiler department ahead of the production program. Had this mark been made possible through indefinite extension of the plant's equipment and labor supply, marine men and steel workers might not be so much interested in the accomplishment. However, the story of these boilers is one of organization and specialization that marks a new departure in heavy manufacturing.

All Auxiliary Work In Own Shops

The Willamette Iron & Steel Works for years has been doing all the auxiliary work in its own machine shops, and the amount of such work going into a marine boiler is considerable. In fact, it was this splendidly-established department, ready to give co-operation to the boiler shop, that made possible the successful consummation of the huge progressive assembly system of boiler construction, decided upon as the best means of carrying out the contracts which the company had accepted and so assuring power to the merchant marine then building on half-a-hundred ways at Pacific Coast ports.

The problem, then, was one of co-ordinating the men and machines and materials to a steady production program, so that each day there would appear a sufficient number of staybolts and stayrods and boiler tubes to keep a force of almost a thousand men at work in the task of actually assembling and building boilers. It was a race against former manufacturing methods with both a lack of space to overcome and the ever-present quandary of where to get the materials with which to do the next day's work. The company officials realized that the system which successfully kept up with the delivery dates as promised would be that which kept work moving all the time, using every available machine all the time and every man every minute.

Immense Stores Impossible

Not so long ago the manufacturers called upon to produce anything in such quantity immediately would have looked to the accumulation of immense stores of the necessary parts to make the completed units. This would have been impossible under the conditions, materials for all plants being rationed out sparingly by the government as they were used.

It accordingly became necessary carefully to synchronize production , both of parts and boilers, with receipts of material. Definite speed, establishing a close relation between the working program and the available supply of material, became an economic necessity. Gradually rushing lots of material through the machine shops for the boilers gave way to assigning definite units to the constant production of boiler parts, such as staybolts and stayrods. This system gradually covered the drilling of holes in the boiler heads, until all the work be-

A battery of boilers

came highly specialized. This much was accomplished last fall. Now, with speed doubled, the plan has been worked out so well that in most cases the supplies for two or three days ahead are always on hand. When the pace occasionally proves too much for some one process, additional mechanics are thrown into the breach until the rate there has been boosted up to the schedule. Often, in the matter of drilling plates, emergency portable drills driven by air motors and other means are used to speed up the operation.

Large Equipment Needed

The Scotch marine boiler as a unit steam generator requires no small outlay of equipment because of the rather complicated forms that go to make it up, all of which need considerable machine tool work before being assembled into the boiler. The boiler program at the Willamette Iron & Steel Works requires the following quantities of machined parts each month: 6720 staybolts, 420 main stayrods, 240 small stayrods, 420 crown bars, 90 manhole plates, 90 furnaces, 2880 staytubes, 9000 tubes, in addition to the various chambers and parts made of plate in the boiler shops.

Briefly the production of these parts is as follows:

The staybolt is cut and machined at the plant from Norway iron. The actual machining takes place in a staybolt machine, which does everything except tap the small holes bored in the core to show fractures while in use. This bolt when machined is 40 inches long with diameters of 1⅝ and 1¾ inches. It is used to bolt the chambers together and to bolt the chambers to the shell. Each boiler takes 224 such bolts.

The main stayrods, fourteen in each boiler, are made of tested steel, forged. These come to the plant in the rough. Each end must be accurately machined and threaded exactly to fit the nut. These rods pass longitudinally through the boiler and pass through both heads. Their general dimensions are 3¼ and 2¼ inches in diameter and 11 feet 7 inches in length.

The crown bars, fourteen in number, are turned from plates riveted together in pairs. They brace the crown sheet and chambers, passing across all three, and are fastened to the crown sheet by crown bolts.

Plates Cut With Torch

Manhole plates are cut from plate with oxyacetylene torch and flanged and faced to fit the manholes.

Staytubes of charcoal iron are upset first in the plant blacksmith shop. Then in the machine shops they are threaded and cut to dimensions. Of the staytubes ninety-six are needed a day. The boiler tubes, also charcoal iron, 300 in number a boiler, are machined and finished at the plant.

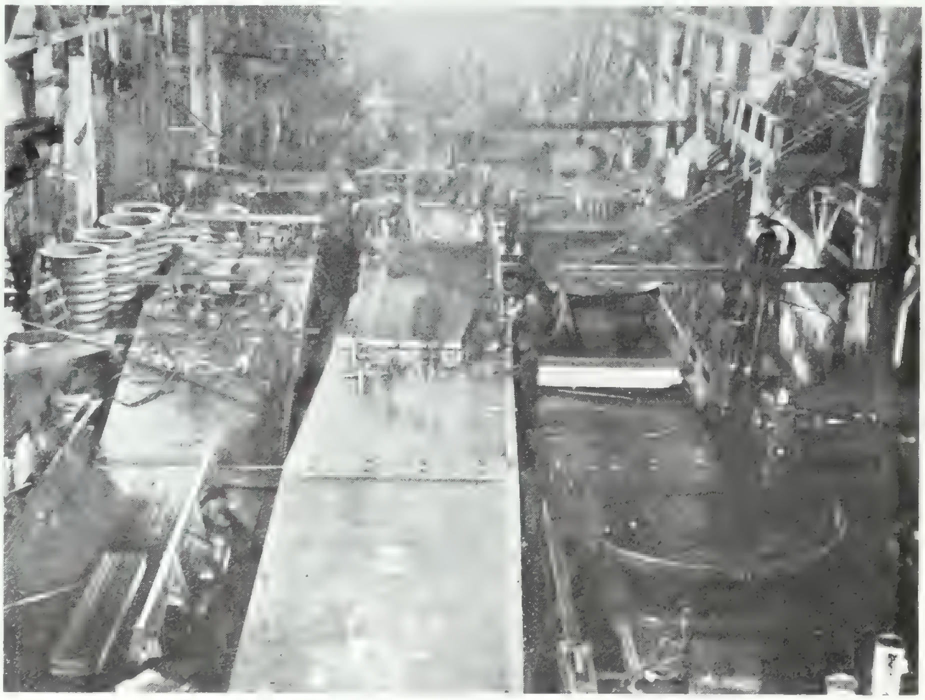
The plate work may be divided roughly into two departments — the fabricating and assembly. Both work along well-defined lines of "progressive construction."

The Trinidad takes boilers to Long Beach

Steel plate enters the plant by the carload and is delivered at the "layer-out" department. Here the various parts are marked out as front and back heads, the shell plates, butt straps, wrapper sheets, flame and tube sheets, used in the chambers and the furnaces. The heads and flame and tube sheets then are sent to the flange presses, where the flange is turned to afford a riveting edge. Then all this material is marked off for the drill presses.

Rolled to Required Radius

The shell plates and butt straps are planed square, then drilled, then rolled to the radius required for the boiler. These operations completed, the shell is set on edge in the main assembly rooms and the butt straps bolted on. The assembly then follows through the processes of riveting with inch and

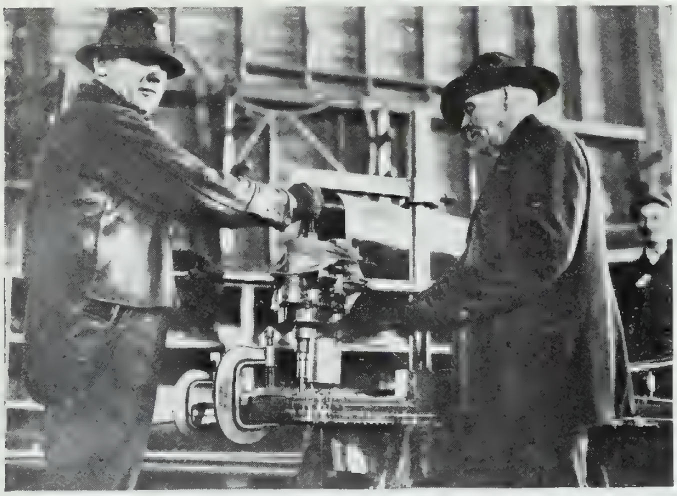


The initial assembly of boiler shells and preliminary drilling quarter rivets and a hydraulic press, to fitting the heads and riveting the back head in another gigantic press. The chambers in the meantime have been built up and drilled in another department and are brought in and set in place within the boiler. The furnaces, shipped and drilled, also are in readiness and the boiler work is now ready for final assembly. This proceeds with men working inside and out, and in ten days the boiler is ready for testing.

Best Month With Fewer Men

When in March, 1918, boilers began appearing ahead of schedule, the company felt that something had been accomplished. However, more contracts necessitated still greater production, with no chance to increase the plant or equipment. The result is the pace which marked these first three months of 1919. March has been the best month of the year, with fewer men working than were on the payroll in January.

Through all this, production has been so increased that at times as many as twenty boilers, completed ahead of the delivery date, stand in the street waiting for their purchasers to claim them.



When a part of the program falls behind the pace, other mechanics and other means are thrown into the gap. Drilling plates with air motors

Although the need for speed has dropped off since the signing of the armistice, this method of production will be pushed to its limit, for it is pleasing to the Willamette people for more reasons than the quantity of the work accomplished.

Highest Type of Workmanship

Boilers produced in this fashion have proved by test and inspection to present the highest type of workmanship. The specialization of every operation has produced a uniformity and standard of workmanship that assures flawless construction throughout. The method has given to every man the special duty involved in his one simple operation. Good boilermakers were at a premium at the time that it became necessary to furnish power for all these ships, and it became imperative to produce the work with the men and material at hand. It was easier, with the nucleus of trained men on hand, to teach the newcomers some simple operation until they had learned to do it well and speedily. So, with a comparatively limited number of actual boilermakers, to do nothing but the assembling of the boilers, the mark which this company established was made possible.

Each day a ship calls to take boilers to some shipbuilding center on the Pacific. This vessel takes six to California

Willamette boilers today are being shipped to practically every port on the Pacific where shipbuilding is going on. Half of the production goes to California ports, while the remainder is distributed in the yards of the Columbia River district, at Puget Sound and British Columbia. Only recently ten of them were shipped to Balboa, where they will be placed in hulls whose boilers had been dry-fired by the Germans in order to prevent their use by our government.

A SPECIAL MACHINERY NUMBER

"The First Annual Pacific Machinery Special Edition" of Pacific Marine Review will be published in June. It will be of great interest and value to every man who builds, operates or navigates a vessel and to the many industries allied with shipbuilding. Many of the prominent shipbuilders, toolmakers and other metal-workers of the Pacific Coast have promised their assistance to make the June number of Pacific Marine Review one of the best that has been issued.

The forward deck load of a shipment to Balboa

What Shall We Do With the Wooden Ships?

By G. N. Somerville

MR. HURLEY'S proposal to dispose of the Shipping Board's war-made merchant marine to private owners contains many interesting points. He states that it is intended to turn over these ships to the new owners, the government reserving the right to specify trade routes and freight rates that shall be charged. This on the surface seems quite acceptable, provided the rates to be charged for carrying cargoes will permit the new operators to realize a little on their investment, and at the same time enable them successfully to compete in the much-heralded trade war soon to start. In this war, however, foreign ship rates, and not the government, will determine the prices to be charged for carrying cargoes across the seas, and the real competition which we shall have to meet in carrying these cargoes can be met only when we are on an equal footing, as regards operating costs, with our competitors.

Diesel Most Economical Prime Mover

Practically all European maritime nations have accepted the Diesel engine as the most economical type of marine prime mover. These motors have been in successful operation for a sufficient length of time to remove any doubt as to their economy and practicability. At the same time, we have before us an issue of national importance—the disposition of our wooden ships. There has been much unjust criticism of the seaworthiness, economy and other phases of the operation of the wooden ships, but he who criticises should not lose sight of the fact that the wooden ships were built under stress and solely as a war emergency. The question was not one of cost of operation, but primarily one of providing bottoms to carry overseas the immense supplies necessary to feed our own army, as well as those of our fellows in arms, and the civilian populations of those countries. Therefore, let us not criticise too severely the policy adopted in the Shipping Board's shipbuilding program; the outstanding fact still remains that the war was won and it was for this purpose that the wooden ships were constructed—to fill the need of quick ship construction. Now that the war is over and that their work in the emergency has been accomplished, the task before us is to equip and operate these ships in such manner as will enable us, by their use, to meet, in a certain measure, the competition to follow. If these ships are to engage in competitive trade, one of the first considerations is to improve their economy.

Wooden Ships Make About Eight Knots

Let us, then, consider the Diesel engine and the wooden ship jointly in arriving at this conclusion. The 3500-ton net deadweight ships built to the government standardized plans and specifications now are equipped with 1400 indicated horsepower steam engines and boilers. These vessels are designed to operate under a boiler pressure of 250 pounds, but, as a matter of fact, the average pressure probably does not exceed 180 pounds a square inch. This will reduce the indicated horsepower to about 1100 and under these conditions the ships now log from eight to eight and one-half knots. It should be explained here that one reason for the lower boiler pressure is the intense heat in the engine and boiler rooms and the inability of the men to work, especially when passing through the tropics.

Let us consider what improvement can be made by installing Diesel engines in these wooden ships, or, at least, in the many yet to be equipped with machinery. A first-class steam installation of this size will consume not less than one and one-fourth pounds of coal an indicated horsepower hour, or the equivalent of fifteen tons a day. This figure is very conservative, and it is probable that these vessels, including auxiliaries, will burn not less than twenty tons of coal a day, but for the sake of avoiding any misstatements, we will base our comparison on fifteen tons a day.

Oil for Forty-one Days

It will be shown later in this article that, in the present wooden ships equipped with Diesel engines, a sufficient amount of fuel oil can be carried within the engine room tanks to allow a cruising radius of forty-one days, and for that reason we will make our comparison on a forty-one day voyage with both a steam and Diesel installation. At fifteen tons a day of twenty-four hours on a forty-one-day cruise, a steam installation will require 615 tons of coal, and, allowing forty-five cubic feet a ton, this brings our bunker capacity for such a voyage to 27,700 cubic feet of space, which would be available for cargo with a Diesel engine installation. With the same ship equipped with 1100 indicated horsepower Diesel engines, capable of driving the ship at from eight to eight and one-half knots, the fuel consumption would be 3.6 tons a day, the equivalent of .3 pounds an indicated horsepower hour. For a forty-one-day voyage this would require 147.6 tons, a saving in favor of the Diesel engine of 467 tons of cargo space. Four hundred and sixty-seven tons of cargo is equivalent to 21,000 cubic feet, which space is saved by avoiding the necessity of carrying coal for fuel and to the smaller amount of fuel required for the Diesel engine.

The engine and boiler room space of the 3500-ton standard wooden steamer is now approximately fifty feet long and is placed amidships. In an 1100 indicated horsepower single-screw Diesel engine installation, tankage for 7000 cubic feet of fuel oil, or more than 147.6 tons, together with all of the ship's auxiliaries, could be installed amidships in a space not more than thirty-five feet in length, or a saving of fifteen feet, which is equivalent to nearly 14,000 cubic feet of additional space released for the carrying of cargo. Assuming again that a ton of cargo occupies forty-five feet, this releases an additional cargo-carrying capacity of 310 tons, which, with the 467 tons made available by the elimination of the coal bunkers, makes a total of 777 tons additional cargo that can be carried when Diesel engines are installed.

Forty-three per Cent More Revenue Space

The 3500-ton wooden steamer must carry, for a forty-one-day cruise, 615 tons of coal, which reduces the net cargo tonnage to 2985 tons. With a Diesel engine installation, the ship can carry an additional 777 tons, which makes the total cargo tonnage 4277 tons. The difference between the two is 1292 tons, or 43 per cent additional revenue-earning space. The fuel cost on such a voyage for a steam job with coal at $10 a ton would be $150 a day. With a Diesel engine operating on 3.6 tons a day with fuel oil at $1.85 a barrel, the cost a day for fuel amounts to $47, making the total fuel cost of the voyage for a steamer $6150, as against $2000 for the Diesel, a saving of $4150 in favor of the Diesel. The saving in fuel, together with the additional cargo-carrying capacity of these ships, is enough to justify a serious consideration of making the change in motive power.

But there are further gains that may be realized in the operation of these ships when Diesel-engine equipped. The wages of the officers and crew for a steamer as against a motorship for similar positions are about the same, an exception being that six firemen and six coal-passers are dispensed with on a motorship. The salaries of the crew at the prevailing wages for one and one-third months (forty-one days) on these steamers amount to $5700, whereas, by the elimination of the firemen and coal-passers, a saving of $1300 is effected in a Diesel ship covering the same period, when the total salaries amount to $4400.

Fuel and Labor Compared

To summarize the fuel and labor charges, we have:

	Steam	Diesel
Fuel	$ 6,150	$2,000
Salaries of crew, 41 days	5,700	4,400
Total cost	$11,850	$6,400

The cost of carrying a ton of cargo on such a voyage by the steamer would be $11,850, divided by 2985 tons, which equals $3.97. On the motorship it would be $6400, divided by 4277 tons, or $1.50. The motorship, therefore, can carry her cargo at 38 per cent of the cost of a similar steamer of the same general dimensions. The interest on the investment and depreciation charges have been eliminated purposely from this discussion because we are not dealing with the original cost of two vessels especially designed, one as a steamer, the other a motorship; and, further, because of the fact that in turning these vessels over to private ownership the government no doubt will exact the same, or nearly equal, amounts for either a Diesel ship or a steamer; and, further, because the cost of installing Diesel engines in the wooden ships yet to be engined probably will not exceed the cost of equipping steamers with steam machinery as originally intended.

It was stated above that within the engine room of a motorship it would be possible to carry a sufficient amount of fuel oil for a forty-one-day cruise. It is without fear of contradiction that I state that 7000 cubic feet of tankage can be installed in the wings for fuel oil alone, and still have a couple of thousand cubic feet available for fresh water, lubricating oil, in addition to the auxiliaries necessary for operating such an engine room.

Eliminates Steam Auxiliaries

It is advisable to eliminate, as much as possible, steam auxiliaries, because of the bulky nature of the fuel used, and in an installation of Diesel engines in the 3500-ton wooden steamer, it is possible to install about 300 horsepower in auxiliary Diesel engines for electrically operating both the deck and engine room auxiliaries. By equipping these motorships with such a capacity in auxiliary engines, the deck machinery can be made entirely electrically-driven and by the amount of power available when in port the loading and unloading can be speeded up greatly, while this power would be available for operating electrically-driven air-compressors, bilge, circulating, lubricating oil and bunker pumps while at sea. These ships could be equipped with a small donkey boiler for ship heating and for an auxiliary steam bilge and fire pumps which have proved quite satisfactory in motorships.

The First Trans-Atlantic Steamship

ONE hundred years ago this month—in May, 1819—the first trans-Atlantic steam passage was made. The vessel was the Savannah. She sailed from her home port in Georgia, for which she was named, May 24, 1819, under command of Captain Moses Rogers; arrived at Liverpool twenty-seven days out, having used steam for eighty hours on the passage; and returned to New York November 30. It was the first and last voyage under steam, for her machinery was removed and sold at New York. The Savannah today would be known as an auxiliary steamer, inasmuch as she used steam as vessels of the City of Portland class use oil engines now—when there is not enough wind; but, in fact, it was not until 1889, when the White Star Line brought out the twin-screw steamships Majestic and Teutonic, that vessels relying altogether upon steam appeared on the Atlantic.

Ordinary Sailing Vessel

Captain Rogers generally is given credit for having inspired the voyage of the Savannah. In 1816 he had navigated a steamship on the seas for the first time in history, commanding the New Jersey on a voyage from New York to Chesapeake Bay; and, animated by a desire to take the first steamship across the Atlantic, he persuaded Scarborough & Isaacs, ship merchants of Savannah, to buy a vessel then building by Francis Fickett of New York. She was an ordinary sailer, 100 feet long, 28 broad and 14 deep.

Her engine was built by Stephen Vail of Speedwell, New Jersey, and her boiler by David Dod of Elizabethtown, New Jersey. The paddle-wheels were of iron, having eight radial arms so that they could be folded up and laid inboard when the vessel was under sail. The engines and boiler were on deck. Her tonnage was 350.

Voyage to Russia

From Liverpool the Savannah went to St. Petersburg, Russia (Petrograd, since 1914), taking thirty-three days for the voyage, including stops at way ports. She was under steam for ten days.

The Savannah's voyage from New York to her home port, prior to her sailing for Liverpool, was made in eight days and fifteen hours, steam being used for forty-one and one-half hours. She sailed from New York March 28, 1819.

Too much space being taken for fuel, which was wood, probably was the cause of the Savannah's failure to inaugurate steamship service on the Atlantic.

One Engine a Week

TO follow the growth of the Llewellyn Iron Works from a small iron foundry established in Los Angeles during 1886 to one of the largest steel and iron plants and machine shops of the West is to read a remarkable page in the history of business development in Western America. Pacific Coast history is full of such romantic stories of resourceful men with keen visions who have achieved great success.

New Mill Was Needed

Prior to the great war, the Llewellyn Iron Works operated only its Los Angeles plant. During the progress of the war it became evident to the Llewellyns that a steel mill was needed which would be capable of producing steel forging ingots and steel rolling ingots to supply their machine shops with the raw material to build the marine engines, boilers, cranes and other machinery required by the Pacific Coast shipbuilders.

Torrance, an industrial suburb of Los Angeles, situated about fifteen miles west of the city, is where the Llewellyn steel plant is located. This plant, which covers thirty-five acres of ground with four miles of broad gauge railroad track, may be considered the product of the Llewellyn shop at Los Angeles.

Having been built at a time when rolling mill machinery, furnaces and other equipment practically were unobtainable in the West, it was necessary for the Llewellyn Iron Works to design and build almost every piece of equipment and machinery that was installed at the Torrance plant.

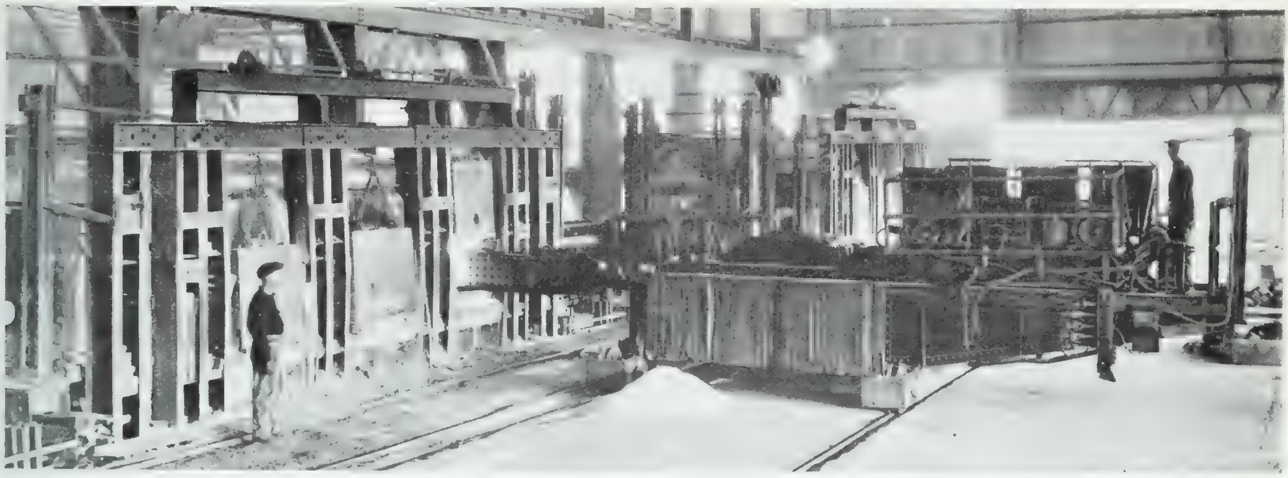
Let us make a trip of inspection through this plant.

One illustration shows the horizontal type charging machine used at the plant. This machine, as well as the charging buckets, were designed and made at the Llewellyn shops, and this is also true of all of the steel equipment in connection with the open hearth furnaces.

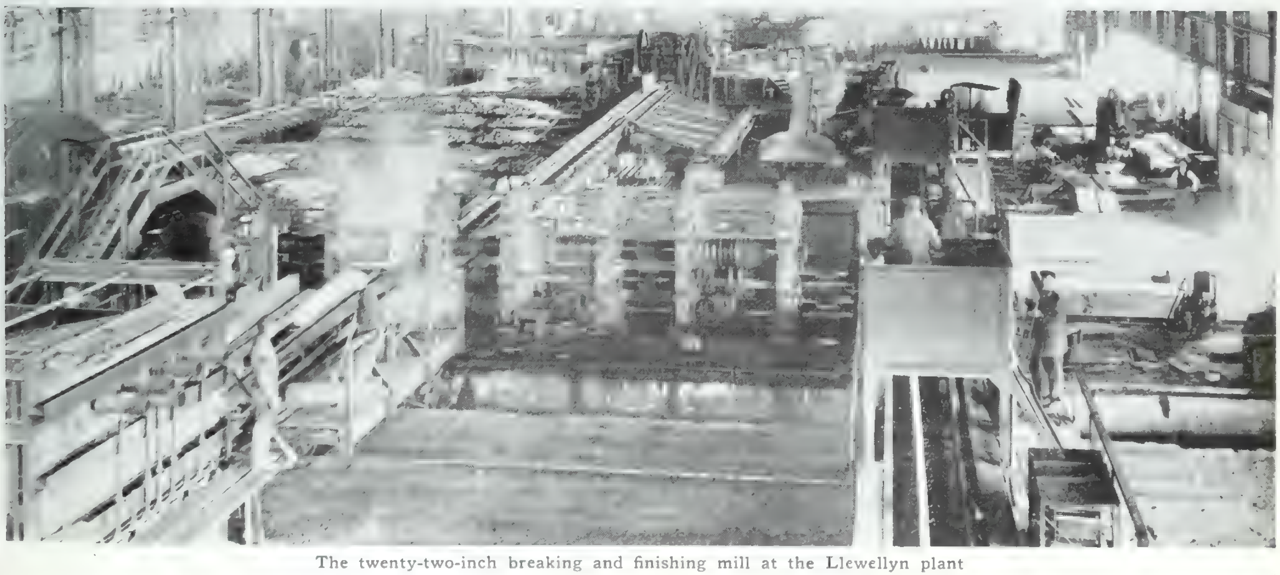
Furnace Doors Hydraulically Operated

The heavy furnace doors are operated hydraulically, and the furnace-man has only to turn a small lever at the back of the platform in order to lower or raise them.

The process of stripping molds from the steel ingots which have been cast vertically in the molding pit of the floor of the steel plant, also is illustrated. Forty-eight ingots are cast at one heat and are bottom-poured by the use of two master molds, which are shown in the illustration. These ingots, which measure 10 by 10 inches by 6 feet and weigh 1750 pounds each, are consumed by the rolling mills located in adjacent buildings.



Llewellyn-made charging machine for open-hearth furnace



The twenty-two-inch breaking and finishing mill at the Llewellyn plant

The open hearth furnaces, as well as the three-ton Herault electric furnaces, are used in turning out forging ingots which vary from one-half ton to twenty-five tons in weight.

Castings for Marine Work

The plant is also busily engaged in turning out the great variety of steel castings which are necessary in the construction of marine engines, ship equipment and shipbuilding equipment.

From the open-hearth molding floor the hot ingots are loaded to standard railroad cars and, after they are weighed on track scales, are moved to the continuous ingot furnaces. Each of these furnaces has a capacity of eighty-five ingots, which are shoved through the heating area by means of a hydraulic ram.

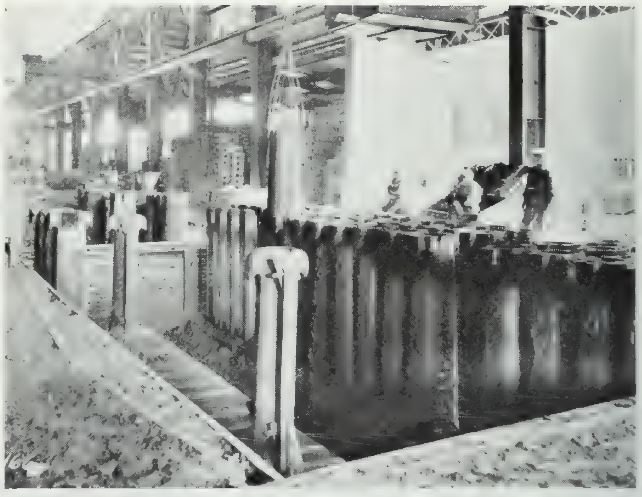
The twenty-two-inch rolling mill is used for breaking down the ingots as well as for finishing, and is equipped with four tilting tables. This mill, as well as the twelve and eight-inch mills, were completely built by the Llewellyn Iron Works.

Mills Operated Electrically

The mills are operated electrically. To give one an idea of the power of this twenty-two-inch mill it is interesting to note that the fly-wheel weighs 110,000 pounds and is nineteen feet in diameter. The electric power equipment is the speed-change design, allowing the mills to be run from full-speed to half-speed without change of horsepower, which makes them as flexible as if propelled by steam power.

All machinery in the Llewellyn plant is driven by electricity and natural gas is the only fuel used. The latter is piped to the plant a distance of 165 miles. This natural gas is also used in connection with oxygen for cutting scrap iron.

A visit to the iron foundry shows the forty-two-inch and seventy-two-inch cupolas in operation. Great quantities of iron castings are used for engine bed-plates and other machinery parts, as well as for the steel molds and other equipment about the plant.



Stripping forty-eight steel ingots which have been been cast from two master molds

A complete machine shop is maintained at the Torrance plant for repairs to equipment and the steel roll-making department is of especial interest. In this department there will be found three specially built heavy-duty lathes which are continuously busy in turning out new steel rolls for use in the rolling mills.

The writer was amazed at the great progress which has been made at this $2,000,000 plant and the completeness with which it is equipped. The buildings, of fire-proof steel construction, are also a Llewellyn product. It is of interest to know that the first brick laid at this plant was in April, 1916, the first heat was in October of the same year, and during the following February the first rolling mill was in operation.

General Offices at Los Angeles

Let us return to the Los Angeles plant, where are located the general offices housed in a modern reinforced concrete building located in the plant

General view of Llewellyn machine shop

The 8000-pound steam hammer in the forge shop

yards, which contain the machine shops, forging plant, boiler, tank, structural steel and engine-erecting shops.

The forging plant, which works on Llewellyn-made steel exclusively, is located in a building 70 by 175 feet, containing six steam hammers, the largest of which is of 8000 pounds' capacity. The illustration shows this great forging tool shaping an eighteen-ton steel ingot into a forging for a marine engine. The forge shop is served by a fifteen-ton Llewellyn electric traveling crane and eight large jib-type cranes. This shop is equipped with five large heating furnaces with separate boiler and power-plant equipment. The forge shop equipment also includes bolt and rivet machines and other tools necessary in the production of the heaviest and lightest forgings which this shop is called upon to furnish.

Raw Material Finished

The Llewellyn machine shops may well be considered as modern and completely equipped as any in Western America. Here the raw material produced at the Torrance plant is finished and assembled in light, well-ventilated shop buildings, which are entirely finished with cement flooring. Everything is electrically-driven and the shops are practically without line or counter-shafting. The main building is 84 by 504 feet and is served by two fifteen-ton and two five-ton Llewellyn electric traveling cranes, as well as seven smaller traveling cranes and seventeen two-ton jib type cranes.

The Llewellyn machine shops have every facility for machining the massive castiron and steel parts which make up the modern marine engine. Here are planers, boring mills, lathes and similar tools of the heaviest and most powerful type. There are vertical mills and horizontal mills, engine lathes and screw machines, shapers and slotters, milling machines, both horizontal and vertical, gear cutters and grinders, drill presses for the largest as well as the smallest work.

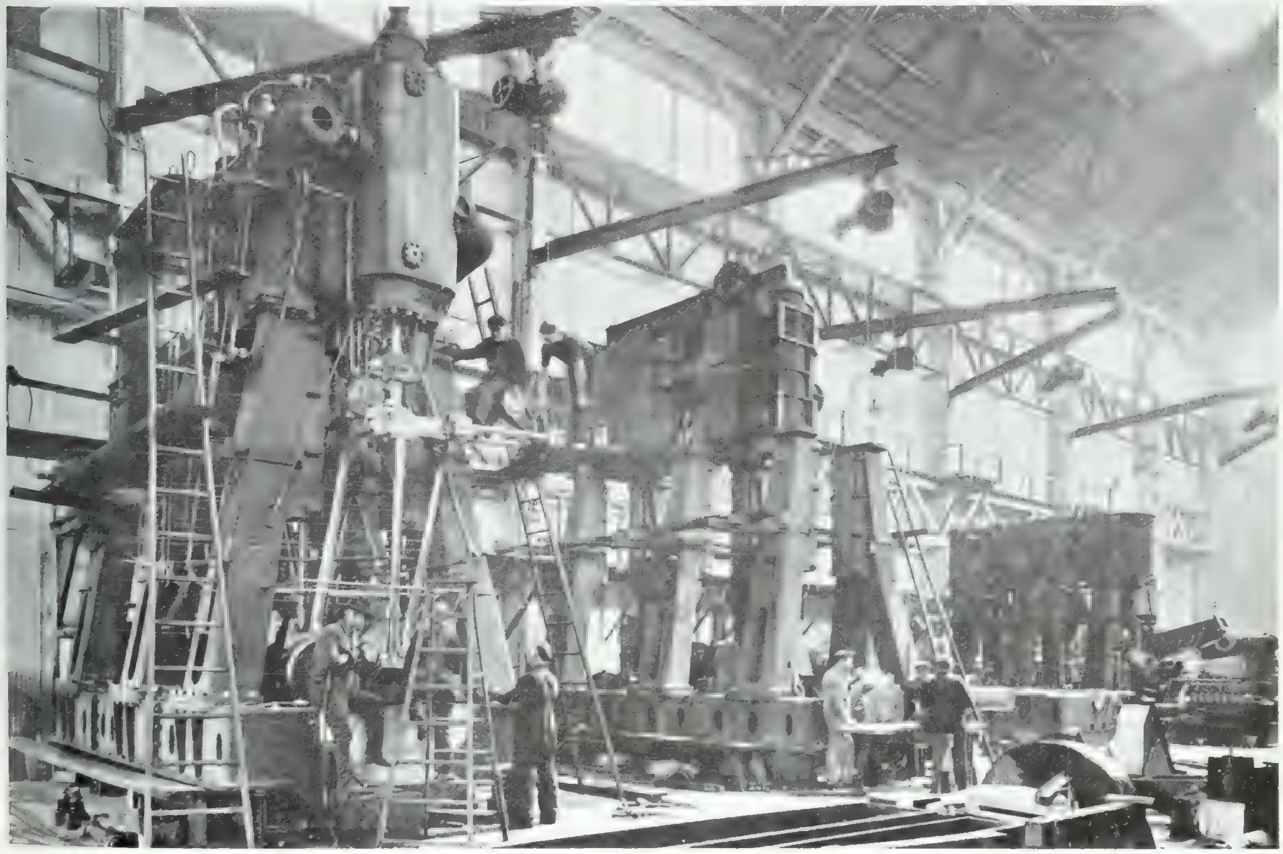
What Planer Can Do

The big planer in this shop will machine a piece eleven feet wide and thirty feet long. A sixteen-foot diameter can be turned on one of the vertical mills and one of the crankshaft lathes will swing seven feet and thirty feet between centers. These tools can be readily adapted for machining still larger pieces.

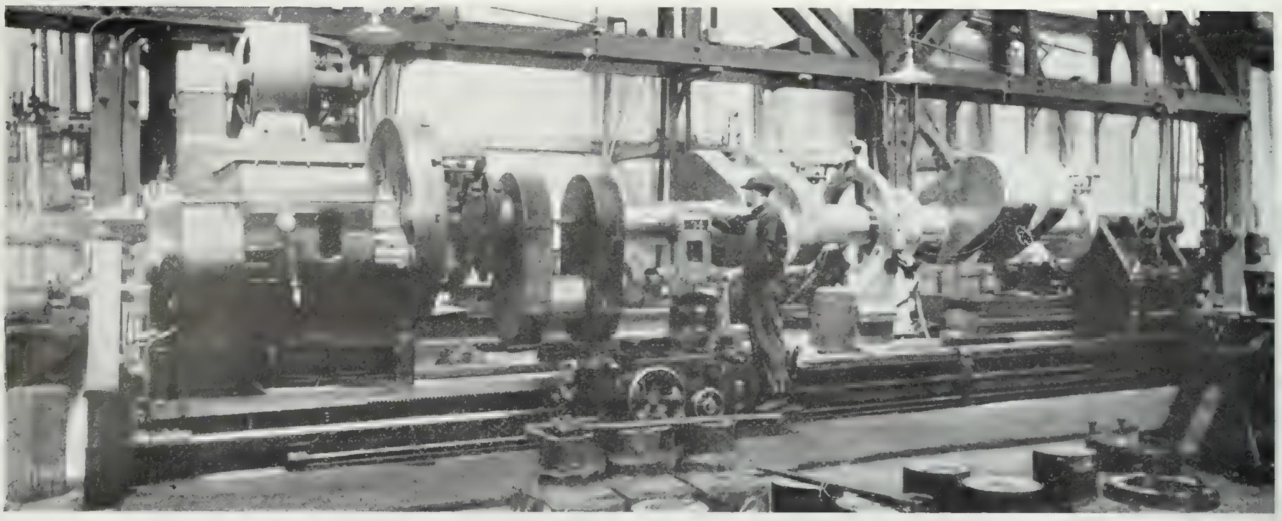
The Llewellyn Iron Works has adequate facilities for the manufacture of marine boilers, stationary boilers, tanks and sheet metal work of every kind.

Boiler and Tank Shop

In the boiler and tank shop are plate shears and angle shears, radial drills, plain and universal, several with arms sixteen feet long, horizontal and vertical bull riveters, rolls for sheets up to sixteen feet wide, scarfing hammers, hydraulic presses, including 200-ton four-ram flanging and forming



View of Llewellyn erection shop, showing 2800-horsepower marine engines



Turning the crank pins on built-up crankshafts

press, plate planers for sheets sixteen feet wide, acetylene tools of various kinds, air hammers, riveters, calkers and other tools required in a boilershop. In addition, there are various shears, punches, rolls, etc., for tank and pipe work, including a "dip kettle," which will take a pipe five feet in diameter by thirty feet long.

The main shop is 48 feet by 510 feet and the south bay 54 feet by 256 feet, with 38,300 square feet of floor space. Handling facilities consist of two fifteen-ton and two ten-ton electric traveling cranes, twenty-four two-ton cranes and standard gauge trackage.

The Erecting Shop

The erecting plant of the Llewellyn Iron Works, 54 feet wide and 195 feet long, was especially designed and built for the assembling and testing of marine engines and heavy machine construction.

The heavy concrete floor makes it possible to erect structures of great weight and height without settlement or distortion. The massive forty-ton electric traveling bridge crane, forty feet above the floor, permits assembling heavy parts close to the floor, where they are accessible, and then hoisting them "en masse" and placing them in their position in the structure. Eight two-ton jib cranes, standard gauge railroad tracks and trackless industrial haulage supplement the work of the overhead traveler.

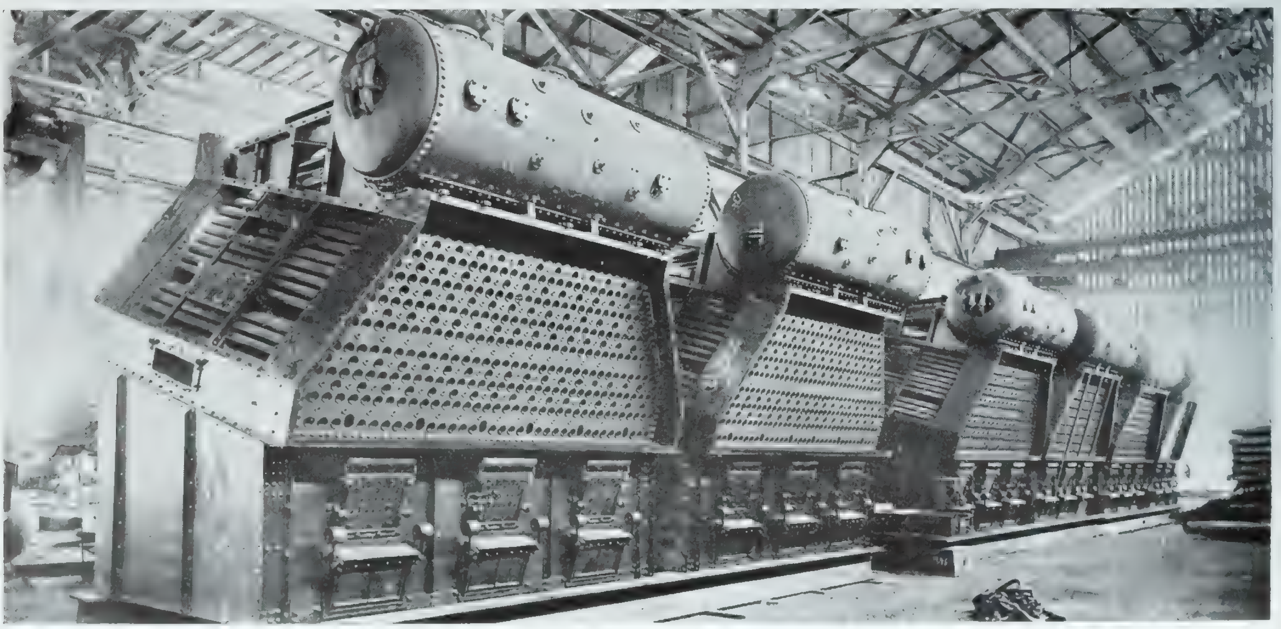
Erect Three Engines at Once

The floor space, 10,500 feet, is sufficient for the erection of six 2800-horsepower marine engines simultaneously, with plenty of room left for "floor work." Only six days are required to assemble, test, tear down and ship a 2800-horsepower triple expansion marine engine. These engines are designed to develop their rated power at eighty-eight revolutions a minute on 200 pounds of steam pressure. Each unit, including the thrust bearing, weighs approximately 164 tons.

ERRATA

The article on "Cutting and Drilling Speeds" on page 114 of Pacific Marine Review for February was largely a reprint from "The Standard Oil Bulletin," and credit should have been given to that publication for the text and for the use of the cuts. The Calol cutting compounds of the Standard Oil Company were used in making the records described in the article.

In Pacific Machinery section of the April issue the caption under cut of the Axelson lathe at the bottom of page 120 should have read "An 18-inch by 6-foot Axelson heavy-duty, quick-change gear lathe."



One week's product of the Llewellyn boiler shop

A Successful "Anti-Noise" Marine Telephone

AMONG the industrial developments and inventions born of the war, one that possesses great interest both to shipowners and shipbuilders, is a telephone that has proved an entirely successful means of intercommunication to, from and between the noisy parts of a steamship or motorship.

Since the days of its earliest development, the telephone has been tried out at various times for communication from bridge to engine room and between other parts of power-propelled vessels. That it has been found conspicuously wanting in these trials is apparent from the fact that communication from bridge to engine room, and vice versa, is still chiefly effected by means of such mechanical and electro-mechanical devices as the ship's telegraph, etc., and even by the antediluvian speaking tube.

Aeroplane Needs Imperative

With the enormous use of the aeroplane as a fighting and observation unit during the European war, there developed constantly new reasons why rapid and efficient means of intercommunication were necessary—both between the pilot and the bombers or observers aboard the same craft, and also from airship to ground and the reverse (in the latter case, of course, by means of wireless telephony).

To those who have been in the vicinity of unmuffled gasoline or other internal-combustion engines under test, it is superfluous to say that the noise they emit precludes any sort of conversation nearby—except, of course, by some means such as sign language. With the twelve cylinders of a Liberty aeroplane motor exhausting directly into the air alongside the fuselage of an aeroplane (or, in the case of a twin-motor plane, twenty-four cylinders), the problem of providing easy communication among the crew of that aeroplane seemed, at first glance, impossible of solution. The tendency of a telephone transmitter of any type previously developed to pick up every noise in its vicinity, as well as the vibrations of the voice directed against it, is only too well known to those who have attempted to use the telephone in any noisy locality. This evil is known in telephone parlance as "side-tone" and the best brains of the telephone engineering profession had been combating it for years.

The Magnavox marine telephone in use

California Engineers Solve Problem

Confronted with such a problem as this, Edwin S. Pridham and Peter L. Jensen, engineers of the Magnavox Company of San Francisco and pioneers in the adaptation to commercial use of the electrodynamic principle in telephone receivers, took one of the boldest steps ever taken in telephone development, and, by so doing, produced the Magnavox "Anti-Noise" telephone transmitter.

It was this transmitter, invented by these two Californians under war pressure and developed in the laboratories of the Magnavox Company, that enabled virtually perfect telephonic intercommunication among the members of the crews of America's combat aeroplanes, and equally efficient wireless telephone communication with the ground, from heights as great as ten thousand feet. It was its virtually perfect performance under the severest noise conditions that caused the authorities of the United States Navy to adopt, as the navy standard intercommunicating and wireless telephone system for its seaplanes, the Magnavox Company's equipment.

Commercial Possibilities Great

Prior to the cessation of hostilities in November, of course, the veil of war secrecy was kept closely drawn over these developments in telephony. Since the signing of the armistice, however, one may disclose to the industrial world and the public what has been conceded by engineers, scientists and commercial men to be one of the most radical developments in speech transmission in the last quarter century; and now the Magnavox Company with vast peace-time commercial possibilities before its "anti-noise" telephone apparatus, has placed on the market various commercial adaptations of its new telephone developments born of the difficult conditions of war.

How Jensen and Pridham attacked and solved the seemingly impossible problem of overcoming the noise of the exhaust of two thundering, unmuffled Liberty airplane motors and enabling the use of telephones only a few feet from them (both for intercommunication among the crew of the plane and for wireless telephone communication with the ground), is interesting in that the step they took was daring indeed.

"Sound-Proof" Idea Discarded

Every previous attempt made by telephone engineers—many of them world-famous—to overcome outside noise influence or "side-tone" in the telephone transmitter had been by **trying to exclude noise** with "sound-proof" cases, padding and the like. .

Pridham and Jensen boldly opened the diaphragm and button of the transmitter and **let all the noise in**—impartially to both sides of the diaphragm.

The result was entire exclusion from the circuit of **every sound save the voices of the users;** and the inventors at once patented the method, the extreme simplicity of which impresses itself forcibly on everyone who hears a demonstration.

Gong Beaten on Both Sides

The idea is simple. Conceive a big Chinese gong or tomtom, struck on both sides at once, in the same spot, by hammers of equal weight. The blows being equal, the gong will not vibrate. But if a light tap be administered on one side only, at the same time, with a smaller hammer, the gong will vibrate in proportion to the tap of the little hammer. In the case of the transmitter, the outside noise (affecting both sides of the diaphragm equally) is analogous to the two hammers; the voice waves to the smaller hammer.

All of this brings us back to the question of telephone intercommunication between the bridge of a steamship or motorship and the noisy parts of the ship—main engine room, refrigerating engine room, steering engine room aft, boiler room, wireless room, etc. Demonstrations of the performance of the Magnavox "anti-noise" telephone under severe and actual service conditions convinced the representatives of the Emergency Fleet Corporation that it was the long-desired means of unimpeded telephonic intercommunication amid the perpetual din in the vitals of a power-driven ship. As a result, merchant ships now under construction in Pacific Coast shipyards are being equipped with Magnavox "anti-noise" marine telephones.

Designed for Strenuous Service

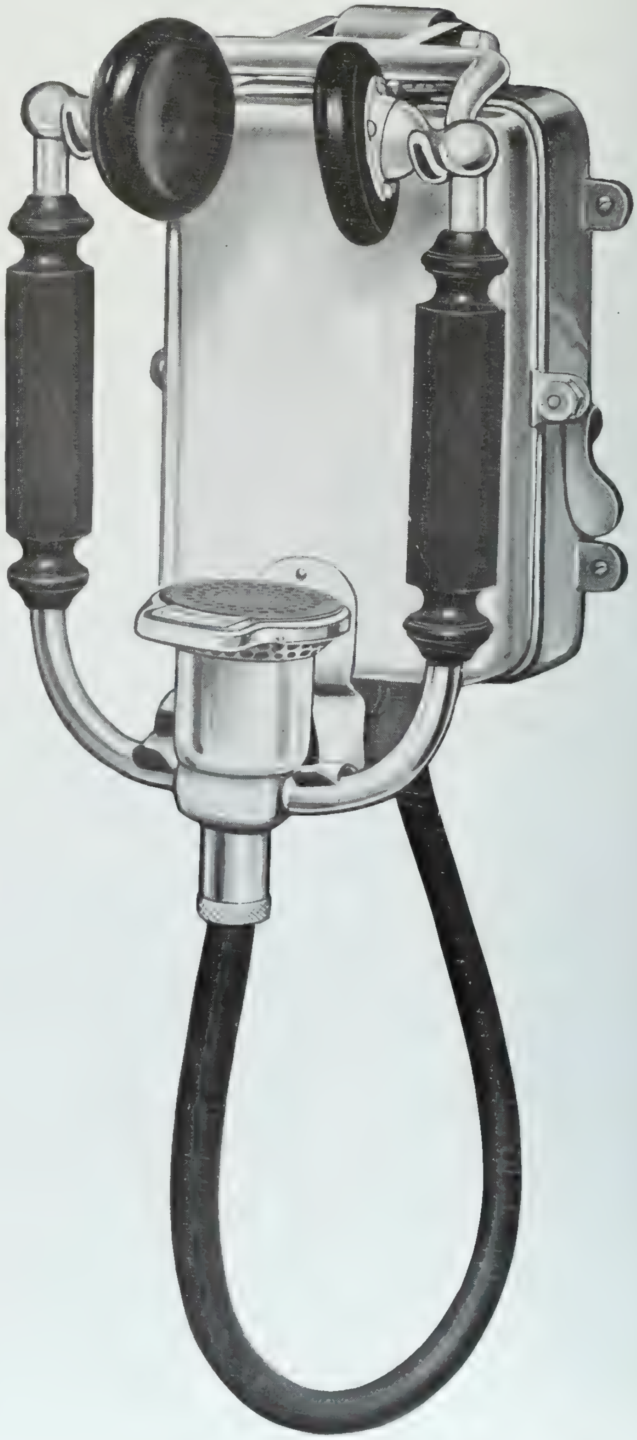
These marine telephones embody not only the same transmitter that revolutionized intercommunication on board and to and from army and navy aeroplanes, but also the electro-dynamic type of telephone receiver, which is far superior in speech reception and reproduction to the old type of electro-magnetic receiver employed in the familiar commercial form of telephone.

In addition to embodying these two vital features, the "anti-noise" transmitter and the electro-dynamic receiver, these instruments bear ample evidence of having been carefully and thoughtfully designed to meet all of the unusually severe conditions that must be met by electrical apparatus of any form on board ship. It must be remarked that, unfortunately, owing to the extremely rapid expansion of shipbuilding because of the war, comparatively few electrical manufacturers and contractors as yet have come to a full realization of the rigors that marine service imposes upon all electrical apparatus. As a result, much electrical equipment has been installed on shipboard, in the rush of war-time construction—equipment that would have been fully adequate, in strength and endurance, to meet any requirement on shore, but which, under actual service tests aboardship, has failed.

High Standard of Ruggedness

The Magnavox Company, in designing and manufacturing its marine telephones, appears to have taken ample consideration of these differences in working conditions and to have maintained a standard of ruggedness in construction fully up to the severest marine requirements. This has been carried through the manufacture of marine telephones even down to the design of the smallest screw—for the pliers and screwdriver in the overalls pocket of any ship's electrician or engineer are all ever necessary in adjusting or "tightening up."

The use of both ears (the only way to use a telephone and get efficient performance out of it) is permitted by the convenient construction of the nickel-plated hand set. A glance at the photograph will show that this hand set can be used with equal convenience by a right-handed or left-handed person. The tubes which form the side arms of the hand set are hinged at the base of the transmitter mount, and swing outward to permit ready adjustment of the instrument to the ears. A light spring in the base holds the receivers against the ears with the correct pressure, and the ball-and-socket



The Magnavox marine telephone installed, with the hand-set in place. The transmitter is of the type used on army and navy aeroplanes. The receiver, within the nickel-plated waterproof wall-case, is of the electro-dynamic type, which reproduces more faithfully and clearly than any other.

construction at the ear pieces permits the latter to adjust themselves to ears of any shape or slant.

For Correct Mouth Distance

It will be noted that, with the hand set in position for speaking and listening, the transmitter is automatically in position for correct mouth distance; nevertheless, an easy sliding adjustment in the base of the transmitter permits its being moved closer to or farther from the mouth, if necessary, or for adjustment to fit various facial contours.

The receiving apparatus of the instrument is located in the waterproof nickel-plated wall case, where it is properly protected from salt spray or any other moisture—as also are the switch-hook contacts and binding posts.

A word here about the technicalities of the electro-dynamic type of telephone receiver may not be amiss. In this form of receiver, the vibrating element is a flat coil of wire, and not a soft iron diaphragm as in the old electro-magnetic type. This flat coil of wire is rigidly attached to a bronze diaphragm, in such a position that it cuts the lines of magnetic force passing between the pole pieces of a permanent magnet. The passage of the fluctuating voice currents through this coil causes it to vibrate in this magnetic field synchronously with the vibrations of the transmitter diaphragm at the other end of the circuit; and, inasmuch as the coil is always at a fixed distance from the pole pieces of the magnet, the reproduction of speech effected by it, through the attached receiver diaphragm, is far clearer and more faithful to the original than ever has been attained by the common or electro-magnetic type of receiver. It is not necessary in this article to go into the technical reasons why; however, it may be remarked in this connection that it is this superiority, coupled with certain structural modifications permitting wide amplitude of vibration and greater ruggedness of vibrating parts, that make the so-called "Magnavox," or loud-speaking, voice and music amplifier long marketed by this company, the most powerful instrument of its kind on record.

How Speech Is Carried

It will be noted, from a further glance at the photograph of the marine set, that the reproduced speech is carried from the protected receiver within the waterproof case through the flexible tube and via the hand tubes to the ear pieces of the hand set.

The hook switch which makes and breaks the talking circuit at any individual station is on the top of the wall case. In restoring the hand set to the hook-switch after use (which automatically breaks the circuit, as in an ordinary wall or desk telephone), a slight push locks the base of the hand set in place beneath the nickel-plated spring clips at the bottom of the case. The telephone is thus prevented from falling when the vessel is rolling or pitching.

Master Telephone on Bridge

The master telephone is located, of course, on the bridge; and other stations may be located in the main engine room, the refrigerating engine room, the chief engineer's room, the steering engine room in the stern, the wireless room, or elsewhere on board as conditions require. In existing installations there are provided waterproof brass junction boxes of special design for each substation. One of these may be readily installed at any point in the circuit, fore or aft, where it may be thought that a future station installation might become necessary.

Current for the telephone service, at six volts, is taken from any three cells of the storage battery located in the wireless room of the vessel; the leads being carried down to a special junction box, directly below, in which is located the necessary induction coil. The use of the storage battery in the wireless room assures the source of telephone current receiving the necessary regular attention and re-charging, and also eliminates all possibility of the old shipboard bugbear—failure of dry-cell batteries.

Adapted to Shipyard Use

The shipbuilder reader probably already has asked himself the question: "If the Magnavox 'anti-noise' transmitter, as adapted to marine telephones for use on board ship, will exclude the noises of engine room and boiler room, then will it not also permit peaceful use of the telephone in the boiler shops of my shipyard, or in the neighborhood of riveting hammers on steel hulls?"

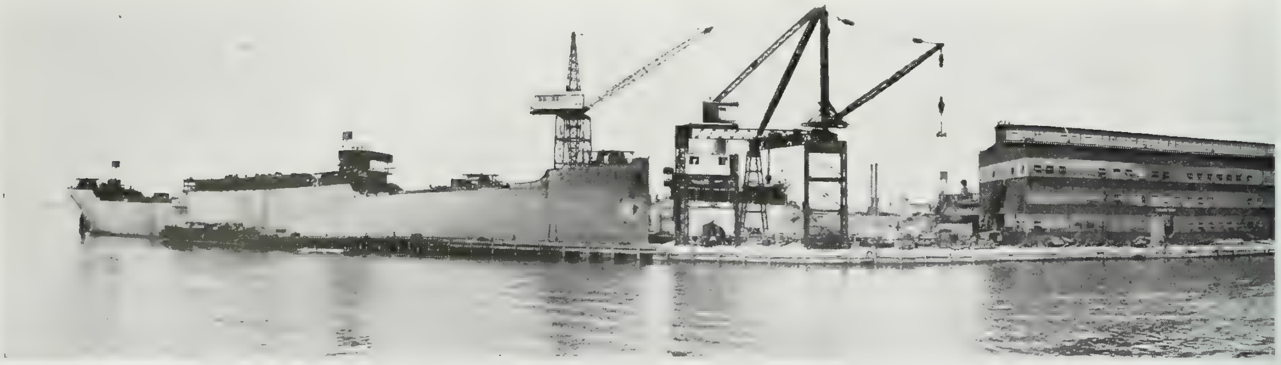
For emergency use in the steering-engine room aft, when the helmsman must handle the vessel by telephone instructions from the bridge, a telephone attached to the head will leave both hands free. The noise-proof set here shown is that used by aviators, but the Magnavox Company is ready to supply equipment patterned after this.

The answer is: "Yes."

With a view to establishing the utility of its "anti-noise" transmitter under just such circumstances, the Magnavox Company has had its apparatus demonstrated under conditions fully as severe as these, and even more severe. One unique test that was made consisted in placing a telephone equipped with the "anti--noise" transmitter inside the steel shell of a boiler. With several men outside the boiler pounding on the shell with hammers, a person inside was able to telephone to those on the outside without interference from the din of the hammering. Judging from this performance, it would appear that the company's equipment will prove somewhat of a blessing to shipyard officials who find frequent use of the telephone to and from noisy parts of their plants a necessity.

Desk Telephone Also Manufactured

The Magnavox Company has developed a desk telephone equipped with a hand set quite similar in appearance to that embodied in its "anti-noise" marine telephones.



The south plant, Baltimore Dry Docks and Shipbuilding Company, showing the 8800-tonner Naiwa tied up at the outfitting pier just after launching; the giant stiff-leg derrick, outfitting shops, boiler shop and, in the other half of the panorama, on the next page, the shipways and the 6200-ton refrigerator ship Polar Sea, built at the lower yard

The Baltimore Dry Docks and Shipbuilding Company

THE establishment of the Baltimore Dry Docks and Shipbuilding Company consists of three large and well-equipped ship-repair and shipbuilding plants, known as the upper, lower and south plants, employing approximately 10,000 men.

The upper plant comprises 9.6 acres. At this plant there are a large drydock, 610 feet long; two marine railways and one building slip, capable of accommodating a ship 200 feet in length; as well as the necessary pump house, punch shed, mold loft, etc. There are excellent facilities at this plant for handling repairs to ships with unusual dispatch.

Lower Plant Building Tankers

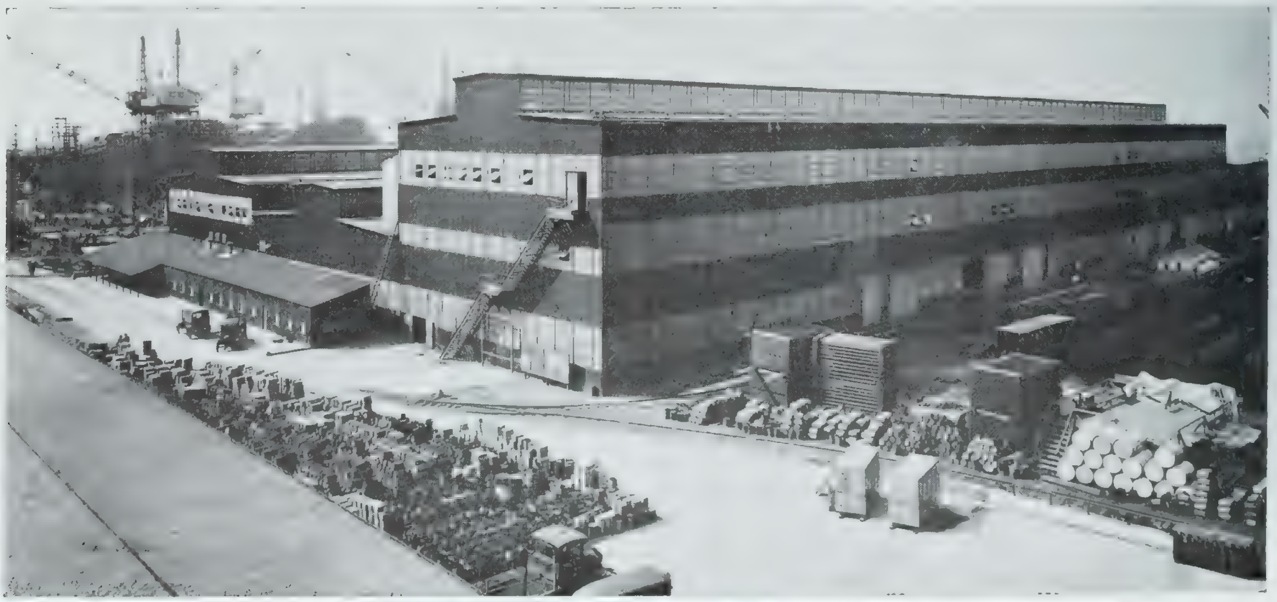
The lower plant comprises 13.5 acres. There are two building slips at this plant capable of constructing 340-foot vessels, the slips being served by two elevated fifteen-ton locomotive cranes on one runway; one shear leg, capable of lifting 100 tons, and six locomotive cranes. There is also complete plant equipment here necessary to serve two drydocks and care for repairs to merchant vessels. The drydock at this plant is 437 feet long. At the present time 6000-ton oil tankers are being constructed at this plant for the United States Shipping Board Emergency Fleet Corporation. During 1918, 6200-ton cargo-carriers and refrigerator ships were built here for the Fleet Corporation, one of the latter being the famous forty-day ship, South Pole.

South Plant Recently Built

The south plant is new, having been constructed during the latter part of 1917 and early 1918, at an outlay of $4,000,000. This plant, built primarily for the construction of vessels for the Emergency Fleet Corporation, is a permanent improvement and a lasting tribute to the importance of Baltimore as a shipbuilding center. It comprises 36.5 acres and is one of the most modern and complete plants in the country.

It contains four massive concrete building slips; two 70 by 500 feet and two 60 by 500 feet, capable of turning out twelve 8800-ton ships a year. These slips are built with a view to future expansion, so that ships up to 12,500 tons deadweight may be built upon them without strengthening the present structure. They rest on 3000 concrete piles, each pile capable of bearing safely a load of twenty-seven tons.

The plant is laid out so that the raw material arriving in the material yard is carried through the layout shop, fabricating shop, assembly shop, out under the traveling tower cranes, to be placed in proper position in the hulls. As the material is



The south plant, fabricating shop. The shipways and traveling cranes may be seen in the distance.

received it is unloaded from the cars and distributed into permanent concrete and steel racks by locomotive cranes. From the material yard the material is taken into the main ship shop, where the plates and shapes are marked and laid out ready for the machines. In another division of this building are situated the Lysholm tables, with their punching machines, the shears, bending rolls and other tools for punching and shaping the plates, and sections ready for the assembly shop, where the material is assembled and bolted together before being placed in the hull. Running parallel with the layout shop, its entire length, is a gantry crane, which picks up the material from the various tracks as it is sent out of the shops and places it at the head of the crane ways, which in turn pick up the material and lay it in its place in the hull on the launching ways.

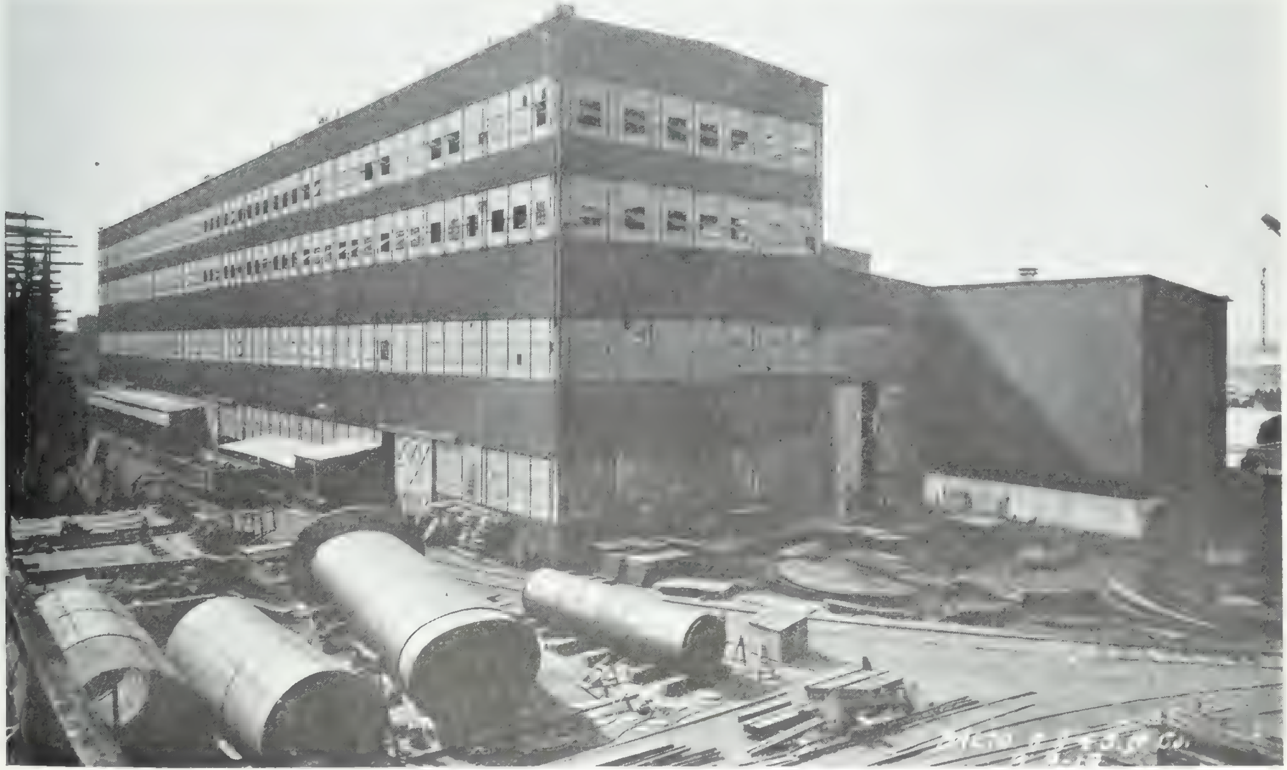
Rapid Work at Fitting-out Pier

Besides the ship shop and ways before mentioned, there are at this plant a three-story office building, store house, heating plant, boiler shop, outfitting shops and pier. An unusual feature of this plant is the fitting-out pier, 100 feet long, equipped with modern electric cranes for the rapid and economic handling of material for vessel outfitting. The joiner, carpenter and outfitting shops are on this pier, and, with the crane facilities, insure the fitting-out of ships in minimum time after launching. At the end of this pier is a giant stiff-leg derrick, capable, at a sixty-foot radius, of lifting eighty-five tons. This derrick is used in placing the boilers and engines in the hulls of vessels.

As this plant is operated by individual motor-driven machinery, requiring 4500 kilowatts, and as the material handled by cranes is almost entirely of steel, all wiring is underground. There are in the plant approximately fifteen miles of duct lines, and many miles of water, air, oil, heating and sewer pipes.

Building Record for 1918

During 1918 the company built eight 6200-ton ships and two 8800-ton vessels for the Emergency Fleet Corporation; as well as two mine sweepers for the navy. The 6200-ton refrigerator ships Luella, North Pole, South Pole, Polar Sea, Polar Land, and the 6200-ton cargo ships Elinor, Polar Bear and Polar Star, representing a total tonnage of 49,600, were constructed at the lower yard, and the 8800-ton cargo ships Naiwa and Fort Wayne were built at the new south plant. In addition, the mine sweepers Avocet and Bobolink, of



The boiler shop, south plant, Baltimore Company

700 gross tons each, were completed at the upper plant for the Navy Department. This made a grand total of 67,200 tons built for the Emergency Fleet Corporation and 1400 gross tons for the Navy Department during the year. The 8800-ton cargo carrier Osawatomie, work on which was begun during the year 1918, was not completed until late in January of this year.

The contracts which the company has with the Emergency Fleet Corporation will provide sufficient work to keep all three plants in full operation during 1919. There are still four 8800-ton cargo ships and six 10,300-ton oil tankers to be constructed at the south plant; four 6000-ton oil tankers to be constructed at the lower plant, and one mine sweeper at the upper plant.

In addition to this there is an enormous amount of repair work being done at the three plants at all times. There are often twenty-five to thirty-five ships undergoing repairs by the company at one time. Outside of the plant at Newport News, this company's plant is the leading drydock establishment on the Atlantic seaboard south of New York.

A section of the ship shop, south plant, showing Lysholm tables and punching machines

The Company's Executive

President Holden A. Evans, engineer and shipbuilder, was born at Greenville, Alabama, December 6, 1872. He was educated at the Alabama High School, Tuskegee, Alabama, and the United States Naval Academy, where he was graduated in 1892.

In 1895 the United States government sent him to Scotland, where he pursued a two-years' post-graduate course in naval architecture and engineering at the University of Glasgow, taking the highest class prizes both years. He also received certificates of merit with "great distinction." In May, 1897, he was appointed assistant naval constructor of the United States Navy and assigned to duty at the works of the Newport News Shipbuilding & Dry Dock Company, and upon the outbreak of the war with Spain he had charge of repairs to the blockading fleet at Key West, Florida. Subsequently he was assigned to duty at the Bureau of Construction and Repair, Navy Department, Washington, and superintended construction at the Crescent Ship Yard, Elizabethport, New Jersey, and at the Gas Engine & Power Works, Morris Heights, New York, until August, 1899. From 1899-1904 he was senior assistant to the naval constructor at the Norfolk, Virginia, navy yard. During the period from 1904-1909 he served as naval constructor and manager of the navy yard at Mare Island, California, when he was assigned to special duty by the Navy Department at Seattle, Washington; Bath, Maine; Boston, Massachusetts; Washington, and Norfolk, Virginia, continuing thus until January, 1910.

Resigned from Navy in 1911

The following year he resigned from the navy to become vice-president of the Seattle Construction & Dry Dock Company, Seattle, Washington. He remained in this connection until May, 1914, when he was chosen vice-president and general manager of the Skinner Shipbuilding & Dry Dock Company, Baltimore, Maryland, which was then in the hands of the bondholders. In June, 1915, the business of the Skinner company was taken over by the Baltimore Dry Docks & Shipbuilding Company, which is financed by Milwaukee interests. The active management was placed in the hands of Mr. Evans, and through his untiring efforts the plant and property were considerably improved and everything put in readiness to handle a record-breaking volume of work.

Mr. Evans is the author of "Cost Keeping and Scientific Management," as well as many technical articles on shipbuilding methods and management. He is a member of the Society of Naval Architects, the Society of Mechanical Engineers, the Army and Navy Club of Washington and the Baltimore Country Club of Baltimore. He married, February 2, 1910, Frances Helen, daughter of Amos Ingersoll, a merchant of Boston and a descendant of the Ingersolls who settled in Salem, Massachusetts, in 1629.

ASPROMET NAME CHANGED

The Aspromet Company changed its name to H. H. Robertson Company March 31, 1919. The change of name involves no change of directorate, management, or policy. It is rather a matter of better identification of the H. H. Robertson products—marking them more individually, pointing more clearly to one guarantee and responsibility behind them than any coined name—such as the one now supplanted—ever could.

Japanese Shipbuilding and Shipping

By Special Correspondent

Yokohama.

THE Japanese government has just extended for two years the present regulations regarding the granting of steamship subsidies, which otherwise would have lapsed next December. Before the extension will be promulgated, however, the authorities will go through the steamship lists carefully and make a revision as to those lines which are to be subsidized further, which are to be dropped from the list and which added.

Agitation Against Subsidies

When the shipping boom was at its height and Japanese shipowners were reaping fortunes, an agitation was started against the payment of further subsidies to such lines as the Toyo Kisen Kaisha, the Nippon Yusen Kaisha and the Osaka Shosen Kaisha, which were well established and extremely prosperous. The stand was taken by many that to continue subsidizing these lines was only further to swell their profits at the expense of the general Japanese public. The government, however, took the ground that the shipping boom was abnormal and temporary and that the necessity for the subsidy remained.

There is much rumor in Japanese shipping circles of a possible Japanese-American steamship company to be formed between a large American corporation and some of the important Japanese interests. The new corporation is to be capitalized at $100,000,000, to be equally contributed by Amercans and Japanese. That any such combination will materialize is open to doubt. The Japanese desire the amalgamation principally to avoid the big losses that face them through having built a number of big steamers under war conditions and prices and having these now, just built or about completed, on their hands with the whole shipping situation changed. They are reported as desirous of paying for their shares in the new company with their ships, but at a figure exactly double what the American amalgamators are said to be ready to agree to. The Japanese figure is 600 yen a ton as the valuation on their vessels, while the American estimate of their worth is $150 a ton, or practically the quotation on steamers in the open market.

Government Subsidy Precludes

Another factor interfering with the scheme is the fact that the ships necessarily would have to operate under the Japanese flag, but with foreign shareholders would be precluded from any chance at a Japanese government subsidy.

The Osaka Shosen Kaisha, which recently secured a place for its representatives at the London Freight Conference, has also succeeded in being admitted to the Java-Bengal Freight Conference. This gives the company a very strong position and a new service by it is to be inaugurated soon, when its president, Mr. Hori, returns from Formosa. The new service will be from Japanese ports to Singapore, Java and Australia, with four 3000 and 4000-ton steamers to begin the run. Sailings will be monthly and other vessels will be added if the business justifies.

Some big harbor improvement projects are now taking place, the principal plans centering around Kobe and Moji. Mayor Kashima of Kobe is now in Tokyo, laying the details of the Kobe plans before the authorities of the Home Department and endeavoring to clinch the matter of the national participation in the scheme, which involves the expenditure of a total of 30,000,000 yen, to be borne equally between the national government and the Hyogo prefecture, for which Kobe is the shipping and industrial center.

It is planned to about double the size of the Kobe harbor by dredging what is known as the Hyogo basin, already a part of the general harbor but available at present only for the smaller domestic and coasting ships. In the dredging it is expected to reclaim about one-half million square yards of tide lands, the cost of the work to be paid for out of the sale of the reclaimed harbor frontage. The project is expected to take six years to complete, with an annual expenditure during that period of $3,000,000.

Kobe is Japan's Trade Gate

The port of Kobe is fast growing into prominence and is easily first as the trade gate of Japan. Last year the exports through that port were valued at $257,000,000, and the imports at $385,000,000, or a total trade for the port in 1918 of $642,000,000, which figures do not include the value of the Korean trade, amounting during the year to $14,000,000. This is an increase over the previous year of more than $150,000,000.

The Moji project is less ambitious, involving an expenditure of only $3,000,000, the greater part of which the national government is expected to assume. The items for the Kobe and Moji projects are expected to be passed at the present session of the Diet in a supplementary budget.

To Establish Observatory

A marine meteorological observatory is to be established soon in Kobe, according to plans announced by S. Shinjo, manager of the Osaka Shosen Kaisha, who has been fathering the scheme and collecting the funds necessary for the institution. Mr. Shinjo has secured a total of 233,500 yen, the Nippon Yusen Kaisha, the Osaka Shosen Kaisha, the Mitsui Bussan Kaisha and the Mitsubishi Kaisha contributing each 15,000 yen, with other large shipping firms donating from 8000 to 10,000 yen each. This amount will establish the observatory, the maintenance of which is to be taken over by the government. Dr. R. Okada, chief of the Central Meteorological Observatory in Tokyo, internationally known as an authority on meteorology and astronomy, will be appointed by the government as chief of the new observatory.

This observatory is to work along broad lines, in addition to furnishing the mariners in Japanese waters with storm warnings and such. One important branch of the work to be done will be the testing of compasses, dynamos and such other marine apparatus. The observatory will also make Japan independent for the first time in the matter of charts, as at present all the charts used by Japanese mariners are imported from England.

The Department of Agriculture and Commerce of the Japanese government has announced a revision of the war-time marine re-insurance regulations. Under the new rules, ships re-insured by the government will be paid compensation in case of accident on the basis of one-half the old rates. The new rate ranges from 300 yen a ton for new ships not over five years old to 135 yen a ton for ships over thirty years old and below forty.

A report of the earnings of the Osaka Shosen Kaisha for the six months ending December 30 has just been made to the stockholders, the net earnings being the enormous sum of $12,250,000. The company's gross receipts for the six months were more than $50,000,000, which is two and one-half times the total of the paid-up capital and debentures, as shown on the financial report. The company declared a dividend of sixty per cent.

Since 1914 this company has increased its fleet from 109 to 191 vessels, with six more now building. It operates fifty lines, enabling its ships to touch at every important port of the world open to trade. In the six months covered by the recent financial report, the gross receipts for freight were 87,000,000 yen and the gross passenger receipts more than 3,000,000 yen.

Educate Picture Brides on Ships

The three Japanese passenger lines in the American service—the N. Y. K., T. K. K. and O. S. K.—recently have inaugurated a new system of educating Japanese women passengers for the United States, who are for the greater part picture brides. Each company has employed three women teach- can customs and manners and give brief courses in American geography and history.

Kobe merchants and shipowners held a meeting recently in the Kobe Chamber of Commerce rooms and conferred over the bill of damages to be pre- ers, who are to hold classes on the ships en route to their American ports and teach English, Ameri- sented at the peace conference against Germany in regard to the ships and cargoes lost in the submarine campaign, which list is to be forwarded to Baron Makino in Paris. The discussion resolved itself into the following divisions: Insurance on cargo lost; matters regarding the payment of such insurance; documentary proofs and papers relating to the lost cargoes; application to the proper authorities for securing just compensation.

Kobe Bill Is $250,000

It is estimated that the bill from Kobe alone will total $250,000, which covers only the shipments of the Kobe exporters.

Another freight rate cut in the South American trade by the Nippon Yusen Kaisha and the Osaka Shosen Kaisha is rumored. A rate very much lower than the one which has prevailed for the past three years goes into effect with the sailing of the Sanuki Maru of the N. Y. K. from Kobe this month, this being 150 yen a ton. The rumored cut in this new rate is said to bring it as low as 100 yen.

From the Hawaiian Islands

By Special Correspondent

Honolulu.

ENCOURAGED by the stream of traffic of the past few months, especially since the signing of the armistice and lessening of travel restrictions to and from the Orient, business and civic interests of Honolulu and the other islands are united in plans for the material enlargement of harbor facilities. Two concrete plans for bringing about this end already have been launched and both are now pending before committees in the legislature.

$2,000,000 for Improvements

First, and of most pressing importance to Hawaiian interests and shipping which will use the port in future, is a program of expansion drawn up by Lyman H. Bigelow, chairman, and members of the Harbor Board, which sets aside a sum just short of $2,000,000 for additions and improvements. Of this amount the greater part, totaling $1,132,000, is to be expended in Honolulu harbor; a new concrete wharf at Hilo is requested at a cost of $500,000; the island of Maui is allotted $220,000 for a new wharf and harbor improvements; while Kauai will get $182,000 to build a new wharf, thus materially increasing facilities for ships of the sugar fleet. The money for these comprehensive improvements has been incorporated in the loan fund bill now in committee of the territorial legislature and seems likely to pass.

In Honolulu harbor the following sums have been asked for: Improvements on pier 2, $270,000; pier 15A, $45,000; pier 11, $375,000; Kewalo basin, $132,000; purchase of a dredge, $100,000; dredging slips, $50,000; dredging Honolulu harbor, $50,000; construction of a water front belt railway, $100,000.

Hardly second in importance to the improvement project is the proposal made by George McK. McClellan, Washington representative of the Honolulu Chamber of Commerce, Delegate Kuhio and Secretary of the Interior Lane for the creation of a "port district act" to be based on port laws of New York, San Francisco, London and other maritime cities. It is believed that many problems of equipment and expansion can be solved by this scheme. The original proposals have been redrafted by Governor McCarthy and the territorial executive board, in consultation with the harbor commission, and are pending.

It is considered inadvisable for the port district, or port corporation, if formed, to obtain Federal aid, and as a substitute Governor McCarthy has suggested that permission be obtained from Congress to increase the limit for bonded indebtedness of the territory of Hawaii from 7 to 12 per cent. The governor would charge toll on freight passing over the wharfs, and with this additional revenue pay interest on the bonds, which would have to be floated, and set aside a sinking fund with which to retire the bonds at maturity.

Pacific Warehouse Center

In line with all the foregoing projects for expansion, plans have been taken up and are being worked out by the Pan-Pacific Club of Honolulu to establish Honolulu as a Pacific warehouse center for all of the large firms doing a heavy business in the Orient. Advocates of the scheme point out that by maintaining warehouses in Honolulu the larger supply companies would be able to fill orders from the Orient in a minimum of the time required to get the same articles from the mainland. The scheme is said to work both ways, as many of the large exporting houses in the Orient are evincing interest in the plan with respect to speeding up their exports to the United States.

All records for deep-sea vessels entering the port of Honolulu during any month were broken in March, according to statistics recently compiled by port officials, which show a total of eighty vessels. Harbor facilities were taxed at times to handle the vessels. An enormous bunkering business was done and the drydocks profited largely, as a number of the vessels put into port in distress for one cause or another.

Schooner and Steamer Sunk

The heaviest marine disaster which has occurred near Honolulu for some years took place with the collision and sinking of the Inter-Island steamer Wailele and the schooner Kitsap, owned by the Port Blakeley Mill Company. The vessels struck in Kauai channel the night of March 21. All the crews were saved, but the loss, including 8000 bags of sugar, totalled about $350,000. Admiralty proceedings for $100,000 damages were instituted by the owners of the Kitsap, but an order restraining further action on the case was issued by Federal Judge Vaughan pending decision on a counter-libel asking limitation of liability of the Inter-Island Company to the value of equipment saved and of pending freight. There was no pending freight and the value of the two life-boats, all that was saved from the Wailele, was put at $750. The collision took place on a clear night when both ships were visible to each other for at least three-quarters of an hour before coming together, and the schooner even sent up flares. Some days later the Kitsap was found floating bottom up in the path of steamers using Kauai channel for the northern passage, and the lighthouse tender Kukui was sent to tow the derelict to a point where it could be destroyed by gun fire from the cruiser Monterey.

Inter-Island Seeks Vessel

The loss of the Wailele has caused a shortage in the shipping facilities of the Inter-Island Company, as there is no reserve vessel to take its place. President Kennedy of the Inter-Island departed for San Francisco to look over the field and arrange for the purchase of at least one steamer and possibly another. Sugar schedules are in very good shape this year and the volume of sugar tonnage is slightly ahead of schedule, which makes the loss of the Wailele less keenly felt than it might have been.

The largest harbor fire in the history of the port took place in March, when a case oil cargo, valued at about $200,000, took fire and was destroyed on Sand Island. The cargo had been removed only a few days before the blaze from the crippled schooner Harvard, which at that time was moored to a wharf in the harbor. This was a great piece of good fortune, as had the fire occurred in the Harvard many harbor buildings probably would have been destroyed. Only the isolated location of Sand Island prevented larger damage. As it was, the powder magazine, where thirty tons of explosives were stored, was saved from ignition by a narrow margin.

As a result of the fire, measures are now being discussed by the Harbor Board and the city supervisors for the acquiring of a harbor fire boat, or a barge on which the fire engines of the city could be carried, in the event of future fires. At present Honolulu has no marine fire equipment.

Hilo, on the Island of Hawaii, is to get direct service to San Francisco once more, according to a recent announcement by Matson Navigation officials, stating the steamer Enterprise henceforth will ply between San Francisco and Hilo direct.

Captain MacCaulay to Retire

Captain J. R. MacCaulay will retire in May after more than twenty-five years of active service as pilot. Few men know the "ins and outs" of the channel as Captain MacCaulay. He expects to go to the mainland on a vacation of several weeks immediately upon his retirement.

Travelers to Hawaii during the past few months have been confronted with well-nigh insurmountable obstacles in getting passage from ports on the West Coast on account of the travel restrictions and the acute shortage of tonnage on the Pacific. The "tabu" has been lightened somewhat by recent lifting of the permit regulations whereby only those on urgent business or for reasons of health were allowed to leave the United States proper. But the lack of passenger ships is still as bad as ever. A ray of hope was discovered with the announcement that the Matson liners Lurline, Manoa, Sachem and Enterprise henceforth will run exclusively between Hawaii and San Francisco. The Manoa already went on the local schedule when she reached San Francisco the last of March from Manila, and the Lurline has made her last voyage to Manila. The gain, however, is somewhat offset by the loss early in April of the two Dutch liners, the Wilis and Grotius, which will resume the Batavia-Holland run. No encouragement for some months is offered by the Matson Company for the return of its big steamers now doing duty on the Atlantic as transports.

A humorous aspect of the tourist troubles is seen in Honolulu in their frantic efforts to get back to the mainland after they finally arrive. Through passenger traffic from the Orient and Australia in the past six weeks has been phenomenally heavy, with the near approach of normal trade conditions and the consequent rush of business men.

BADENHAUSEN OFFICES OPENED

The Badenhausen Company, Philadelphia, announces the opening of additional sales offices at Pittsburgh, 311 Jenkins Building, under management of A. D. Neels, Jr., and at Chicago, 1225 Marquette Building, under the management of J. F. O. Stratton. Inquiries from their respective localities will be handled by these men.

OUR MAY COVER

For the cover this month we are indebted to Willard E. Worden, 312 Stockton street, San Francisco, who gave permission for the reproduction of the unusual and beautiful photograph, of which he holds the copyright. The vessel is the bark Amy Turner in the deep water outside the Golden Gate.

By Special Correspondent

TRADE with the Orient and conditions requiring readjustment to insure the stability of trans-Pacific commercial relations, now form the theme of many meetings of shipping men and others interested in all parts of the Northwest, if not on the entire Pacific Coast.

Fight to Hold Trade

That these problems being discussed are many and diversified is quite evident to those who have attended any of these meetings. Although Seattle continues to enjoy a sort of leadership in the Oriental trade, at least as far as the compilations of the customs officials are authoritative, the competition of the other Coast cities is by no means discounted, and every effort is being made to hold this trade and to increase it if possible.

Because of this threatened competition these meetings are the result. Many suggestions have been offered, and these are now being sifted with a view of arriving at a concrete program. The general tendency of decline in Oriental freight tariffs, even though somewhat stabilized by the action of the United States Shipping Board in fixing a certain charge, is what might be termed "the nigger in the woodpile" of the situation.

Japanese Competition a Factor

The general inclination of the Seattle shipping interests seems to be to abide by the Shipping Board rulings. Against this, however, is the always prevalent possibility of the Japanese companies cutting the rates, and the flag of Nippon continues to predominate over most of the overseas cargo ships entering Seattle.

Officials of the Japanese lines, especially the larger operating concerns, continue to enter denials of any contemplated slash in freight rates, yet the situation remains tense just the same. A rate war in the effort to retain the business by the Japanese and an effort to secure it by American ships undoubtedly would prove disastrous to many concerns.

The fact that all the Japanese concerns are heavily involved financially in the construction of new ships and the expanding of service is all that prevents such a rate war from being initiated at an early date, it is believed in Seattle.

Expect Japanese to Fight for Trade

However, one thing seems assured, and that is that the Japanese will not sit idly by and see the business, and one which to a large extent they have built up, taken away from Japanese carriers, and this is the bugaboo of those who fear a rate war soon.

Despite the forebodings at least one American concern is going ahead with its Oriental program, seemingly unconcerned as to the possibilities prognosticated by rumor, and that is the Pacific Steamship Company.

As manager and operator of ships owned by the United States Shipping Board, the Admiral Line continues to add to the fleet in the Oriental service. With five of its own ships in the service, the Pacific Steamship Company acts as manager and operator for ten of the big new steel ships of the government's fleet, and the company continues to plan extensions of service to Asiatic and Australian ports.

Two Fast Liners to be Built

This company, while fostering its Oriental business in a strong and progressive manner, is by no means neglecting its coastwise and Alaskan service. In the service between Puget Sound and California ports the Admiral Line announces that some time this year it proposes to add two liners, capable of making twenty-one knots speed, designed as passenger carriers between the ports of call on this route.

This announcement, recently made public by Vice-President and General Manager A. F. Haines, followed the assertion made some time ago by H. F. Alexander, president of the concern, who predicted that his company at some time would operate speedier and more popular vessels than the Great Northern and Northern Pacific, which were operated between the Columbia River and San Francisco at the time the assertion was made. War conditions deferred Alexander's idea, but it now seems likely of fruition. The management declares that these ships will be built on the Pacific Coast, and will furnish a service of thirty-five hours' sea voyage from Seattle to San Francisco, virtually railroad express time. It is also asserted that something like twelve hours' steaming time will be the limit between San Francisco and San Diego, which means that the proposed new ships will be the fastest vessels on the Pacific Ocean.

Vessels Load for Vladivostock

Returning once more to the Oriental overseas trade—the past month marked a still greater increase in the exporting of supplies and railroad material to the Siberian port of Vladivostok. Two ships, fully laden, carrying all told 16,700 tons of this freight, left Seattle during April for the principal Siberian Pacific port. Two other ships, both new vessels, built for the Shipping Board, have been assigned for May loading, and the addition of two Japanese ships, for which deals are now being negotiated, may mean a total of four cargoes loading for Vladivostock during the month.

The new ships assigned to the Siberian service for the transporting of railroad equipment are the West Helix, a product of the J. F. Duthie plant, and the Cascade, built by the Todd concern at Tacoma. The first-named is a steel cargo vessel of the 8800-ton type, while the latter is a 7500-ton steel carrier. Both these vessels were among the large number of Sound-built vessels, delivery of which was delayed several months due to the shipyard strike of January, which continued until early in March.

Five Drydocks Are Rushed

Seattle now has five drydocks in full operation, and each plant is taxed to the utmost capacity. Many vessels, given but a casual overhaul and inspection during the war period, are demanding more complete renovation and repairs. The largest repair plant is that of the Todd Drydocks Company, which operates three marine docks, two of which have capacity for vessels of 10,000 tons, while the third will lift up to 4000 tons. Frequently the larger docks berth two vessels at a time, and the big plant is booked far ahead in repair work.

A similar condition exists at the new Skinner & Eddy repair plant, which has just completed its new 17,000-ton sectional drydock, the largest lift in the Northwest. This plant has been rushed with orders, and is likewise booked ahead with repair work. The fifth drydock is located at the plant of the Heffernan Engine Works, and is occupied all the time, though much of the work here is the completing of a number of wooden ships of the Shipping Board fleet.

Wooden Vessels Carry Lumber

Another activity which assumed notable proportions in Seattle recently is the utilization of the Shipping Board's fleet of wooden vessels in the lumber-carrying trade, mostly to Atlantic ports. The division of operations of the Shipping Board announced a contract for the transporting of 50,000,000 feet of railroad ties to the Atlantic, most of which was to be sent to Philadelphia, and this contract would require nearly forty vessels. The first to load was the steamship Mosketo, and the second, the Brookhaven, is awaiting the completion of certain alterations in her equipment. All these ships will load at Puget Sound ports, and the larger number of them at Bellingham, where the Mosketo's cargo was loaded.

During the month the steamship Bockenoff, another of the wood fleet, loaded a cargo of lumber at Tacoma for Poughkeepsie, New York, which marked the first loading of a cargo in this section for the Hudson River in many years.

Alaskan Travel Is Light

Travel to Alaska, hitherto one of the most active local shipping enterprises of the summer season, shows an appreciable falling-off this year, especially insofar as Nome is concerned. The Victoria, the largest steamship operated in northern waters in the past, always was booked to capacity for the first Nome voyage, whereas this year the company has decided to withdraw her and substitute the steamship Northwestern. The Pacific Steamship Company has announced the Senator as their sailing for Nome on the opening of the Bering Sea to navigation in June.

The withdrawal of the Victoria came as a surprise to many folks interested in the Far North, but the move was anticipated by others more familiar with Northern conditions. The curtailment of steamship service to Nome was presaged by the exodus of a big percentage of the former inhabitants, who left the Seward Peninsula district in crowds last year, mostly attracted to the States by the high wages and other advantages not enjoyed in the North.

During the month the steamship Admiral Evans at one time known as the Buckman, and a favorite Alaska liner, was returned to service. She sank at Hawk Inlet after striking a pinnacle rock something over a year ago. After operations conducted for nearly three months, the ship was floated successfully and brought to Seattle for repairs. Wartime conditions made it almost impossible to complete this work last year, and it was not until after January 1 that the Pacific Steamship Company was able to get concerted action in the matter of repairing the liner. She sailed for the North on April 17 in command of Captain Charles Smith, one of the Admiral Line's most popular mariners.

The return of the Admiral Evans permitted the withdrawal of the Admiral Schley, which had been diverted temporarily from the California service to handle the early seasonal rush to the Alaskan canneries.

Lumber Cargo to Cuba

The steamship Bromela, another wooden ship, was assigned by the Shipping Board to W. C. Dawson & Company, as operators, and took a cargo of hemlock lumber loaded at Port Angeles (the first such cargo arranged in many years) for Neuvitas, Cuba. She completed loading on April 18 and sailed at once for her destination.

The month also was notable for the charter arranged through a Vancouver concern of the Norwegian schooners Brisk, Trolltind and Snetind, new ships, to load lumber for Europe. The Brisk recently was completed, had a successful series of trials on Puget Sound and commenced loading at Tacoma on April 21. She was built by the National Shipbuilding Company and was launched last August, but the long delay in the delivery of her auxiliary power equipment held up her delivery. A sister ship, the Bright, originally intended as a motor craft, was later completed as a sailing schooner, and sailed from Seattle for Buenos Ayres two months ago.

CHICAGO WANTS FOREIGN TRADE

A MEETING of the Chicago Freight Forwarders' and Customs Brokers' Association was held in the fraternity room of the Great Northern Hotel, Thursday evening, April 3, for the purpose of formulating plans for the betterment of shipping conditions in general and the closer co-operation with shippers in developing the foreign trade of the Middle West. The meeting was largely attended and was one of the most enthusiastic meetings ever held by the organization.

The following officers were elected for the ensuing year: President, J. P. Collins, of G. W. Sheldon & Company; vice-president, Walter J. Riley, of Judson Freight Forwarding Company; secretary and treasurer, S. E. Boughton, of Overseas Shipping Company.

Committees were appointed to discuss matters of immediate importance in connection with export and import traffic via both Atlantic ports and the Pacific Coast, as well as domestic business.

It is believed that the close co-operation of the Chicago freight forwarders and customs brokers, together with similar organizations in other cities, will result in facilitating the development and maintenance of a profitable foreign trade for the manufacturers, the exporters and the importers of the country.

TACOMA

By Special Correspondent

BOTH lumber and flour shipments from Tacoma are expected to be fairly heavy during the next few months. There has been an increasing call from foreign markets for lumber, and with the flour mills the goods have been available for some time. The question has been tonnage for transportation and permission from the Shipping and Food Administrations to ship. The shipyard strike held up the vessels, but these have now been promised and will be moving from now on. It is estimated that twelve vessels at least will secure all or a large part of their flour freight in Tacoma.

First Cargo to Australia

In lumber Tacoma is sending out its first cargo to Australia in several years and has one cargo on the way to Europe. The barkentine Lahaina is taking the Australian lumber and the Cap Palos, one of the new motorships, the European. In the Oriental trade there is a slowing down in business, although the Osaka Shosen Kaisha operating out of Tacoma reports business as good. For the first time in a number of years a Japanese vessel arrived at Tacoma in ballast from Japan to load. This vessel, the Meichu Maru, loaded her entire cargo at Tacoma, being handled by the O. S. K. as agent.

Wood yards are reaching the end of their government contracts, and, so far as reported, no new business is offering, although the operators are hoping that before they are forced to close down some new work will be secured. As the work decreases the men are being laid off. Had it not been for the strike several of the yards would have had their contracts so far along that vessels under way would have been beyond the "barge" stage. As it is, there are three vessels at least that will be cut down to Ferris type barges.

Launchings of the Month

Among the launchings for the month was the Puyallup at the Seaborn yard and sponsored by Mrs. Arthur Hawley of Seattle; the Fort Jackson at the Tacoma yards, sponsored by Mrs. Olive Kain, wife of the superintendent of the yard, and the Elissa at the Wright yard, sponsored by Mrs. Horace V. X. Wright. Each of these yards has one vessel it is cutting down to a barge.

The steamship Western Knight, in charge of Captain W. C. W. Renny, is one of the new vessels fixed to load a part cargo of lumber for Manila. The vessel is an award to the Pacific Steamship Company, but is being loaded by Balfour, Guthrie & Company. She will take about 1,000,000 feet from the Puget Sound Lumber and St. Paul & Tacoma Lumber Company mills.

Members of the Tacoma Port Commission are hard at work on the plans for docks and other work in connection with port development. A public hearing on the plans was held April 14. In this connection United States army engineers also have submitted a port plan of development. So far the development proposed will take in the central part of the harbor in what is known as the Wapato Waterway district. This lies between the Chicago, Milwaukee & St. Paul docks and the Todd Shipyards. There are several hundred acres in this section suitable for docks.

Todd Official Returns

After being in California for several weeks following his recovery from pneumonia, Vice-President and General Manager J. A. Eves of the Todd Drydock & Construction Corporation, has returned to Tacoma. Mrs. Eves died at Palo Alto.

The Blue Funnel Line has opened its offices in Tacoma. It closed when the United States entered the war. The office is in charge of Edward J. Pole, one of the younger shipping men of the Sound and formerly in charge of the Tacoma department. The offices are located in the Tacoma building.

The Matson Line also is resuming service to the Hawaiian Islands. There is much freight out of Tacoma to the Islands and the war did not alter this. Tacoma sent out many cargoes of box shooks in the last few years.

Captain Andrews Expected Home

Captain W. Frank Andrews, who has been on the West Cohas in the Atlantic service for a number of months, is expected in Tacoma within a short time. He is vice-president of the International Stevedore Company and resident manager of the Washington Stevedore Company. At the outbreak of the war he entered the Naval Reserve and was given the West Cohas.

Just how far a county can go in the collection of taxes on foreign vessels under construction, or just completed at American yards in Washington, will be tried out in the near future, it is believed, following the issuance of a restraining order against Grays Harbor County officials. This is the outgrowth of an attempt to collect taxes on the schooner Gaby there. It is alleged that the vessel is owned by the Compagnie de Transports Maritime Belge of Belgium and that a tax amounting to $1794.75 was charged against the ship and she was ordered sold March 29. On application of the owners a restraining order was issued by Federal Judge Jeremiah Neterer, preventing the sale.

The manufacturing end of the business of Doud-MacFarlane Machinery Company of Tacoma remains good and the plant is turning out many ship fittings for builders all up and down the Coast.

Wheat which has been held in the warehouses for several months is now being moved to the mills. There is about 55,000 tons of wheat to be ground, provided none of it is sent out in bulk.

On the Shores of Grays Harbor

By Special Correspondent

THE Grays Harbor district in Washington ranks with the Columbia River as the second greatest lumber port in the Pacific Northwest, Puget Sound alone excelling in lumber exports. In 1918 the Columbia River territory shipped 16,000,000 feet more of lumber than Grays Harbor, but in the preceding year Grays Harbor shipped 20,000,000 feet more than the Columbia. Nowhere in the country, however, is so much lumber manufactured as in the Grays Harbor district, which embraces only Grays Harbor County, an area of about 820,000 acres. Columbia River shipments come from an area of hundreds of miles. On Puget Sound vessels load lumber cargoes over a great area and in many different cities far separated.

1918 Lumber Shipments

Cargo lumber from various Pacific ports in 1918 follows:

British Columbia	88,069,027
Puget Sound	353,620,535
Grays Harbor	216,348,699
Willapa Harbor	68,224,310
Columbia River	232,138,253
Coos Bay	182,764,113

In 1917 the shipments from the three principal ports were:

Puget Sound	251,486,866
Grays Harbor	183,784,089
Columbia River	163,173,398

L. J. Weatherwax, pioneer Grays Harbor realty dealer, has returned to Aberdeen after several years' absence in the East and has engaged in boat construction, building knock-down boats and other small types of craft. Mr. Weatherwax was one of the founders of the Brooks Boatbuilding Company of Michigan, builder of knock-down boats. It started with a capital of a few hundred dollars; within four years had assets valued at $100,000, and in 1918 transacted business amounting to $2,700,000. Mr. Weatherwax believes the outlook on Grays Harbor is more favorable than that of a few years ago in Michigan, not only in boat and shipbuilding, but in all lines of industry. He made a comfortable fortune by selling out his interest in the Brooks concern, but lost it speculating in Indian oil lands in Oklahoma.

Aberdeen on the Atlantic

The steamship Aberdeen, the world-record speed ship, built at the Grays Harbor Motorship yard in Aberdeen, is operating in the Atlantic Coast-South American trade as a member of the fleet of Tracey & Company, according to recent advices received on Grays Harbor. Because of the vessel's remarkable showing on her maiden voyage from Seattle to Honolulu, thence to Boston and New York, via the Panama Canal, it is stated she has been eagerly accepted by the Tracey Company under a charter from the Shipping Board. "Since her arrival in New York, with every ton of her cargo absolutely dry and undamaged, the vessel has been in great demand and the Shipping Board could have chartered her several times over," according to the latest reports.

Most of the material for the sixty-foot Federal government steel weather tower to be erected in Aberdeen now is on hand. Erection of the tower will start as soon as the city has turned a lease of the land over to the government authorities. The original plan was to make the tower a fifty-foot one, upon which would be mounted a twenty-foot flagstaff for the flying of marine weather signals. Later the government decided upon a sixty-foot tower. All the material except that for the last ten feet has been received.

Lumber Trade Reviving

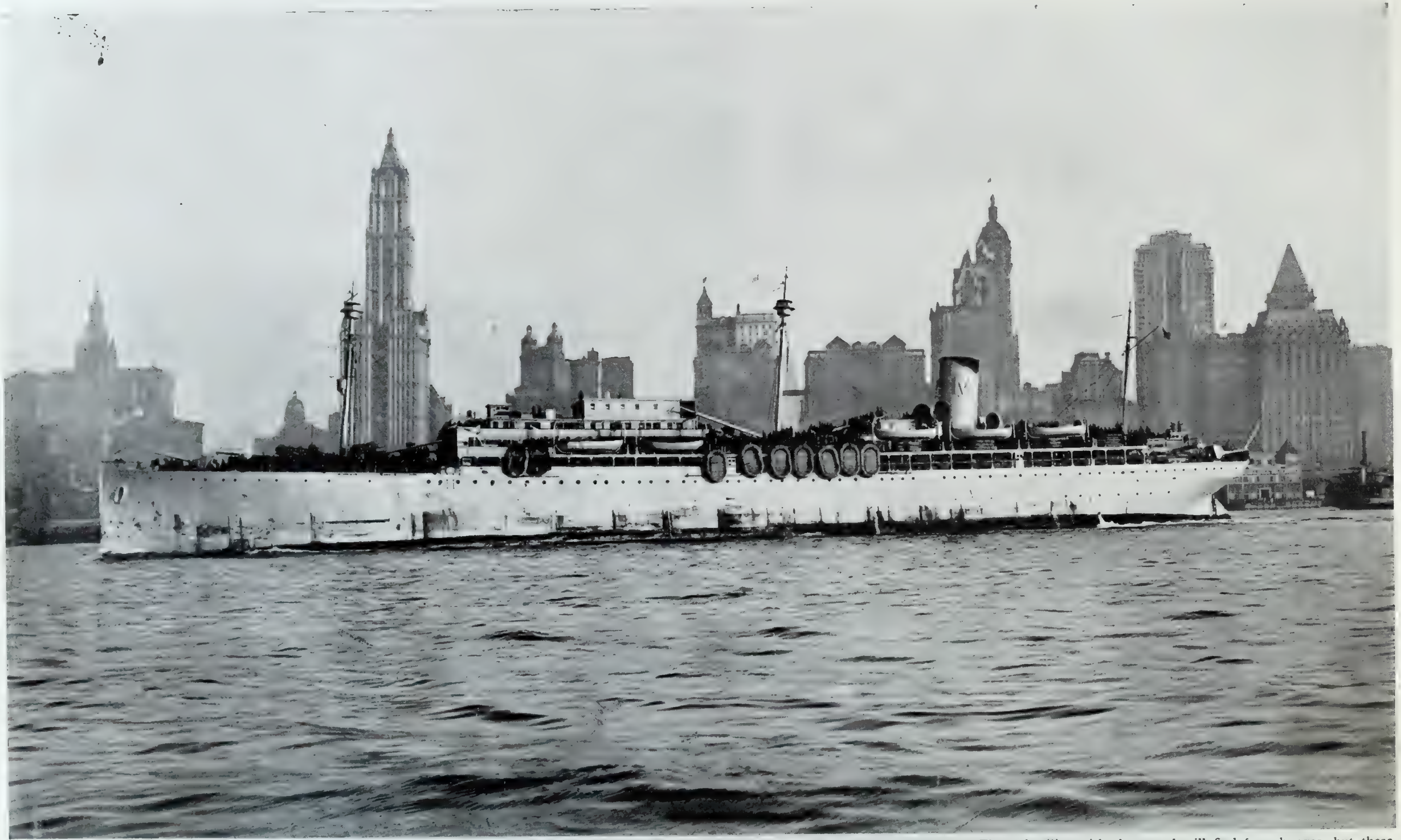
Shippers are looking forward to a revival this summer of the West Coast foreign lumber trade. Prior to the war, shipments of several million feet of lumber were made monthly to the South American countries. Then the shortage of bottoms came along and ended this business. Now with general conditions getting back to normal, a revival of this business naturally is expected. That the demand of South America for lumber will be heavy is predicted. Chile, for instance, has voted 89,000,000 gold pesos ($32,500,000) for modernization of her railroads. This work will demand large quantities of ties and other building materials. The South American countries, like other nations, have been compelled to forego building activities during the period of the war, and a steadily increasing demand for lumber now is expected.

Great Demand in Allied Countries

Lumbermen expect to see tremendous activities in the Allied countries of Europe started this year which will create a heavy demand for lumber. Most of the lumber for Europe no doubt will be furnished by Gulf Coast states, but that will leave the American market more largely to the mills of the Northwest, thereby bringing prosperity to both sections. Italy is among the first of the Allied nations to begin reconstruction. That country has authorized $360,000,000 for public works, and appropriated an additional $100,000,000 for use if necessary. The ministry of public works expects to spend about $200,000,000 for roads, harbors and bridges. A large sum is to be spent at Bari on the Adriatic. Railroad reconstruction in Italy is to cost $60,000,000, it is estimated.

The order for 8,000,000 feet of ties, recently awarded the Eureka Lumber Company's mill at Hoquiam, is only a drop in the bucket compared to the amount of this stock necessary for railroad reconstruction work at this time, according to Victor H. Beckman, prominent Seattle lumberman, recently on a business trip in the Grays Harbor cities. He states, when repairs and general reconstruction are kept up all the time, it is figured 125,000,000 ties are used annually, but this work has been almost at a standstill for a number of years, owing to lack of funds. In other words, practically the entire railway system of the country now is in need of rebuilding. In addition some 6000 miles of railway in France has been destroyed and must be rebuilt.

The Maui Brings 3500 Doughboys from France



The steamship Maui, flagship of the Matson fleet, as she appeared against the New York skyline when she brought 3500 troops from overseas. Those familiar with the vessel will find few changes, but these are significant: Guns, the lookout stations and military tops, and the addition to the deckhouse. The soldiers call this last the "nuthouse," because the insane men and others who cannot remain with their fellows are kept there

SAN FRANCISCO exporters and importers are not at all satisfied with the reductions in export rail rates, as made by the Railroad Administration late in March, and are preparing to carry on their fight before Edward Chambers, traffic director of the Railroad Administration. A committee of the San Francisco Chamber of Commerce will be given a hearing in Washington May 5. John S. Drum of the Savings Union Bank and Trust Company will act as chairman.

Why San Francisco Complains

Marston Dill, chairman of the foreign trade committee of the chamber, outlined the present cause of complaint as follows:

Prior to the disruption of the import and export freight rate schedule, June 24, 1918, the Pacific Coast was in a position to compete with the Eastern seaboard, and had been for years. Thousands of tons of freight from the Far East were routed through San Francisco for overland delivery, sometimes at rates less than all-water shipments could command.

The chamber is not asking for a restoration of these conditions, he said, but it does desire to be able to compete with New York in shipments of commodities originating in the district directly outside the Atlantic Coast proper — especially Pittsburgh, Cincinnati, Birmingham, St. Louis. The reasons why San Francisco cannot compete now are the export rail rates, even though recently revised.

As illustrations, Mr. Dill said that it would cost $23 a ton more to ship automobiles from a common point to the Far East through San Francisco than through New York; chemicals, $8 to $11 more; railroad materials, $3.90; steel, $1 to $1.25; caustic soda, $3.30. He laid especial emphasis on the steel rate, for, he said, San Francisco must have steel and other heavy metals in order to fill vessels; that, without freight of this nature, vessels scarcely could load at San Francisco profitably. The port also is looking forward to the great expected expansion of China's railroad building; hence, the disquiet with which the railroad materials rate is regarded. And these were cited only as examples.

In addition to the export rate situation, the import rates also will come up for discussion. New import rates were not fixed concurrently with the export rates in March; and the chamber desires to fend off, if possible, a similar readjustment of them. There is, besides, an intention to fight it out not only on a ground of what the chamber regards as justice to the Pacific, but also to meet, if necessary, counters by the Eastern seaports, should there be any.

Members of the Committee

The members of the committee are: John S. Drum and E. Avenali, of the First National Bank, representing the banking interests; Robert Dollar and A. T. DeForrest, the latter of the United States Steel Products Company; George Middlemas, of H. M. Newhall & Company, and Carl Eddy, of the New York office of S. L. Jones & Company; J. K. Armsby, president of the California Packing Corporation; Seth Mann, manager of the chamber's traffic bureau and a member of the Western Freight Committee of the Railroad Administration, and J. S. Willis, manager of the traffic bureau of the chamber. President Frederick J. Koster also will go to Washington.

A resume of the situation issued by the chamber was in part as follows:

"Prior to June 24, 1918, there were in effect a number of export and import rates applying from and to the Eastern portion of the United States via Pacific ports on trans-Pacific business. On June 24 last these rates were withdrawn by the Railroad Administration on the ground of the war emergency. Some commodities were subsequently put back on a very much higher basis. During the period from June 24 to the signing of the armistice—November 11—ship tonnage was so scarce that, notwithstanding the high rates in force, practically all of the trans-Pacific commerce was handled through the Pacific Coast ports. Shortly after November 11, however, ocean freight rates began to decline and the foreign trade department of the Chamber of Commerce, realizing this would very shortly divert this commerce to the Atlantic via the Panama Canal, made a recommendation to the board of directors that steps be immediately taken to have the export and import rates restored. * * *

Decided Against Committee

"The chamber had arranged for a committee, consisting of Captain Robert Dollar (chairman) and about eight other leading importers and exporters, to go to Washington, but on the recommendation of the members most vitally interested decided it better to await Mr. Chambers' decision before sending this committee. Not only did Mr. Chambers state a delegation was unnecessary, but the Hon. Julius Kahn, Daulton Mann, of the Pacific Mail Steamship Company, and Seth Mann, who is not only manager of the chamber's traffic bureau, but also a member of the Western Freight Committee of the Railroad Administration having jurisdiction over the rates in question, all stated such a delegation could do no good and might do some harm. The rates have now been published and the San Francisco exporters state they are unsatisfactory and would fail in their object of retaining and developing export business through Pacific Coast ports."

SELLING AGENTS FOR PACIFIC

The Sizer Forge Company of Buffalo recently has appointed Messrs. Ford & Geirrine, 720 Merchants' Exchange Building, San Francisco, as selling agents for California, Oregon and Washington, thereby hoping to get into closer contact with forging buyers on the Pacific Coast.

MACHINISTS RETURN TO WORK

THE "strike" of machinists and riggers in the San Francisco Bay shipyards, which had lasted since March 3, ended April 3, when the men voted to return to work. The trouble grew out of the men taking the Saturday half-holiday, March 1, in defiance of the employers, who announced that men who did not work that Saturday afternoon would be discharged the following Monday. The whole number involved was estimated at about 10,000. A half-holiday on Saturdays, which was one of the subjects of dispute, was granted by the yards, although it was put into effect gradually, the forty-four-hour week not coming until the week beginning April 20. Each Saturday prior to that time was an hour shorter than the preceding.

Another point of dispute was back pay, which the men will receive.

Attitude of Employers

The attitude of the employers was stated as follows in a newspaper advertisement, signed by the Bethlehem Shipbuilding Corporation, Ltd.; Hanlon Drydock & Shipbuilding Company; Pacific Coast Shipbuilding Company; Schaw-Batcher Company Shipworks; Moore Shipbuilding Company; Union Construction Company — members of California Metal Trades Association:

"To the Shipbuilders and Metal Workers of San Francisco Bay District:

"The deadlock between the machinists, riggers and other crafts in the shipyards has been broken by a compromise agreement.

"Under this agreement we will operate the yards seven hours today, six hours next Saturday (April 12), five hours the Saturday after, and four hours on Saturday, April 26, and each Saturday thereafter until October 1.

"We made this compromise in the general interests of the industry, the community and those men who have remained loyally at work.

Broke an Agreement

"Your leaders are wrong when they tell you that in this compromise there is victory for you and the stand you took.

"They are wrong because you broke an agreement. He that wins by breaking his word, loses. Also you lost a month's wages.

"We are telling you this to impress on you again the necessity for keeping agreements.

"The government will not long continue what practically has amounted to a subsidy to the men employed in the shipbuilding industry. Work and wages will depend again on contracts and profits.

Must Compete With World

"The time is fast approaching when we, employer and employe, will be thrown into competition with the world in building ships, and it is important for your good rather than ours that we can depend on your keeping an agreement honorably made.

"We suggest that you men as individuals insist upon knowing at all times what agreements have been made in your name. And consider well before you, as members of an organization, vote or permit your leaders to break your agreements.

"We propose to keep all our agreements to the letter. Can we depend on you keeping yours?"

Ed Nolan, president of Machinists' Union No. 68, regarded the agreement as a victory for the men. He said:

"The agreement is a justification of the position of our union. We have held that any time a reasonable proposal was presented us that we would agree to it. The employers have established a definite date for the forty-four-hour week. We are going back to work."

CUNARD'S NEW OFFICE MANAGER

THE Cunard Steamship Company, Ltd., gave a dinner at the Palace Hotel Friday night, April 4, to A. B. Swezey, who has been appointed manager of the local office. Mr. Swezey came to San Francisco from the Baltimore office of the company, which he opened some six months ago. Previous to this, he was in charge of the Vancouver office, which he opened a year ago last February. Among those present at the dinner were the following: W. H. Sellander, Matson Line; R. V. Crowder, Toyo Kisen Kaisha; H. N. Thomas, China Mail; O. E. Scherer, Union Steamship Company; R. Back, Union Steamship Company; Clay Hutchison, Pacific Mail; L. F. Cockroft, Oceanic; F. L. Nason, Canadian Pacific Ocean Services; A. C. Doolittle, Cunard Line; H. G. DeGolia, Cunard Line.

A. B. Swezey
Manager Cunard, San Francisco office

AGENT FOR STEWART COMPANY

The Stewart Davit & Equipment Corporation announces that Captain John F. Blain has resumed his pre-war connection as Pacific Coast agent, Colman Building, Seattle, Washington.

PACIFIC MAIL SEVENTY-ONE YEARS OLD

THE Pacific Mail Steamship Company, long the premier American trans-Pacific company, celebrated the seventy-first anniversary of its founding April 13. First a carrier between San Francisco and the Isthmus of Panama, the Pacific Mail early entered the trans-Pacific trade and has continued in it, except for a break in 1915, after the vessels of the old company were sold, and prior to the purchase of the stock and the reopening of the service by W. R. Grace & Company and the American International Corporation.

The Toyo Kisen Kaisha has announced its intention of opening a service between Singapore and San Francisco with two new cargo steamers, the Choyo Maru and the Koyo Maru, recently completed by the Asano yard. Each is 9800 deadweight tons. The Pacific Mail during the month received the Diablo, first vessel launched by the Pacific Coast Shipbuilding Company, at Bay Point, and will use her between San Francisco and Manila, Singapore, Calcutta and Colombo.

After an interval of about two years, the Matson Navigation Company again is operating vessels between San Francisco, Puget Sound and Honolulu, three steel steamers having been assigned by the Shipping Board. The Glendoyle loaded at Sound ports early in the month. This service will be highly gratifying to Hawaii, which had depended upon it for Puget Sound direct trade after the American - Hawaiian suspension three years ago. Box shooks for pineapple packing are an especially important commodity furnished by the Sound. The Matson steamer Hyades has been returned to the company, having returned from her last voyage to the Far East, and will be used again in the Island trade. Wooden ships will not be so necessary now, and some are being returned to the Shipping Board by the Matson Line.

The "forbidden anchorage" regulations of the Board of State Harbor Commissioners became effective April 21. The limits were advertised extensively in the daily newspapers.

BROOKDALE IS SCHOOL SHIP

The steamship Brookdale, a 4000-ton Ward type vessel, launched August 8 at the Grays Harbor Motor Shipyard at Aberdeen, has been selected for service as a permanent merchant marine school ship in Seattle. The Brookdale was taken to Seattle in December and was being made ready for service when the shipyard strike occurred. She will have accommodations for 500 apprentices, in addition to the officers of the ship and corps of instructors. There will be a large cabin, where classes in navigation and steamship may be held.

OPEN TULSA OFFICES

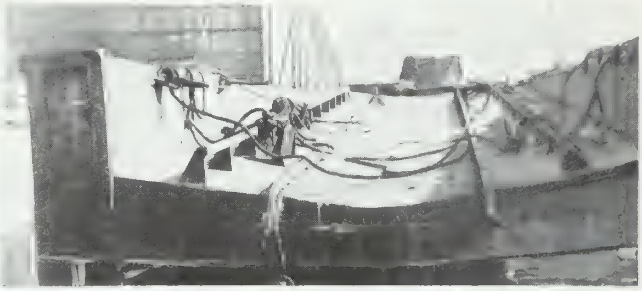
Better to supply the growing demand for its products in the Oklahoma and Kansas fields, the Chicago Pneumatic Tool Company has opened offices and warehouses at Tulsa, Oklahoma (313 Richards building), and at El Dorado, Kansas. Stocks of repair parts and the company's products will be maintained at both of these points to facilitate prompt deliveries to their customers in this territory.

SEAPLANE SKIDS

THE odd-looking craft shown in the accompanying pictures are navy seaplane skids. They are used to pull a seaplane from the water after it has descended, preventing damage being done to the seaplane by a heavy sea or bad weather. Many seaplanes were damaged badly while being towed to shore before the skid was invented.

The skid closely resembles the chopped-off bow of a sailing vessel. Its deck slopes toward the stern at a gentle angle, the lower end terminating under water.

By means of ballasting tanks, it is possible to lower the deck to any depth required. The deck of the skid is laid with pairs of parallel rails. The plane is drawn up on one pair of rails, and so upon the deck, while the other pair of rails serves as a guide and to keep the plane steady. The skid has no motive power of its own, having to be towed to destination. The pictures are of skids U. S. N. 57 and U. S. N. 58. They are to be cut in half and a section will be added to lengthen them fourteen feet.



Seaplane skids, United States Navy

Union Plant's 1918 Record in Detail

Hull	Name of Vessel	Keel Laid.	Slip No.	Launched.	Delivered.
135	**S. S. A. C. Bedford**	April 21, 1917		Oct. 27, 1917	Feb. 14, 1918
143	**S. S. J. E. O'Neil**	Apr. 11, 1917	2-Ala.	Aug. 30, 1917	Jan. 10, 1918
144	**S. S. Herbert L. Pratt**	May 29, 1917	1-Ala.	Nov. 8, 1917	Mar. 1, 1918
145	**S. S. S. M. Spalding**	July 21, 1917	3-P	Dec. 17, 1917	May 11, 1918
146	**S. S. Paul H. Harwood**	Aug. 9, 1917	4-P	Feb. 10, 1918	May 1, 1918
147	**S. S. W. S. Rheem**	Nov. 19, 1917	1-Ala.	Apr. 30, 1918	Aug. 17, 1918
148	**S. S. W. M. Irish**	Aug. 20, 1917	3-Ala.	Dec. 30, 1917	Apr. 30, 1918
149	**S. S. W. M. Burton**	Sept. 13, 1917	2-Ala.	Feb. 20, 1918	June 25, 1918
150	**S. S. Volunteer, 191-1220**	Jan. 7, 1918	3-Ala.	May 18, 1918	Aug. 23, 1918
151	**S. S. Liberator, 191-1221**	Dec. 1, 1917	4-Ala.	Mar. 24, 1918	July 2, 1918
152	**S. S. Wooden Drydock**	Dec.	H. P.		
153	**S. S. Challenger, 191-1222**	Feb. 21, 1918	2-Ala.	July 4, 1918	Sept. 30, 1918
154	**S. S. Redondo**	July 7, 1917	5-Ala.	Nov. 10, 1917	Feb. 6, 1918
155	**Caisson**	Mar. 14, 1918	H. P.	Aug. 31, 1918	Aug. 31, 1918
156	**Destroyer McKee, No. 87**	Oct. 29, 1917	5-P	Mar. 23, 1918	Sept. 7, 1918
157	**Destroyer Robinson, No. 88**	Oct. 31, 1917	5-P.	Mar. 28, 1918	Oct. 19, 1918
158	**Destroyer Ringgold, No. 89**	Dec. 20, 1917	3-P	Apr. 14, 1918	Nov. 14, 1918
159	**Destroyer McKean, No. 90**	Feb. 12, 1918	4-P	July 4, 1918	
160	**Destroyer Harding, No. 91**	Feb. 12, 1918	4-P	July 4, 1918	
161	**Destroyer Gridley, No. 92**	Apr. 1, 1918	5-P	July 4, 1918	
162	**S. S. Independence**	Mar. 26, 1918	4-Ala.	July 4, 1918	Oct. 31, 1918
163	**S. S. Victorious**	Apr. 30, 1918	1-Ala.	July 4, 1918	Oct. 19, 1918
164	**S. S. Defiance**	May 18, 1918	3-Ala.	July 4, 1918	Aug. 31, 1918
165	**S. S. Invincible**	July 4, 1918	2-Ala.	Aug. 4, 1918	Oct. 16, 1918
166	**S. S. Courageous**	July 4, 1918	4-Ala.	Sept. 22, 1918	Nov. 27, 1918
167	**S. S. Triumph**	July 4, 1918	1-Ala.	Sept. 29, 1918	
168	**S. S. Eclipse**	July 4, 1918	3-Ala.	Oct. 20, 1918	
169	**S. S. Archer**	July 4, 1918	6-Ala.	Nov. 4, 1918	
170	**S. S. Steadfast, 191-1223**	July 4, 1918	5-Ala.	Dec. 24, 1918	
171	**Tug Dreadnaught**	Apr. 14, 1917	5-Ala.	July 18, 1917	Jan. 10, 1918
172	**Tug Undaunted**	Apr. 14, 1917	5-Ala.	Aug. 1, 1917	Jan. 30, 1918
173	**Submarine R-15**	Apr. 28, 1917	1-P	Dec. 15, 1917	Aug. 5, 1918
174	**Submarine R-16**	Apr. 26, 1917	1-P	Dec. 15, 1917	Aug. 5, 1918
175	**Submarine R-17**	May 5, 1917	1-P	Dec. 24, 1917	Aug. 17, 1918
176	**Submarine R-18**	June 15, 1917	1-P	Jan. 8, 1918	Sept. 11, 1918
177	**Submarine R-19**	June 22, 1917	1-P	Jan. 28, 1918	Oct. 7, 1918
178	**Submarine R-20**	June 4, 1917	1-P	Jan. 21, 1918	Oct. 26, 1918
181	**Destroyer Schley, 103**	Oct. 29, 1917	5-P	Mar. 28, 1918	Sept. 20, 1918
182	**Destroyer Champlin, 104**	Oct. 31, 1917	5-P	Apr. 7, 1918	Nov. 11, 1918
183	**Destroyer Mugford, 105**	Dec. 20, 1917	3-P	Apr. 14, 1918	Nov. 26, 1918
184	**Destroyer Chew, 106**	Jan. 2, 1918	2-P	May 26, 1918	Dec. 12, 1918
185	**Destroyer Hazelwood, 107**	Dec. 24, 1917	3-R	June 22, 1918	
186	**Destroyer Williams, 108**	Mar. 25, 1918	4-R	July 4, 1918	
187	**Destroyer Crane, 109**	Jan. 7, 1918	5-R	July 4, 1918	
188	**Destroyer Hart, 110**	Jan. 8, 1918	6-R	July 4, 1918	
189	**Destroyer Ingraham, 111**	Jan. 12, 1918	7-R	July 4, 1918	
190	**Destroyer Ludlow, 112**	Jan. 7, 1918	2-P	June 9, 1918	Dec. 23, 1918
191	**Destroyer Burns, 171**	Apr. 15, 1918	5-P	July 4, 1918	
192	**Destroyer Anthony, 172**	Apr. 18, 1918	3-P	Aug. 10, 1918	
193	**Destroyer Sproston, 173**	Apr. 20, 1918	3-P	Aug. 10, 1918	
194	**Destroyer Rizal, 174**	June 26, 1918	3-R	Sept. 21, 1918	
195	**Destroyer Mackenzie, 175**	July 4, 1918	4-R	Sept. 29, 1918	
196	**Destroyer Renshaw, 176**	May 8, 1918	1-R	Sept. 21, 1918	
197	**Destroyer Obannon, 177**	Nov. 12, 1918	5-P		
198	**Destroyer Hogan, 178**	Nov. 25, 1918	5-P		
199	**Destroyer Howard, 179**	Dec. 9, 1918	4-P		
200	**Destroyer Standbury, 180**	Dec. 9, 1918	4-P		
201	**Submarine S-30**	Apr. 1, 1918	1-P	Nov. 21, 1918	
202	**Submarine S-31**	Apr. 3, 1918	1-P	Dec. 28, 1918	
203	**Submarine S-32**	Apr. 12, 1918	1-P	Jan. 11, 1919	
204	**Submarine S-33**	June 14, 1918	1-P	Dec. 5, 1918	
205	**Submarine S-34**	May 28, 1918	2-P		
206	**Submarine S-35**	May 29, 1918	2-P		
207	**Submarine S-36**	Dec. 10, 1918	1-P		
208	**Submarine S-37**	Dec. 12, 1918	1-P		
	Freighters—				
215	**S. S. Heffron, 230SC-1574**	Aug. 6, 1918	2-Ala.	Dec. 31, 1918	
216	**S. S. Hegira, 230SC-1575**	Sept. 24, 1918	4-Ala.		
	Destroyers—				
217	**Destroyer Chauncey, 296**	June 17, 1918	2-P	Sept. 29, 1918	
218	**Destroyer Fuller, 297**	July 4, 1918	4-P	Dec. 5, 1918	
219	**Destroyer Percival, 298**	July 4, 1918	4-P	Dec. 5, 1918	
220	**Destroyer John Francis Burns, 299**	July 4, 1918	5-P	Nov. 10, 1918	
221	**Destroyer Farragut, 300**	July 4, 1918	5-P	Nov. 21, 1918	
222	**Destroyer Somers, 301**	July 4, 1918	5-R	Dec. 28, 1918	
223	**Destroyer Stoddard, 302**	July 4, 1918	6-R	Jan. 8, 1919	
224	**Destroyer Reno, 303**	July 4, 1918	7-R		
225	**Destroyer Farquhar, 304**	Aug. 13, 1918	3-P		
226	**Destroyer Thompson, 305**	Aug. 14, 1918	3-P		
227	**Destroyer 306**	Sept. 25, 1918	1-R		
228	**Destroyer 307**	Sept. 25, 1918	3-R		
229	**Destroyer 308**	Oct. 2, 1918	4-R		
230	**Destroyer 309**	Oct. 3, 1918	2-P		
231	**Destroyer 310**	Dec. 31, 1918	5-R		
	Tankers—				
5257	**S. S. Derbyline, 177-1127**	Oct. 1, 1918	1-Ala.		
5258	**S. S. Deroche, 177-1128**	Oct. 22, 1918	3-Ala.		
5259	**S. S. Devolento, 177-1129**	Nov. 7, 1918	6-Ala.		
5260	**S. S. Dillwyn, 177-1130**	Dec. 26, 1918	5-Ala.		
5261	**S. S. Dilworth, 177-1131**	Dec. 31, 1918	2-Ala.		

This 1918 record of the Union Iron Works, San Francisco, reproduced from the Bethlehem Star, shows what one Pacific Coast yard did in 1918. For the Alameda plant, the Star claims the tonnage record per slip per man of all yards in the country during 1918. The Union plant received little attention in the public press during 1918 because it was so largely engaged on government warship construction, for which publicity naturally was not desired.

LOS ANGELES

By Special Correspondent

THE Harbor Commission of Los Angeles has decided to go before the voters and ask for the authorization of $4,500,000 in bonds, the proceeds of which are to be spent in harbor improvements. The question will be placed on the primary ballot to be voted upon May 6.

Would Complete Boulevard

In asking for the issuance of the bonds the Harbor Commission cited many improvements which are needed, one being the completion of the harbor boulevard from Wilmington to the municipal and private docks in the outer harbor. This includes the crossing of the entrance to the west basin by a drawbridge or tunneling beneath the channel. Other improvements to which the commission has pledged itself are the installation of a team ferry and dredging operations in the west basin and in portions of the harbor.

The voting of the bonds is being advocated by civic associations of Los Angeles, in conformity to the pledge made by the city of Los Angeles upon the acquisition of the harbor through the annexation of San Pedro and Wilmington nearly ten years ago. Then Los Angeles agreed to spend $10,000,000 in ten years in harbor improvements. The municipality has spent approximately $6,500,000. The completion of the boulevard to the outer harbor will cost $1,500,000 and the installation of the municipal ferry system $225,000, it is estimated.

The delegation of representatives from Washington who visited Los Angeles in the last month were witnesses of the launching of the steamer West Cavanal at the yards of the Southwestern Shipbuilding Company. On the same day the United States battleship Oregon berthed in the inner harbor at Wilmington, demonstrating the depth of water in the most remote portion of the port.

Submarine Base for Harbor?

Members of the congressional party would not commit themselves directly on proposed improvements along naval lines. They indicated that a submarine base would be recommended for Los Angeles, with possibly a naval aeroplane station.

Fishermen testing nets offshore in the last few weeks provided several tons of fresh fish for the citizens of the harbor district, owing to the strike of the commercial fishermen against the rulings of the state fish exchange. On two occasions the fishermen brought in heavy catches of barracuda and rather than sell them under state market directions gave the fish away to all who would come and get them.

The strike which began last month against the rulings of the state market director has spread throughout the state, until Frank Van Camp announced that forty-nine canneries in the state were idle as the result of the strike of the fishermen. "I do not see what the cannery fishermen mean," said Van Camp. "Some forty fresh market fishermen here went on a strike against the rulings of the state fish director and then the cannery fishermen went out in sympathy. The cannery men are in the large majority and yet they are influenced by the few."

Railroad Rates Discussed

The floating cannery John G. North, operated by the Van Camp Sea Food Company, sailed for Cape San Lucas last month, together with a fleet of eleven fishing launches and one floating refrigerating barge.

The cannery has a capacity of 1000 cases daily and the barge a capacity of 150 tons of fish. The latter will be used to cool the tuna when the day's catch is larger than the capacity of the cannery. The innovation of sending the floating cannery south to meet the oncoming schools of tuna has proved successful and each year the pack is increased.

Railroad rates and alleged discrimination between the inner and outer harbor in charges were discussed at a lively meeting of San Pedro business men held recently. The question of rates between the inner and outer harbor long has been a point of contention between shipping interests of San Pedro and Los Angeles and Wilmington. The former contend that it costs approximately $1500 more to discharge a steamer in the outer harbor than in the inner. Requests for a readjustment of rates so that the switching rate from any part of the harbor will be the same have been made by the harbor commercial organization.

Pacific Company Does Stevedoring

For the first time since the steamers of the company have been operating to Los Angeles, the Pacific Steamship Company has begun its own stevedoring. The stevedoring formerly was done by the Banning Company. The steamship company is operating union men in the work.

The dismantling of the fifth shipyard organized in the harbor district for war work took place in the last month, when the buildings of the West Coast Shipbuilding Company were sold. The West Coast Shipbuilding Company was organized to construct submarine chasers and tugs for the navy and the Emergency Fleet Corporation. Much equipment was purchased and placed in position after contracts had been closed with the United States government. The plant was getting into operation when the armistice was signed and the contracts were canceled.

Harbor Day will be celebrated May 3. Delegations of Los Angeles men will visit the harbor and be the guests of the community. The Southwestern Shipbuilding Company has arranged to open its yards to the visitors and Fort McArthur will be opened.

European Marine Notes

By Special Correspondent

London.

VERY great interest has been aroused in this country by the announcement that Sir Alfred Yarrow, head of the famous firm of shipbuilders, is proposing to transfer himself and his building to Vancouver, British Columbia, because, he declares, the Pacific Coast has a great future before it which he believes the Clyde, in Scotland, has not. Sir Alfred is a very vigorous man, although in his seventy-eighth year. He has been in shipbuilding for sixty years, originally on the Thames, but for the last twelve years on the Clyde. During the war his firm built a great number of destroyers at Scotstown, on the Clyde, and also all the shallow-draught gunboats used on the Tigris, in the Mesopotamian campaign, either were his design or construction.

Compliment to Union Plant

Sir Alfred Yarrow has been expressing some very decided views, which your correspondent is passing on, not because they are considered correct, but because, coming from a man like Sir Alfred, they are worth consideration. He agrees that in Canada he will have to pay much higher wages than in Scotland, but declares that he will get twice as much work done. He says: "Our machinery will be running all the time, and there will be the benefit. I am all in favor of men having better wages; it is their right to improve their earnings as much as possible. The thing, however, which threatens to cripple British industry is the limitation of output, the set policy of men refusing to put forth all their energies, under the mistaken idea that if they go slowly they are helping to provide work for their fellows. There is very little of that on the other side of the Atlantic. Men over there have zest, and get through more work than the British worker."

It was suggested to Sir Alfred that with the demand for ships there ought to be enough work to keep yards busy for years. "Not at all," he insisted. "America is going to be the foremost shipbuilding country in the world; of that I am certain. She is suffering disadvantages at the start, but she is accommodating herself. The Union Company's yard at San Francisco is among the very best anywhere. With three shifts it is working right round the clock—a thing which is unknown on this side. You see, the machinery is running all the time; it is not permitted to be idle, as is often the case with us. We know exactly the shipbuilding capacity of the world. With the new yards established in the United States and Japan it will take just two and one-half years to recover the damage caused by the war and enough more to provide for all the sea-carrying of the world. And, remember, Japan is very active in shipbuilding. The people are clever and most industrious. I know her agents are now touring the South American republics, appointing agents to seek orders later on. Well, with tremendous output in America and cheap labor in Japan, the British shipbuilder, with high wages and lowered output, is going to have a bad time. We are proposing to let our building on the Clyde decrease while extending our building on the Pacific Coast, not because we want to, but because we have to advance with the times and conform to the new conditions of industry."

Not More Clever Than Others

Later a word was put in for the superiority of British workmanship as an asset to be reckoned. Sir Alfred was not so sure on that matter. "I do not believe we are really more clever than other nations. But we've had enormous advantages during the last century. Our modern industrial life began after the Napoleonic wars. Europe was torn, and so we had an easier field than continental countries. Just when the United States was getting strong she plunged into the Civil War, from which, industrially, she did not recover for a long time; and we went ahead. Then there came the Franco-Prussian war, which put a check on industry in those countries, and we again benefited. When Germany got her chance she made far more progress in manufacturing than we did. But now Germany, France and ourselves have been crippled by this war, and it will take long before we can get back to our old manufacturing life, if ever. And America, which has been very little affected by the war — financially benefited, in fact — and Japan, which has not been injured at all, will get the benefits we got by pressing on with our manufactures when other nations were fighting or remaining wounded for many years as a result of the fighting.

"Another thing which has to be considered," continued Sir Alfred, "is the drainage of good men from this country by emigration. Lots of people say that emigration is good; it gets rid of the surplus population. Nonsense! It gets rid of the best of our youth and leaves the second-best and third-best behind. And those who stay back, not as quick as those who have gone to other lands to become our competitors, know their conditions are not so good as in those other lands, and they foolishly think this can be put right by a restriction of output."

Britain's National Shipyards

The question of national shipyards in this country continues to arouse much attention and the position appears to be that though the government has shipyards it does not turn out the ships. One extraordinary instance of so-called waste is in connection with the national shipyard at Chepstow, at the mouth of the Wye, in the west of England. About $20,000,000 has been spent on this place, apart from working expenses of various sorts, since it was opened. Twelve berths were completed and six keels laid down, but no vessels have been launched. So far as can be seen, the history of Chepstow seems to be that of brilliant prospects badly blighted. The story began, apparently, with the formation of the Standard Shipbuilding Company in June, 1916, at a time when modern shipbuilding in this country was at a very low ebb. It is to the perpetual credit of those who supported the Standard Shipbuilding Company that they recognized the coming acute scarcity of shipping at a time when the government was doing practically nothing to expedite mercantile construction.

The board of the new company was one of the strongest which has ever been established in the shipping world. It included Andrew Weir, head of Andrew Weir & Company, who later became minister of munitions and supply, and who was elevated to the peerage this year as Lord Inverforth; F. W. Lewis (now Sir Frederick W. Lewis, Bart.), deputy-chairman of Furness, Withy & Company, and now one of the shipping controller's committee; John Esplen (now Sir John Esplen, K. B. E.), now technical adviser to the shipping controller; and Allan Hughes, chairman of the Federal Steam Navigation Company, who was one of the first, if not the first, of British shipowners to recognize the shipbuilding possibilities of the United States. Its chairman was James Caird, head of Turnbull, Martin & Company, shipowners, and the vice-chairman was John H. Silley, managing director of R. & H. Green & Silley-Weir, Ltd., one of the oldest and most famous shipbuilding and ship repairing companies in the country, whose earliest shipbuilding experience, appropriately, was gained in the neighborhood of Chepstow. Its shareholders included the P. & O. and British India Companies, of which Lord Inchcape is chairman. If ever a company started under favorable auspices, as regards finance, business management and expert knowledge, that company was the Standard Shipbuilding Company. It was not without its critics, as the London Times points out, for there were builders in the North of England and in Scotland who may not have been too pleased to see a new shipbuilding industry established in the West of England, but all the more credit was due to the promoters of the scheme for their enterprise and far-sightedness.

Government Takes Yard

The requisite land with foreshore rights on both sides of the river Wye was purchased, and the work of construction proceeded with expedition. Two building slips were to have been ready by October-November, 1917, on which two vessels, with a carrying capacity of 10,000 tons each, were to have been laid down, and, it was confidently expected, would have been well on their way to the water a year ago. Two slips were to have been ready in March, last year; two more by July, last, and two more by October, last. In August, 1917, the government apparently recognized the advantages of Chepstow as a building center and coolly evicted the owners. It was known that protests were made by the company, and that, in spite of summary treatment, it offered to place its organization at the services of the government, and to assist the government in working the shipyard as a national undertaking during the war by all means within its power.

On January 25 an announcement was made by the shipping controller to the effect that, in view of the armistice, the national shipyards, "the construction of which was undertaken as a war emergency measure," were being finished off on a reduced scale, all measures being taken to protect the value of the property, in order to secure a fair value for it eventually as a going concern. It was added that any persons prepared to submit proposals for the acquisition and operation of the yards should communicate with the secretary, ministry of shipping, stating how far they were prepared to enlist the co-operation of labor by the adoption of the co-partnership principle or otherwise. It became known that shipowners foresaw difficulty in committing themselves, in advance, to any precise method of dealing with the men to be employed at the yards, since the financial results, especially in the early years of a new venture, must be problematical.

Badly Treated by Government

Unfortunately, the business men—or, at any rate, some of them—who at one time were full of enthusiasm for the scheme, seem now to have lost heart. It is an open secret that they consider that they have been badly treated by the government. The responsibility for the national shipyards was taken over from the Admiralty by the shipping controller early in November, last, and it is understood that from the moment the armistice was signed, a fortnight later, everything possible was done to reduce any further expenditure to an absolute minimum.

William Hamilton & Company of Port-Glasgow, Scotland, launched on February 18 the steamer Clan Matheson, which they have built for the Eastern trade of Cayzer, Irvine & Company, Ltd., Glasgow (the Clan Line). The Clan Matheson is of the shelter deck type, and of the following dimensions: Length, 410 feet; breadth, 51 feet 6 inches; depth, 36 feet 6 inches; carrying capacity, 8240 tons. Arrangements have been made for carrying oil fuel in the double bottom and for water ballast in the fore and aft peaks. Triple-expansion engines will be supplied.

Grafting Ships

I have just heard of a rather amusing salvage feat by the British Navy. In the first German raid on the Channel the destroyer Nubian was disabled, and run ashore. One-half of her hull was afterwards refloated and towed into dock. At a later date the destroyer Zulu was cut in two by a collision while on escort duty, and half of her hull was also salved. It happened that this salved portion was the opposite to that recovered from the Nubian, and as both vessels were of the same class, launched in 1909, the two ends were built into each other and renamed the Zubian. This destroyer is now on active service.

Manchester Ship Canal Tolls

The annual report for the year 1918 of the Manchester Ship Canal Company shows that while there has been a decrease during the year in seaborne and barge traffic, the tolls, ship dues, and miscellaneous receipts show a marked increase. The total receipts were $4,822,326 and show a gain of $627,423, as compared with the previous year (1917), while there was a decrease in the weight of sea-borne traffic on which ship-canal tolls are paid of 614,031 tons, which was mainly due to the restrictions placed upon imports and exports owing to war conditions.

CHICAGO PNEUMATIC APPOINTS

F. V. Sargent has been appointed by the Chicago Pneumatic Tool Company, district manager of sales in the Boston territory, succeeding F. S. Eggleston, with headquarters at 182 High street, Boston, Massachusetts.

ASTORIA

By Special Correspondent

FOR two days, during the latter part of March, Astoria and the Lower Columbia district paused to entertain the visiting members of the Congressional Naval Affairs Committee, accompanied by the various committees of reception and instruction from Portland.

Submarine Site Recommended

The weather could not have been more perfect, and the visitors were shown the best that could be shown, both by land and by sea. The entertainment began with an automobile tour, that included forts and sea resorts, and portions of the possible twenty-eight miles of water frontage of the Port of Astoria. The second day was led off with an excursion on the government lighthouse tender Manzanita, with Tongue Point, along the water front of the upper harbor, as the first objective—this is the site that has been recommended by several official government commissions for a submarine and aviation base, anticipating the time when one-half of the naval fleet shall be stationed permanently on the Pacific Coast.

Returning, the several wharves of Astoria harbor were inspected, representing a total of 7850 lineal feet, with a depth of water averaging from thirty to sixty-five feet at low tide, all of this wharfage served by railroad lines, with adjacent commodious covered storage. The site was passed where the Standard Oil Company this year is expending an estimated $250,000 in the installation of a large distributive plant and fuel oil dock, which will be its second largest in the state.

Inspect Municipal Elevator

Then a long stop at the Port of Astoria terminals, at present covering fifty-six acres of improved frontage. There was a detailed inspection of the million-bushel municipal grain elevator, adjoined by the bulk grain storage warehouse, more than one-fourth mile long and covering more than four acres of ground space, and now crowded to capacity with government grain. Adjoining the grain elevator, the site of the large flour mill, now under active construction, also was inspected by the visitors. This flour mill, to be one of the largest on the Pacific Coast, is being fostered by the Port Commission, for it is expected to prove a most important outlet for its big elevator, capable of emptying it from five to six times during the year, if the mill is run to its full capacity of 3000 barrels of flour a day.

The visitors next inspected Pier No. 2 of the Port of Astoria docks, where is maintained a coal storage capacity of 20,000 tons, with modern equipment for the loading of coal to ship bunkers at the rate of 175 tons an hour. This pier is also served by three locomotive cranes, with lifting capacity up to fifty tons. The greater part of Pier No. 2, however, is occupied by the Astoria Marine Iron Works, with its ship-equipping activities, this plant being the third largest in the United States, in point of government contracts held.

After the inspection of this plant, and luncheon, the Congressional party again boarded the Manzanita for the ten-mile run out across the bar to the open ocean. En route on this final jaunt the party was within view of Young's Bay, fast developing as the industrial center of the Astoria district, and within view of the site on Young's Bay selected by the Major Lyons commission for a United States seaplane base and launching beach.

The entertainment, in its entirety, was meant to suggest to the visitors that the mouth of the Columbia River, with its natural advantages and present facilities, fulfilled the five general requirements for the establishment of a naval base, as embodied in the general report of the Naval Board, these requirements as follows: Location at an important strategic point; accessible from the sea under all conditions; protected anchorage sufficient for a fleet; safe from attack; and near a commercial center with plentiful labor and supply facilities.

Astoria Really Much Awake

Astoria has tended to become discouraged at times, due to the fact that three wood shipyards are still continuing to mark time, employing only small forces, and with no releasing orders from the Emergency Fleet Corporation that either will dispose of the considerable number of ships hanging idle on the ways or that will permit these yards to seek other contracts.

However, it has required only a summary to prove that the Astoria district is really very much awake. The shipyards have gradually reduced their forces, but these forces have as gradually been absorbed by other industries that are awakening, some of them after a long war-period sleep. The saw mills—nine of them in Astoria or the near vicinity—are speeding up, continually sending additional logging crews into the woods. In fact, the total payrolls of Astoria industries are almost back to the totals of the war-period payrolls, now approximating almost, if not wholly, a $1,000,000 a month in Astoria and near vicinity.

$5,000,000 for Improvements

It has been estimated by conservative community leaders that Astoria and vicinity, the Lower Columbia River district directly tributary to the port, will expend for improvements during 1919 not less than $5,000,000.

Foremost among these improvements will be additional marine facilities. The Port of Astoria recently lost two Oriental cargoes because of lack of available storage space. This may have been a factor in an announcement by the Port Commissioners, at a recent weekly meeting, that they would receive immediate bids for the improvement of the new Pier 3. This new pier will parallel Pier 2, leaving between a slip 350 feet wide, wide enough to include, as planned to provide in the near future, a floating drydock with a 15,000-ton lifting capacity. The new pier will be 2000 feet long, measuring from the S. P. & S. Railroad to the pier headline. It will be especially improved for export and import purposes. The new warehouse, for which bids are to be received, is estimated to cost $800,000, and will extend 1500 feet in length and 160 feet in width. The property is to be filled solid to grade, and the warehouse is to have concrete floor and walls, with the most modern of traveling crane roof-loading devices, capable of loading or unloading at one time four 8800-ton vessels, with the most efficient of encircling tracks and driveways.

Dredge Natoma Sunk

Recently the large port dredge Natoma, while being overhauled, was sunk in the harbor, through an accident in the handling of the twenty-inch suction pipe. This dredge is scheduled for the work of filling in the new Pier 3, and the estimated delay of four weeks before the dredge can be again floated, by means of a coffer dam, will be provoking. In fact, it is stated that this efficient dredge has scheduled ahead toward port improvement not less than five years of steady work. One of the most important immediate harbor-dredging jobs relates to the new marine railway, fostered by the United States Shipping Board, and to be constructed and operated by the Astoria Marine Iron Works at the new site on Young's Bay, near the Wilson and the McEachern shipyards and near the seaplane base site recommended by Major Lyons.

This marine railway, James L. Crandall, commissioned by the government as consulting engineer for the project, announces, will be the largest of the kind in the United States, capable of handling 6000 tons deadweight. This marine railway is estimated to cost $500,000, and the new adjacent plant of the Astoria Marine Iron Works an additional $500,000. The Port of Astoria will expend an additional $60,000 in the further extension of its belt line railway around the waterfront, planned to serve, as the farthest present point, the plant of the Astoria Paper Company, where it is announced that $250,000 will be expended this year in plant enlargements. Also, this waterfront railway doubtless will be extended soon on across Young's River to serve the new marine railway and the new plant of the Astoria Marine Iron Works. This latter extension must await the completion of the new state highway bridge across Young's River, which has been announced authorized by the State Highway Commission, at an estimated cost of $250,000.

Further Improvements Planned

Further improvements, not specifically mentioned before, are: Pacific Power & Light Company expansion (electrical service), $450,000; Astoria Flouring Mill (fostered by Port of Astoria), $300,000; Third Reclamation fill (city of Astoria waterfront), $300,000; city of Astoria street improvements, $200,000; channel dredging and bulkheading by city of Warrenton, $100,000; Montana grain elevator in Warrenton, $500,000; extension of the Lewis & Clark Railroad (toward a feasible near connection with the Southern Pacific Railroad in the lower Willamette valley, thus promising for Astoria a second possible transcontinental railway outlet), $500,000; hotels and apartment houses, $250,000; state highway improvements near Astoria (paving), $324,000.

Shipping Board Won't Buy I. M. M. Vessels

THE United States Shipping Board will not buy the British tonnage of the International Mercantile Marine. The following statement was issued by P. A. S. Franklin, president of the company, last month:

During the year 1918 we had protracted negotiations with a British syndicate regarding the purchase of the steamships belonging to the British companies in which we are interested. These negotiations culminated in November last in an offer which, under the then existing circumstances and conditions, was acceptable to our board of directors.

While the details of the transaction were being adjusted we were requested by our government not to proceed further with the matter, and on November 26 we were informed by our government that approval of this sale could not be given, and that our government, under the circumstances, was prepared to take over the ownership of these vessels upon the terms of the British offer.

Since that date we have used our best endeavor to obtain a consummation of the transaction with our government. We recently received a letter from our government, dated April 1, informing us that they could not consider further the possible acquisition of the ownership of our British tonnage, and that we were free, so far as they were concerned, to deal with the properties as we may consider desirable.

The conditions in shipping have materially altered since our negotiations with the British syndicate. The armistice has, in the meantime, been signed, and there have been changes in the United States income and excess profits tax laws and in the exchange situation. All of these matters make it essential that the board of directors should carefully review the whole situation before deciding whether it is now desirable to renew the negotiations with the British syndicate, or whether it might not be preferable to continue our ownership of the various properties, with the view of developing them under the American and foreign flags.

The position of the company is very satisfactory, as the liquid assets, including cash, of the company and its subsidiaries amount to about $73,000,000. Of this sum approximately $41,000,000 represents the proceeds of steamers sold or lost, in replacement of which other vessels must ultimately be secured in order to adequately maintain our services at their pre-war standard. It should be further understood that the larger part of the above cash is in possession of the British companies, and that the earnings of these companies can only be obtained from them through current dividends.

PORTLAND

PORTLAND dedicated the first unit of its new St. Johns municipal terminal, April 12. In addition to the formal opening of Pier No. 1, exercises included the official welcome of the Pacific Steamship Company to the Columbia River and the loading of its first vessel in the reestablished Portland-Oriental service. The 8800-ton steamer West Munham was lying alongside the pier, dressed in national colors and her signal flags. She sailed the latter part of the month with a capacity cargo for Far Eastern harbors, Manila being her last port of call.

Site Embraces 155 Acres

The St. Johns terminal site embraces 155 acres, and has a water frontage of 2500 feet. Pier No. 1 is now 1200 feet long, but a contract was let last month for extending it 300 feet, also to build the wharf section of Pier No. 2, which would have a total length of 1500 feet. The outer 600 feet of Pier No. 1 is covered by a warehouse and the same construction will extend the full 1500 feet. The warehouse is 220 feet wide. Both slips will be 1500 feet long and 180 feet wide. The total area of Pier No. 1 under shed now is 186,600 feet, and when completed it will cover 348,600 square feet, the maximum cargo capacity being 37,000 tons. Pier No. 2 is to be used for open storage at first, having space for 10,000,000 feet of lumber. The terminal complete will have berths for fourteen vessels of 500 feet in length and trackage for 450 cars. The channel in front of the property has a depth at mean low water of thirty feet and a width of 1600 feet.

Besides the cargo terminal the property already is the site of the municipal grain elevator, which will have a capacity of 1,048,000 bushels and is so constructed that a second unit for 1,000,000 bushels additional can be built conveniently.

There are to be three piers when the terminal is finished and in the rear of the shipping facilities are abundant sites for industrial purposes. It is proposed by the Commission of Public Docks, which is directing the project, that the 12,000-ton drydock be built on the site and, should the needs of commerce demand, coal bunkers will be included.

Cokesit Exceeds Requirements

Making a full half-knot in excess of her required speed of eleven knots, even though she was light and two feet of her wheel was out of the water, the 9500-ton freighter Cokesit, vanguard of the steel ships turned out by the G. M. Standifer Construction Corporation, underwent a most successful trial April 16. The Coaxet, second of the fleet, will be ready early in May. The Waban, third of the line, was launched April 17, with her masts in place, her three Scotch marine boilers made fast on their foundations, and even small boats on deck. When the Wawalona takes the water shortly it is planned to have her main engine in as well and have steam up so her whistle can be sounded as she glides into the Columbia River.

The 9500-ton carriers building at the Standifer yard are of the Isherwood design and have a length of 402.6 feet between perpendiculars and 417 feet over-all, with a beam of 53 feet and depth of hold of 34.6 feet. It is said there is less steel used in their construction by 300 tons than is required for the 8800-ton ships of the transverse types, which are 410.5 feet between perpendiculars and 54 feet beam and 29.9 feet depth of hold. At the same time, although the 8800-ton ships are longer and have slightly greater beam, the 9500-tonners have greater depth. The loaded draft of the latter is placed at 26.6 feet and of the 8800-tonners at 24.6 feet.

Has Reciprocating Engine

The Cokesit is the first of the large steel carriers built in the Oregon district to have a reciprocating engine. It was built in Ohio by Hooven, Owens & Rentschler and was to have been of 2200-horsepower, but was changed in orders of the Emergency Fleet Corporation to develop 2800-horsepower at eighty-eight revolutions. On the trial trip it was said at times the engine was making more than 100 turns. The new ship will load flour at Portland for the Atlantic under the management of the Pacific Steamship Company.

Launching three 8800-ton hulls in two weeks—the West Totant, April 3; the West Hargrave, April 10, and the West Quechee, April 16—the Columbia River Shipbuilding Corporation has increased its pace. If the schedule is maintained in completing vessels that are now being mapped out, executives of the organization hope to outpoint all Coast yards in production.

Officers of the wooden steamer Makanda, which the McEachern Ship Company constructed at Astoria, have written from the Canal that the vessel made the trip from the Columbia River to Balboa in 16 days and 13 hours, steaming 3000 miles, and that she is satisfactory in every particular. The vessel carried a lumber cargo from Portland for Balboa, and on discharging was ordered to Nicaragua and Honduras to load for New York.

After having been suspended since December, harbor dredging was resumed in the harbor the latter part of April by the Port of Portland Commission. All docks are to share in a program of clearing away sediment so that all deepwatermen trading in the Pacific can be berthed at any point at the zero stage.

Among new orders received during April by the Willamette Iron & Steel Works was one for twelve Scotch marine boilers for delivery at Shanghai, China, where four steel ships are being constructed for the Emergency Fleet Corporation. The boilers are about one foot more in diameter than those being turned out for the government, being 15.3 feet. The Willamette interests also have contracted with the Union Oil Company for three boilers to be installed in the tank steamer Oleum, which probably will be undergoing an overhauling all of May, the job to cost about $100,000.

In spite of reports that the nautical school maintained at Portland by the Sea Service Bureau of the Shipping Board was to be discontinued, orders have reached Professor Williams to enroll all students who qualify as potential junior officers.

Among the April launchings was that of the motorship Avance April 1 by the Columbia Engineering Works at Linnton. The vessel was finished before the month ended and delivered to the Avance Navigation Company of New York. She was the eleventh launched at the Linnton plant, and was christened by Miss Margaret McNeal, a student of the Washington high school.

Lumber Cargo for Orient

The first big lumber cargo to be loaded for the Orient in the Columbia River following the war activities is to be dispatched in the new Japanese freighter Kaian Maru, which has just been completed on the other side and which loaded general freight for San Francisco, whence she proceeds to Portland. The charter is for May loading and it is estimated the vessel will carry close to 4,000,000 feet, as she is of 8400 tons deadweight.

Colonel William Aiken Starrett, chairman of the Emergency Construction Section of the War Industries Board, which directed the building of the big Eastern terminals for war purposes, was in Portland early in the month, and after an inspection of the new St. Johns terminal, declared it to be the first unit of a most valuable property and one that is started on most modern lines and in accord with the system adopted by the government in rushing the bases in the East. Colonel Starrett departed April 17 for Japan, China, Korea and Manchuria, going via Seattle.

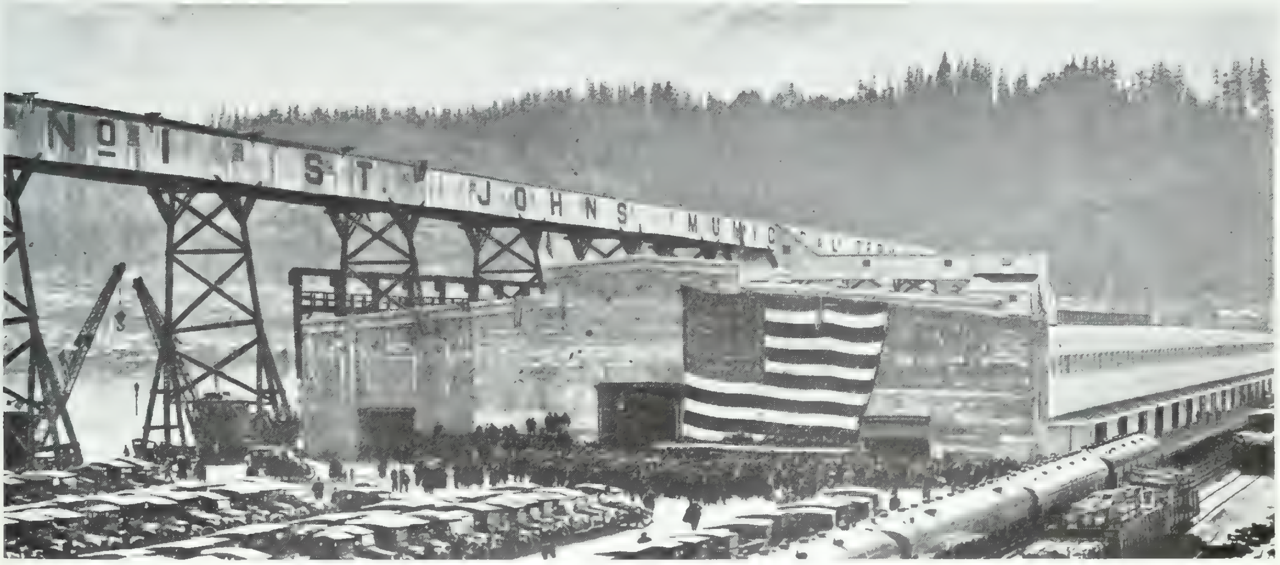
Word reached Portland April 17 that among fifteen wood steamers disposed of by the Shipping Board to the Brooks Steamship Company, at $650,000 each, were five constructed at Portland by the Supple-Ballin Shipbuilding Corporation. They were the Thala, Dalana, Airlie, Ashburn and Birchleaf. They are composite ships built from the design of Fred A. Ballin and are of 4500 tons deadweight. The other ten ships were of the Daugherty type, 5000-ton carriers, turned out at Orange, Texas.

The Portland Bridge & Building Company has completed driving piling for new ways at the plant of the Marine Repair & Construction Company, foot of Albina avenue. The organization plans to handle small type vessels.

Suggest Motors for Peninsula Vessels

Of four Peninsula-type steamers that it was proposed to convert into schooners, in line with such changes being considered by the Emergency Fleet Corporation with Ferris types, it has been suggested that two be made into full-powered motorships, having twin engines of the McIntosh & Seymour design, each of 750 horsepower. Estimates are not being made of the cost of changing the vessels. The Peninsula Shipbuilding Company, designer of the vessels, turned out the auxiliary schooners Erris, Esperanca, Pechiney and Adrien Badin before the war, all of them being reported operating successfully. They were fitted with Winton engines.

Captain A. T. Hunter, master of the turbiner Northern Pacific when she was on the Flavel-San Francisco route with the Great Northern, and who has been navigating officer of the vessel on the Atlantic, where she was operated by the navy as a troop transport, was a Portland visitor April 17 and left for San Francisco, where he will establish an agency for the Steward Davit Equipment Corporation. Captain Hunter is naturally proud of the record made by the Northern Pacific, which was eleven round voyages, the fastest being fourteen days and three hours from New York to Brest and return. She carried 28,000 men to Europe, bringing back 5000.



The new St. Johns terminal, Portland

Making Barkentines of Ferris-Type Steamers

SIX wooden Ferris hulls building in the Southern Pacific district for the Emergency Fleet Corporation will be converted into five-masted barkentines. Plans have been drawn up and bids on rigging and other equipment called for, and, if the prices are satisfactory to the government, the conversion will proceed at once. Detailed plans of the vessels as barkentines accompany this article.

Three at Rolph Plant

The yards at which the vessels are building and the number at each follow, all being California yards: Hanlon Dry Dock & Shipbuilding Company, Oakland, one; Benicia Shipbuilding Corporation, Benicia, one; Rolph Shipbuilding Company, Eureka, three; Ralph J. Chandler Shipbuilding Company, Wilmington, one.

The outcome of this experiment will be awaited with quite a bit of interest, more particularly in the East, where there are many who hold that the Ferris and other types of wooden steamers scarcely could succeed as sailing craft because of the slow speed to be expected. However, the officials of the Southern Pacific district believe that the results will be good.

Six Will Become Barges

Not all the unfinished vessels in the Southern Pacific district will be converted into barkentines. Six will become barges and ten will be finished as to hulls only, without machinery, and laid up in Oakland Estuary awaiting purchasers. The installation of Diesel or other heavy-oil engines in these hulls has been given much consideration of late and it is anticipated that purchasers probably would make that use of them.

Whether a hull became a barkentine, a barge or was completed to be laid up depended altogether upon the stage to which construction had advanced. Those completed as to hulls only were the furthest advanced; the barges were next, and of them there were two classifications: The finished without forecastle head and poop deck, having only a flush deck, tow posts and many hatches; and those on which the forecastle head and poop deck were left. The six selected for barkentine rig were those on which construction was least advanced. The completion of this work probably will end wooden construction in the Southern Pacific district.

Rigging Specifications Out

The hulls will be completed at the different yards and taken to San Francisco to be rigged. The spars are being ordered in the North. Specifications for the rigging were sent out April 24 and bids will be opened early in May.

T. L. Tomlinson, assistant in charge of woodship construction, said that there is a marked similarity between the Ferris-type vessel and the five-masted schooner Snow & Burgess, a well-known Pacific Coast craft, of 1655 gross tonnage. The Snow & Burgess has more dead-rise, he said, but to offset this disparity, the new barkentines will be given a deeper keel and bilge keels.

Sailed About the Bay

The Snow & Burgess, Mr. Tomlinson said, was changed from a square-rigger to a schooner when twenty-six years old. A. P. Lorentzen, her owner, signalized her completion as a schooner by sailing her all about San Francisco Bay, this being cited to prove that the new barkentines might be expected to handle equally well.

Selection of a barkentine rig was made by A. F. Pillsbury, district manager, because the vessels were considered too large for coastwise trade and would handle better offshore if the foremast were square-rigged. However, the expectation is that several Peninsula-type vessels building at the Peninsula Shipbuilding Company's plant, Portland, will be made into schooners, and generally the Northern Pacific district seems to favor the schooner, although plans of the Southern district for the new barkentines have been sent to Seattle, and may be used in the North.

For Handling Long Lengths

As will be seen from the deck plan, the vessels will be given hatches designed for handling long lengths of lumber. Mr. Tomlinson estimated the capacity at about 2,000,000 feet, which is enough to make the vessels sizable carriers, far larger than the average lumber-carrying sailer. Other noteworthy features are the provision for radio and the much better accommodations for the crew than are usually found, two sailors to the room being the plan. There will be one donkey engine, forward, so far as the plans go now, but a "go-devil" could be used to supplement it in port.

No more changes than necessary were made from the original steamship designs of the vessels. Greater strength to provide for the stress of carrying sail was one of the prime considerations.

Barges were made of two Hough-type vessels at San Francisco some time ago, the barges being intended for service on the Atlantic, but they have not been moved yet.

TRADE WITH FAR EAST

THE importance of the Far Eastern trade is discussed in a report prepared for the Bureau of Foreign and Domestic Commerce.

Eighteen per cent of the total trade of the United States, including exports and imports, during 1918 was done with the Far East. The imports from the Far East amounted to $1,041,899,402 and exceeded those of any other grand division, representing 34 per cent of the total imports into the United States, while the exports to the Far East totaled $603,063,877 and were next to Europe and North America in volume, representing 10 per cent of the total export trade of this country.

This enormous increase has taken place practically since 1914 when the total trade with the Far East amounted to only $491,579,139, or less than 13 per cent of the total trade of this country. The 235 per cent increase in Far Eastern trade since 1914 is the largest single increase registered in the trade with any grand division since that year. Other percentages of increase are Africa, 227 per cent; South America, 185 per cent; North America, 149 per cent, and Europe, 97 per cent.

Japan led in the shipments to the United States from the Far East in 1918, supplying 29 per cent.

Outboard Profile, Ferris-Type Wooden Vessel Rigged as Barkentine, E. F. C. Plans

Inboard Elevation and Upper Deck Plan, Ferris-Type Barkentine

Stanchions at hatch corners under girders to be removable. Secured by 12-20-8" pulls as shown on Drawing of Mid Ship Section # SF 400
Hatch and Mast Beams 14"x18" other beams 14"x14"
9" Knees in all beam spaces at hatches
8 Knees at keelson on hatch stanchions
14"x14" Filling pieces on continuous girders between deck beams
UPPER DECK BEAMS
2" Hatch Cover
Filling Piece between Knight Heads
Bow chocks to be 10"x10" worked over ends of Knight Heads
Covering board to stop against Knight Heads & cushion piece worked around filling piece between Knight Heads
Steam Pump
Bottom of Knight Head
5" See Connection on frame as crow set low as possible
Chain Locker

INBOARD ELEVATION

UPPER DECK PLAN

Chairman Hurley's Plan---A Good Beginning

By Winthrop L. Marvin

A MONTH or two earlier than was anticipated, Chairman Edward N. Hurley of the Shipping Board, at the National Marine League dinner of March 27, gave the country his promised "plan for the operation of the new American merchant marine." In the face of the clamor for prompt action, Mr. Hurley dropped his scheme for holding a plebiscitum on this question among the merchants, bankers, manufacturers and farmers of the United States, and boldly proclaimed his own ideas. Whatever opinion any man may hold of the details of the proposal, he can but pay tribute to Chairman Hurley's courage. His is the decisive action which the American people have traditionally loved in their public men from Washington to Roosevelt.

Winthrop L. Marvin, writing from the Atlantic seaboard, in this article on "Chairman Hurley's Plan—A Good Beginning," bespeaks consideration for the Pacific Coast's special problem—that of competition with the Japanese on the Western Ocean. The failure of Mr. Hurley to provide against that competition, Mr. Marvin says, is the "conspicuous fault" of his plan. Generally, Mr. Marvin sums up the plan by saying that "perhaps the fairest way to deal with Chairman Hurley's program is to consider it as a hopeful beginning—the laying of a foundation on which a future complete fabric of just and beneficial American maritime legislation may be laid." Mr. Marvin scores government ownership and operation, with particular emphasis on "our state socialistic experiments with railroads, telegraphs and telephones," and, as the maritime world generally did, praises Mr. Hurley for turning his back "on the government-owned and operated merchant marine."

Favors Private Enterprise

In the first place, Chairman Hurley is unequivocally for American private initiative and enterprise. There had been some questioning of this—but there can be no denying of it any longer. He is not for a government-owned and operated merchant marine. He has read the handwriting on the wall of the record of our state socialistic experiments with railroads, telegraphs and telephones; and he has incidentally helped to lead the Democratic party, of which he is a loyal chief, away from the impending verge of a grievous blunder.

Acclaim for Chairman Hurley on this point has been widespread. With scarcely an exception, the daily newspapers of light and leading in this country approve his declaration for a private-owned and operated merchant fleet. Here and there farmers are said to be opposed to it, but those men hazard much who will assume that American farmers as a whole stand for state socialism in this direction. The New York Grange, one of the strongest in the country, lately has declared the conviction that "the railroads of the United States, when under private management, gave the best service of any railroads in the world, and under government control the service is inefficient and both freight and passenger rates have been raised and an enormous debt has been incurred because of inefficiency in management."

Against Fundamental Principles

These New York farmers—and they are among the most prosperous and enlightened in the country—demand the prompt return of the railroads "to their rightful owners." The New York Grange added this significant proclamation that "the tendency of the times is toward extreme centralization of power, and the disposition of the Washington government to take over so many rights that formerly belonged to the individual is certain to create an autocracy as great as that of Germany, all of which is against the fundamental principles of our government."

From business men — from manufacturers, merchants, bankers, everywhere — there comes no note of dissent from this part of the Hurley program. There has come, of course, nothing but the heartiest approval for the transfer of the government-built ships to the hands of alert and experienced shipowners. In all commercial journals generally there is applause also for the Hurley plan of disposing of these ships "at a price which fairly reflects the current world market for similar tonnage—25 per cent of the purchase price of each ship to be paid down, the remainder falling due and payable in gradual annual installments over a period not exceeding ten years." There have been some suggestions that this period might be lengthened.

Sanction for Development Fund

There is very general sanction for the other feature of the Hurley program looking to the gradual creation of a merchant marine development fund to be made up out of the difference of 1 per cent between the government and the customary commercial rates of interest on the mortgages by which the government will protect the unpaid balances on the purchased ships. To this merchant marine development fund also there is to be added the difference of 1 per cent between the government and commercial American rates of marine insurance—the government carrying in its own fund for purchasers' account insurance covering that part of a vessel for which payment has not been made, while the purchasers are required to insure their equities in American marine insurance companies.

Higher freight and passenger rates, higher telegraph rates, higher telephone rates have brought sharply home to every American home a sufficient demonstration of the fact that government control means greater costs saddled upon inefficient service. It would be the same and more so with our merchant marine if political functionaries handled it. Think of a Burleson in charge of the operation of the vast, complex machinery of maritime trade and transportation! Chairman Hurley on this point has vindicated his reputation as a business man, as well as a sagacious and patriotic American.

Legislation Expected This Year

If President Wilson approves these main features of the Hurley program, as the country is confident he will do, and if he recommends the plan to the forthcoming Congress in his anticipated special message on the merchant marine, it ought to signify the complete enactment of maritime legislation along the lines of the Hurley recommendations within the present year. Republicans will control both Senate and House and will dominate the Senate Committee on Commerce and the House Committee on Merchant Marine and Fisheries. The Republican party as a whole, except perhaps in a narrow section of the Middle West, is known to be overwhelmingly opposed to government ownership and operation of any industry which has been or can be operated by private skill and capital, and a majority of the Democratic Senators and Representatives can be counted on to follow the lead of the Chief Executive.

A Direct, Practical Plan

It is the very imminence of legislation for the permanent control of the American merchant marine that makes Chairman Hurley's recommendations so important. Here is no academic scheme, but a direct, practical plan, the bulk of which will almost certainly become the law of the land before the end of December, 1919. Therefore, not only the main feature, but all the subordinate features, of Chairman Hurley's recommendation are well worth pondering. There are some features, it must be confessed, that have not aroused unstinted praise. One of them is the provision for a government-named director on the board of each company that purchases and operates the government-built ships. It may be that such a director, if a person of discretion, would be of real advantage to the board, but he must be a man of some marked degree of devotion to the public welfare, for he is not to be allowed to receive any compensation either from the steamship company or from the government.

Cannot be "Dummy Director"

He must be more than a "dummy director," for it is further provided that these government representatives shall constitute together an official body advisory to the Shipping Board "upon problems arising in, or questions affecting the welfare of, the American merchant marine, including the administration of the merchant marine development fund." This fund is to be utilized "to relieve such financial difficulties as may be encountered in the development of an adequate and well-balanced American merchant marine." From its resources are to be drawn whatever moneys may be necessary for the establishment of American steamship services on routes which may not at the start return a profit. But such moneys must be repaid to the development fund after these pioneer lines have been brought into profitable existence.

It must be acknowledged that it is not customary for the seller of a steamship or a factory or the control of a bank to remain upon the board of directors of the new organization. These government directors mark a novel departure, and the utility of them remains to be demonstrated by experience. It cannot now be perceived that they add any intrinsic strength to the new merchant marine plan, though they may perhaps ease the launching ways in Congress.

Maximum freight rates, urged by Chairman Hurley as essential to his plan, are already provided for common carriers in foreign commerce by Section 18 of the Shipping Board Act, approved September 7, 1916. It has been pertinently asked whether this insistence on maximum freight rates is applicable only to American-flag ships and not to foreign ships. Apparently it is the intent of Congress that the provision should apply to both, as it must in justice to American shipping.

No part of Chairman Hurley's recommendations shows a finer foresight than his insistence that "simultaneously with the purchase of a vessel the purchaser should be required to provide hull and machinery insurance for his equity with an American marine insurance company." The government itself is to continue to carry its insurance on the value of the vessel still unpaid for, "as additional payments are made, the equity they represent should be insured in the same manner until 100 per cent of the hull and machinery insurance has passed into the hands of private American insurance companies. This arrangement would achieve the double purpose of relieving the government of the insurance risks which the exigencies of the war have compelled it to assume, and of making possible the development of an American marine insurance market capable of carrying insurance on all the vessels under the American flag."

Government Operation Temporary Expedient

It is unmistakable that Chairman Hurley has no idea of having the government remain in the insurance business except as a temporary expedient. He would leave this important service also to private American capital and enterprise; and he speaks like a prophet and historian in emphasizing further the fact that "the history of our merchant marine shows conclusively that it is essential for American shipowners to insure their ships with American marine insurance companies. An American marine insurance market is as vital a necessity to an American merchant marine as is American capital to the steamship companies which constitute it."

Fortunate indeed is it for the country that the American Bureau of Shipping under vigorous management is being so strongly developed that with the growth of our merchant fleet the American marine insurance business will have the indispensable complement of a thoroughgoing American survey and classification society, whose standards will command recognition in all the ports and markets of the world.

"Fundamentally Wise and Just"

One point of controversy in Congress may be Chairman Hurley's recommendation that the government-built ships be sold "at a price which fairly reflects the current world market for similar tonnage." This proposal is fundamentally wise and just. It ought to make an irresistible appeal to the American sense of fair play when consideration of the issue is ended. The United States Shipping Board, for causes beyond its control, inherent in the great war, was compelled to pay through the Emergency Fleet Corporation as high as $200 and even $225 a deadweight ton for steel cargo-carrying tonnage, in order to secure enough tonnage to build that indispensable "bridge of ships" to Europe. It was absolutely necessary in the crisis of the war that those ships should be secured and those prices paid, because of the soaring costs of labor and materials and because of the huge initial costs of constructing and equipping the new shipyards that contracted for this tonnage. These heavy costs were in part the inexorable price of war and in part the price which the American people had to pay for the folly of their law-makers, through long years of peace, in almost utterly neglecting to encourage the building and operation of large ships for ocean trade. For all this there came in 1917-1918 the inevitable day of reckoning.

Seaboard States Not to Blame

But these heavy costs were not the fault of the American maritime community on the Atlantic or Pacific seaboards. All our American states that front the ocean had begged and pleaded year after year since 1865 for some adequate plan of maritime preparedness. Their public men and their business men had predicted with sincerity and vision that any great war in which the foreign nations that were our chief carriers might engage would paralyze American commerce, and compel us to pay an enormous price for a merchant fleet "improvised in an emergency."

The great war just ended brought an overwhelming vindication of their judgment. The shipowners, the shipbuilders, the merchants and the manufacturers of the American seaboard states—those prophets so long unregarded by their country—ought not now to be forced to bear the whole weight of the penalty of the misfortunes of which they vainly warned their countrymen.

There could be no more grotesque injustice than for any part of the agricultural interests of this country to insist that the new ships, government-built at panic prices because of the lack of maritime preparedness, against which the seaboard states protested, should be forced upon the shipowners of America at these panic prices for which the inland states have been entirely responsible.

Under a Free Ship Policy

There is another and a very potent reason why these government-built vessels should be disposed of at the level of world-prices, and that is that we are now living under a free-ship law in the United States. It must not be forgotten that the entirely fruitless free-ship section of the Panama Canal Act of August 24, 1912, was so amended by the Act of August 18, 1914, that foreign-built ships of any age may be admitted to American registry for the foreign trade. Moreover, these ships may be brought in with alien officers, and by presidential proclamation are released from compliance with our measurement and inspection laws. They are exempt from our laws providing for safety at sea. That is to say, the statutes of the United States give foreign-built ships, for the time being at least, an actual advantage in operating over American-built vessels.

Any American steamship company which seeks to acquire new tonnage has entire freedom under our present national policy to buy or build such ships in any country of Europe or in Japan, and to bring them under our flag for employment in any overseas trades, free from regulations which American-built vessels must comply with. How would it be possible, therefore, for our government to command any higher price for its government-built ships than "the current world market for similar tonnage," as Chairman Hurley has recommended?

It needs no demonstration that the ablest American shipowners would not be able to pay $200 or $225 a deadweight ton for government-built ships and place them in competition with free foreign-built ships which might be acquired for $150 a ton. Such a mercantile venture would be doomed to failure from the very outset. The agricultural interests in Congress were particularly eager for a trial of "free ships." The scheme was quite generally supported by inland congressmen. Now their free ship stands as an unanswerable argument for the sale of our new government-built ships at the world prices; for in no other way, on no other basis, can they possibly be sold to business men who are sane and solvent.

Moreover, the ending of the war and the gradual return to normal conditions have already brought about a sharp reduction in the current costs of American ship construction. It was a most significent announcement which Chairman Hurley made the other day that the Submarine Boat Corporation of Newark, New Jersey, had agreed to construct a group of 12,000-ton freighters at $149 a deadweight ton, "without any guarantee from the government on either labor or material." These ships are to be of the shelter-deck type, oil-burning steamers, with 5000 horsepower engines and a sea speed loaded of twelve knots—or steamers far superior to the ten and one-half-knot craft of wartime. By what authority—on what theory of justice—could the American government compel American shipowners to buy ten and one-half-knot freighters for $200 or $225 a deadweight ton, when these new ships of twelve knots are offered by an American shipyard for $149?

Other Yards Can Do It

Nor is the Submarine Boat Corporation the only yard capable of building ships of this type and price. Other offers of a similar kind will undoubtedly be forthcoming from month to month. These new prices challenge the competition of the world, and efface the traditional handicap on American shipping in overseas trade of greatly higher costs of original construction. Well may Chairman Hurley felicitate himself on this latest development of the modern trend of American shipbuilding.

Another factor in the world shipping problem that apparently turns to American advantage is the recent declaration of the international seamen's unions of Great Britain and Scandinavia for a minimum wage of $75 a month for seamen and firemen. This is exactly the present American average rate, and though it has not yet gone into full force and effect in British and Scandinavian ships, the sailors' unions are manifestly determined to make a tenacious fight for it. Their power is greater than the power of the seamen's unions of America, and there is much reason for believing that the European seamen's demands will finally prevail, at least on ships on the Atlantic Ocean.

Chairman Hurley lately brought back word from Europe that "in Sweden the seamen's wage scale is even higher than in the United States." Arthur Cook, well known as managing director of the great British firm of Lamport & Holt, declared on his arrival in New York the other day that "I think it costs as much now, if not more, to operate a British ship as an American ship."

What of Japan?

But the conspicuous fault of Chairman Hurley's program is that it makes no special provision for the formidable competition which American ships of the future must meet from the Japanese on the trade routes of the Pacific Ocean—or, indeed, wherever Japanese ships may go. There ought to be some recognition by our Shipping Board of the fact with which shipowners and merchants are thoroughly familiar, that Japanese merchant steamers stand in a class by themselves. They are constructed by the aid of bounties that have been as high as $12 a deadweight ton. They are navigated by the lowest-paid crews in the world, and they receive the additional overwhelming advantage of generous subsidies from the Imperial treasury. What chance, for example, would a first-class American line to the Orient stand in times of peace against a Japanese line subsidized for $1,200,000 a year? When the La Follette law was interpreted as prohibiting the employment of Chinese crews under the American flag, it inevitably sealed the doom of American trans-Pacific services. Now in the opportunity of war the Japanese companies have built a considerable fleet of "tramp" carriers, and are in a position to become keen competitors in that general world-round trade.

"Coolie and His Bowl of Rice"

Chairman Hurley gives no cognizance to this fact—no sign of comprehending it—unless his merchant marine development fund is intended to meet this type of "unfair" competition. Chairman Hurley in a recent article in "Asia" scored the "coolie and his bowl of rice." Those who know the Pacific Ocean and its trade do not scorn him.

But perhaps the fairest way to deal with Chairman Hurley's program is to consider it as a hopeful beginning—the laying of a foundation on which a future complete fabric of just and beneficial American maritime legislation may be laid. We Americans have a great deal to be thankful for in Mr. Hurley's unqualified declaration for private ownership and operation of American ships. This is certainly setting the true course for our new merchant fleet to follow. But it must be remembered that some positive inducements must be offered to start the flow of investment of American capital into ocean tonnage, whence it has been so long absent that this is now a new, untried and unfamiliar venture. After all, though shipowners may be ready and willing, it is the bankers who must be convinced.

Panama Canal Fuel Prices

By Special Correspondent

THE prices stated in the Panama correspondence, published in the March issue, for coal furnished to ships for bunkers at the Panama Canal, have been reduced, and the prices charged transit ships equalized, regardless of whether the coal is taken at Balboa or Cristobal. Formerly the price was $13 a ton at Cristobal and $14.50 a ton at Balboa, the difference being due to the fact that the coal at Balboa had to be transported through the Canal from the Atlantic.

Price Reduced to $11.50 a Ton

Now the price has been reduced to $11.50 a ton at either terminal of the Canal, for steamships, including warships of all nations, delivered from the coaling plants or alongside of vessels in lighters or in cars on the wharves, and trimmed in bunkers. This means a reduction of $1.50 a ton at Cristobal and $3 a ton at Balboa. However, it should be understood that this applies only to transit ships—that is, ships actually in transit through the Canal. The price to ships not passing through the Canal will be $11.50 at Cristobal and $13.50 at Balboa, the latter being a reduction of $1 a ton from the former price.

The delivery of coal to steamships in transit at the price of $11.50 a ton will be at the Cristobal coaling plant or the Balboa coaling plant at the option of the Panama Canal. The condition of the plants, the quantity of coal available in each plant and the expediting of the transit vessels will be considered in deciding where coal is to be taken. Steamships taking less than carload lots from the coaling plants, or less than twenty-five tons from lighters, will be charged $13 a ton at Cristobal and $15 a ton at Balboa. The additional charge of 50 cents a ton for delivery of coal to vessels on Sundays and holidays has been removed.

Charges for Pioltage

The following charges for pilotage at the Panama Canal are now in effect. Charges for port pilotage are based upon maximum draft, and the rate a foot or fraction thereof equaling or exceeding six inches, is $1. Pilotage is furnished under three classes, viz., transit pilotage, port pilotage, and offshore pilotage. There is no charge for transit pilotage, which applies only to vessels actually transiting the Canal, and it covers the transit, including berthing at the terminals for the sole purpose of bunkering or repairs, or both.

Port pilotage applies to vessels visiting terminal ports without transiting the Canal; and also to vessels which, in addition to transiting the Canal, stop at either terminal and there receive or discharge passengers or freight. Exception is made to transiting vessel which at either terminal receives freight or passengers by boat and consequently does not leave the Canal prism. Port pilotage applies both on entering and leaving except in the case last mentioned, when it applies only once at the terminal where the vessel receives or discharges freight or passengers by boat without leaving the Canal prism, viz., as "in pilotage," when the transfer of the character described occurs at the terminal of arrival prior to transit, and as "out pilotage," when it occurs at the terminal of departure upon completion of transit.

No Charge for Shifting Berth

Pilotage will not be charged when a vessel is shifted from one berth to another at the dock or permanent mooring. This exemption does not cover and will not apply in the case of a vessel shifted from anchorage to dock or permanent mooring, or the reverse. Vessels assigned temporarily to anchorage on arrival pending availability of berth at dock will not be assessed an additional pilotage charge by reason of such double maneuver, and the same general principle applies in the case of outgoing vessels.

Offshore pilotage applies to vessels taking pilots outside of the Atlantic breakwaters at Cristobal. For this service there is made, in addition to port pilotage in cases where the latter is also applicable, a charge of $25 a vessel.

The Panama Canal maintains a force of well-trained and efficient pilots and shipping interests and owners may rest assured that their vessels are in safe hands in the harbors here or while transiting the Canal.

What Shall We Do With Our Merchant Marine?

IN discussing Chairman Hurley's proposed plan for the future operation of the vessels controlled by the United States Shipping Board, practical Pacific Coast operators, managers, shipowners and shipbuilders have evolved some very interesting suggestions. Some of these are reproduced here.

By the Manager of a Prominent Steamship Line

THE vessels requisitioned in the shipyards while under construction for private owners should, I think, be turned over to the private owners at their original contract prices, less a fair depreciation for the period used, based on, say, 5 per cent per annum for normal use. Any expense required to move guns, gun mounts, troop fittings, etc., installed for war zone or transport work, and to restore vessels to original plans, should be absorbed as a war cost by the government.

Different Prices for Different Speeds

Most, if not all, of the vessels constructed under Shipping Board order are freighters of various speeds, from nine and one-half knots up to eleven and one-half knots loaded. I would suggest that all steel vessels so constructed of 5000 deadweight and upward be appraised at, say, $120 a deadweight ton for nine and one-half knots speed; $125 for ten knots; $130 for ten and one-half knots; $135 for eleven knots, and $140 for eleven and one-half knots; and then allotted for purchase "as is" to regular responsible steamship lines (with reasonable selection for types by the steamship lines) on a pro rata basis of the tonnage such lines owned or operated at the time of our declaration of war. Any losses of vessels to be made up first by replaced tonnage, purchased as above outlined, and over and above that additional tonnage, up to a limit of 100 per cent of tonnage formerly operated.

Surplus tonnage over and above these allotments undoubtedly could be disposed of to responsible new companies or agencies, which undoubtedly would be formed if the purchases were permitted along reasonable lines.

Ten Per Cent Cash Payment

For the terms of purchase, I would suggest a 10 per cent cash payment on delivery of vessel, and 7½ per cent a year thereafter, with interest on deferred payments of 3½ per cent, payments to be accepted in Liberty Bonds at par value, and any surplus earnings in excess of 10 per cent paid to the government on account of purchase price—not to act as a stay for any of the deferred payments, but merely to complete the purchase sooner than twelve years—to be exempt from surplus profits tax.

Of the smaller steel tonnage, undoubtedly many vessels would be requisitioned by the regular lines or newly-formed companies, and these could be treated in the same manner as set forth above.

I think the balance should be auctioned off with a minimum price set, and the privilege given to foreigners to purchase and transfer the flag. Many of these could be used as coasting vessels in altogether foreign trade, and I believe a large number of the wooden vessels would be purchased for conversion into barges and sailing vessels.

All contracts on which construction has not yet started should, I believe, be canceled; and work on those not yet actually launched should be stopped, with a view to allowing shipyards to make arrangements for sale of such vessels to private owners, and permit necessary changes being made to suit the different trades, before the completion of the vessels.

It is more than probable that many such vessels would be purchased immediately, if owners had the opportunity to make the necessary changes at the minimum expense, and provided that on a similar basis of rates on tonnage and speed, as set forth above, the shipyards definitely could determine the amount to be returned to the government for the percentage of construction already performed.

The steel already delivered to the shipyards and not yet worked could be sold to the builders at present market rates, or at the purchase price, whichever is lower; and this would be the first step in enabling owners to place new contracts.

By A. M. Gillespie

WITH regard to the after-the-war use of the Emergency Fleet Corporation's steel freighters and method of handling them, our government should retain the fleet, write off 50 per cent of its cost as a war measure, and then time charter its vessels at the going market rate, under usual government form, to established operators, who have specific knowledge of trades and are financially able to live up to their obligations. The furnishing of crews and stores, likewise upkeep and repairs, should come under the supervision of marine superintendents of the government acting under the orders of the directors of operations located at our principal seaports. In this way the shipping property of the government would come directly under the care of its own representatives, while the business of the charterers would be to trade the steamers over specific routes in the upbuilding of American commerce. If the result to the Emergency Fleet Corporation showed a loss in operation, that could be taken up by a special appropriation, treating that appropriation, if you will, in the light of a subsidy. You will find that practical operators will not be interested in the purchase of steamers in these times unless at very low figures, due to the uncertain outlook.

First-Cost Investment Too Great

It is a fact not to be disputed that American-owned steamers cannot compete profitably in foreign trade with similar vessels of any other nationality because their overhead, based on first-cost investment, is out of all proportion to the cost of foreign steamers, and, incidentally, our navigation laws only make our condition worse. Further, the present system of handling vessels through operators or managers is not satisfactory and cannot hold. Under the present basis there is no incentive for good work on the part of operators, because they have no direct liability, their commissions are totally inadequate, and they are called upon to advance large sums in disbursing vessels with no certainty when such advances will be repaid them. This means they assume the risk of crippling their own business by using up their own credit, and as the Emergency Fleet Corporation has set its face against allowing operators the customary disbursing commission on cash advances, it is a question of time only as to when the interest charges paid by the operators on necessary loans will exceed the low scale of commissions proposed for them by the Emergency Fleet Corporation.

Stable Market Most Important

Again, it unquestionably stands to reason that those best qualified to advance American commercial interests in foreign fields are those merchants who already have established trade connections abroad, working in conjunction with the steamship companies operating steamer lines to other countries. The most important thing in developing foreign commerce is not a low freight rate, but an absolutely stable market, so that qualified merchants and bankers can have confidence in trading. The present stagnation and, in many cases, ruin among many import and export houses has directly resulted, in my opinion, from government control of ocean freights. The object of the control is defeating itself, at least temporarily.

If these suggestions are put into effect, the business of this country will automatically come back into the hands of those who, previous to the war, were working to build it up and a great deal of the existing obstructions to business will be removed and a very large percentage of the clerical staff of the Emergency Fleet Corporation will be able to return to their old lines of industry.

The President of the Philadelphia Bourse

EMIL ALBRECHT, president of the Philadelphia Bourse, suggests that:

1. Government ownership be discontinued as quickly as possible.
2. Requisitioned ships be returned to American owners and proper compensation paid for their lost earnings.
3. Shipping Board should sell all ships owned by it, both those in use and those under construction at price based on market value as shown by foreign and domestic shipbuilding costs. Terms of sale to be 25 per cent down, balance on mortgage at government interest for fifteen to twenty years with sinking fund provided and privilege of partial payments. No transfers to foreign registry or ownership without express consent of the government.
4. Vessels not purchased to be distributed for operation, so far as possible, to the purchasers of ships pro rata with the tonnage purchased. Operators to be paid fair commission. Earnings of all ships to be pooled and government to get tonnage pro rata share of pooled net earnings. Government to reserve the right to sell at any time and operator to have option.
5. Legislation be enacted to make mortgage a first lien on ship.
6. Legislation be enacted to authorize the payment by the government of excess cost (if any) of the operation of vessels when compared with similar vessels under foreign registry. Shipping Board to determine this excess cost.
7. Regular lines of adequate passenger, mail and freight steamers be established to all countries where our interests are considered paramount.
8. The ships be officered and manned by American citizens.
9. Immediate correction, revision or abrogation be made of navigation and inspection laws and regulations so as to remove all possible handicaps from American operation.
10. Railroads be permitted to make special import and export rates.
11. Federal incorporation of shipping companies be provided.
12. All restrictions and limitations upon shipping should, as far as possible, be removed.

Views of James A. Farrell

JAMES A FARRELL, president of the United States Steel Corporation, in a speech at the Chicago convention of the National Foreign Trade Council, expressed his views on American maritime policy. On the proposal from the Shipping Board, he said:

"Mr. Hurley's plan, with perhaps a few minor exceptions, appeals to many shipping men of experience having at heart the upbuilding of an American merchant marine as a plan dictated equally by business sense and equity and in the public interest.

"If in other respects we are able to meet the competition of the world on equal terms, especially with types of ships built, or to be built, comparable with those of our competitors, experienced in long-voyage trades, the relatively high wages of American officers, engineers and seamen sufficient in numbers to operate economically with safety, will not prove to be a serious handicap. Of course it is essential that laws requiring the employment of an excessive number of seamen or engineers be repealed by the establishment of a definite policy.

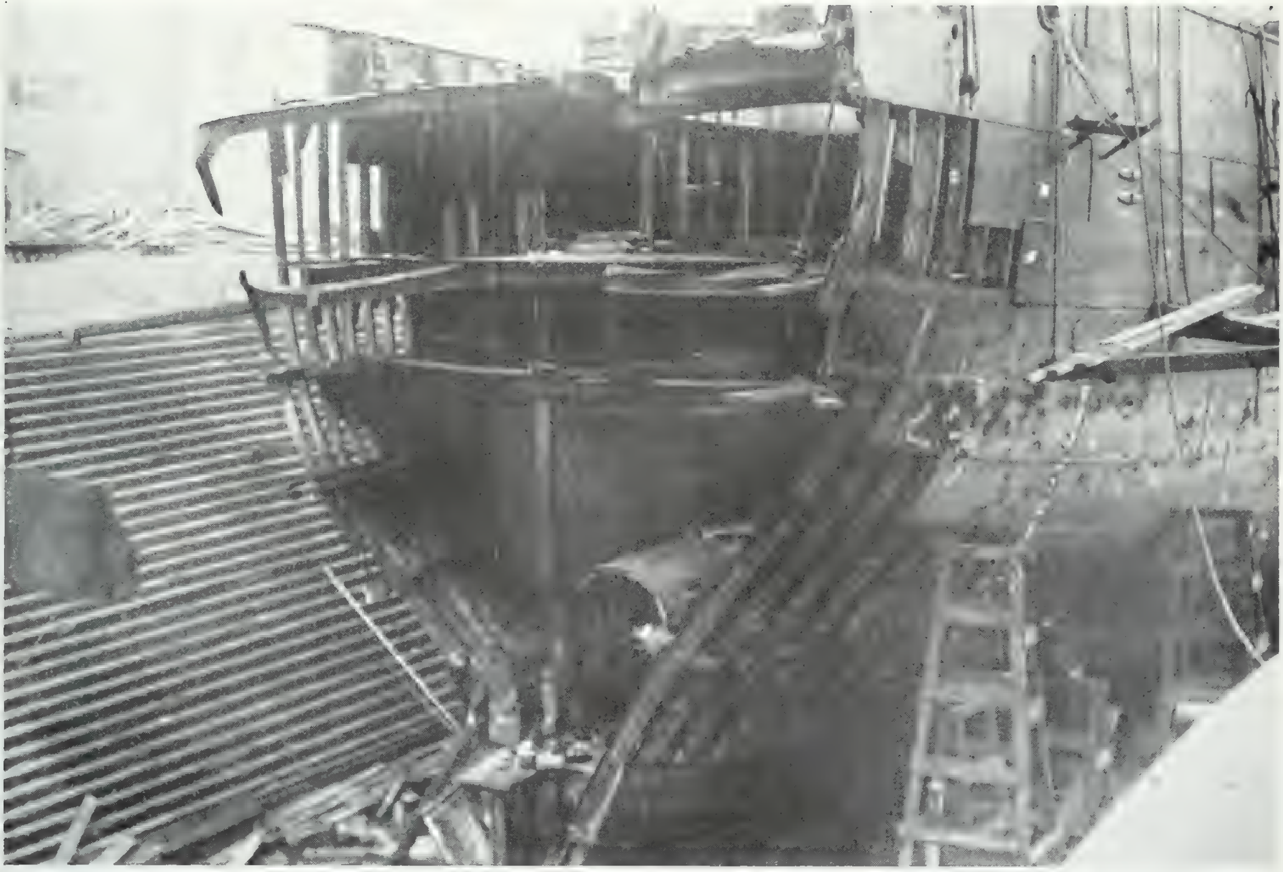
"One of the earliest requirements of the shipping situation is likely to be a general international agreement about the employment of the agencies of ocean transportation in the least wasteful and the most effective way.

"The freedom of the seas, as a working formula of peaceful intercourse, should find a larger conception. It should stand for open ports and as free an interchange of commodities as the fiscal necessities of the nations will allow. To ourselves, with a merchant marine commensurate with the resources of our country, the lesson will come with new force, that to sell we must also buy."

British Editor's View

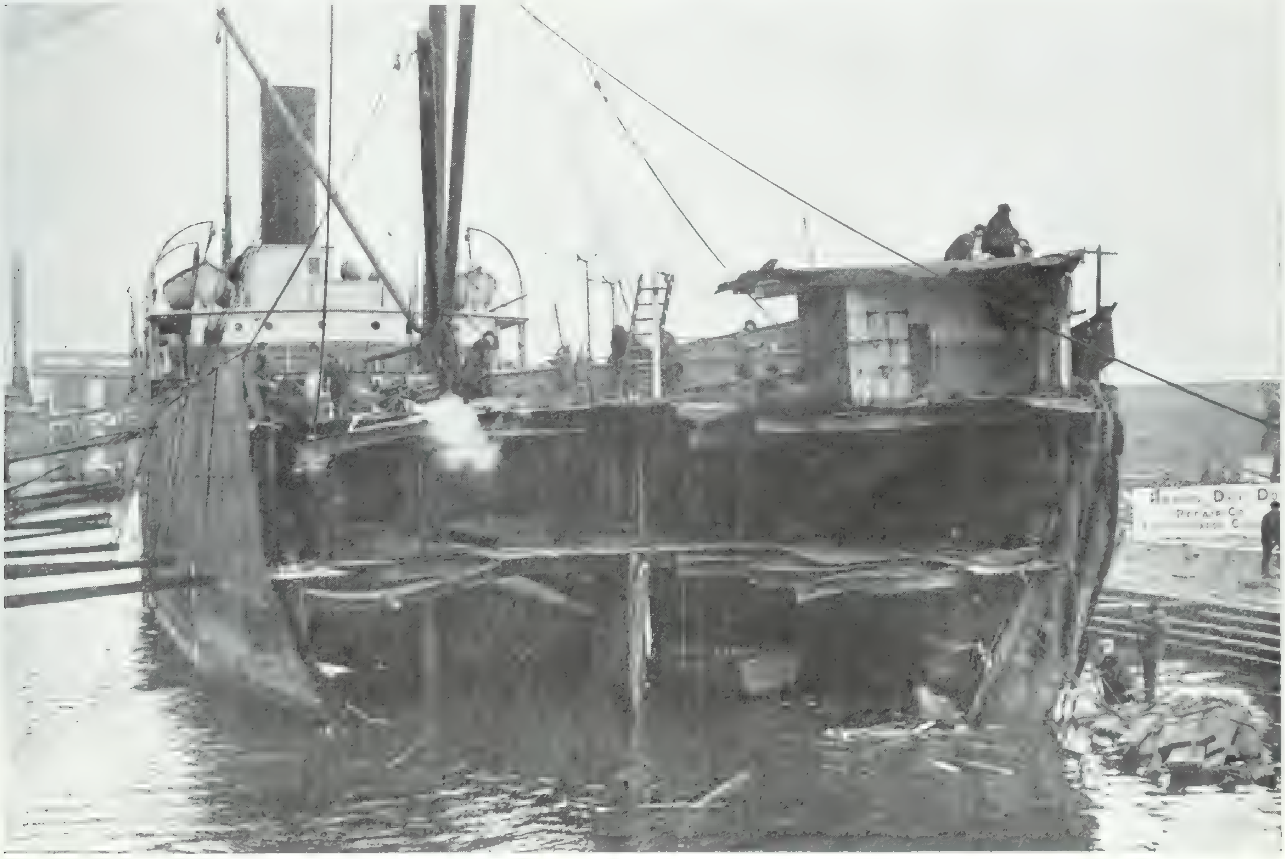
THE plan, which appears to be a compromise of six other plans suggested and considered, will require congressional approval. It would appear that Mr. Hurley is convinced that the government cannot continue the operation of ships as a commercial proposition, and that it is desirable to cut the losses that have been incurred in this connection. And yet the plan does not really do that. It appears, anyhow at first sight, to be a camouflage of government ownership, with a cruder form of protection than any yet produced by other nations. Mr. Hurley's development fund is, as he frankly admits, to pay the losses on unremunerative services, for the ships are to be run on services specified by the government. We should say owners will have quite a good time for ten years, and then, maybe, the taxpayers will object to continue the subsidies.

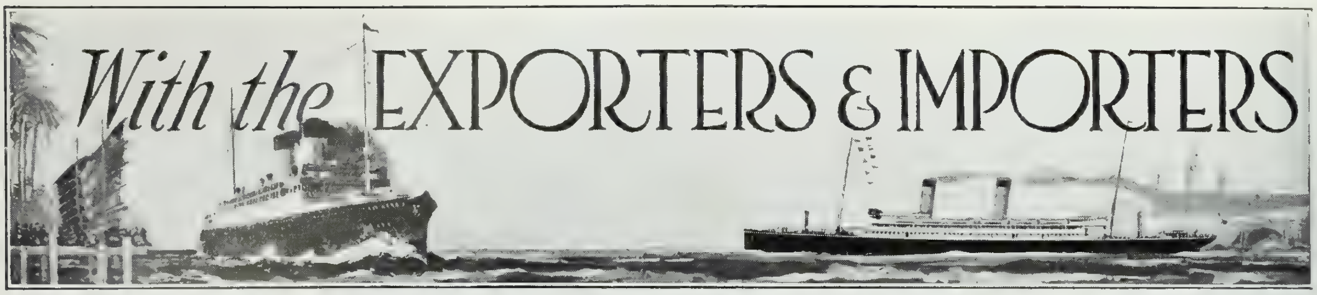
The Lord Dufferin



On February 28 the Lord Dufferin, lying at anchor off Bedloes Island, New York Harbor, was rammed by the liner Aquitania laden with troops returning from France. The Lord Dufferin was loaded with a full cargo of merchandise, mostly sugar from Cuba. Sixty feet of her stern was sliced off and sank immediately. Cargo began pouring out of her hold and she was rapidly sinking when Captain Bass of the tug Mutual boarded her, slipped her cable and towed her to the beach on Bedloes Island. All of her crew except one were saved.

The illustrations show the forward portion of the Lord Dufferin in the dry dock at Robins Dry Dock & Repair Company, Brooklyn, where she is being prepared to have the stern fitted in place, the latter having been recovered from the harbor bottom by salvage companies. This is one of the most spectacular repair operations that has been seen in New York harbor.





With the EXPORTERS & IMPORTERS

SAN FRANCISCO FREIGHT REPORT

April 19, 1919.

OUR last report was dated March 20, in which we stated there was a demand for tonnage to Scandinavia, the same resulting in the chartering by the United States Trading Corporation, of the full-powered motorships Semmeltind, Kirketind and Trolltind, all about completed building at Puget Sound, and all chartered at $40 with full cargoes of barley from this port to Copenhagen. The sailer Falketind, now in this harbor, was also chartered by them at $40 to Copenhagen or Christiania, with barley from this port, and the owners have since given the charterers the option, at the same rate of freight, of sending the vessel to any direct port of the United Kingdom or to Rotterdam direct.

Barley in Wood Vessels

Balfour, Guthrie chartered the schooner John W. Wells on the basis of 140/-, Scandinavia or Cork for orders, United Kingdom at 120/-. She is practically a new five-masted schooner built of wood. The scarcity of tonnage alone had prevented further business to the United Kingdom until the United States Shipping Board suddenly made up its mind to accept barley on its new wooden steamers of the Ferris, Ballin and Hough types at $31 to Cork for orders, United Kingdom not north of Liverpool or Hull or to Havre, Antwerp or Dunkirk, and $1 a ton less if ordered to a direct port discharge. G. W. McNear chartered two; Strauss & Company, two; E. L. Eyre & Company, two; and Westhrope and L. C. Sheldon, one each. These vessels were able to charter, because, through Wilcox, Peck & Hughes, the shippers succeeded in placing insurance on them, with barley at 6 per cent, covering all average above $750.

The Shipping Board yet may have a few more vessels to charter. They are furnishing Charles R. McCormick, altogether, with thirty-five steamers for his tie order from the North to New York or adjacent ports. The idea of the Shipping Board is to get these vessels over where they believe they may find a ready sale for them to use on the coasts of England, France or in the Mediterranean, for which they would be well fitted as they would not have to displace cargo space on account of short voyages.

Steamers Ask Too Much

One or two steamers have intimated they would accept barley for United Kingdom, etc., at $50 to $45, but no business could result at these figures. In our opinion they no doubt could get $37.50 for one port, $40 for two ports, United Kingdom or France.

The demand for barley ships to United Kingdom has helped lumber freights in that direction, and there is a good demand for vessels for lumber at $45 a thousand from the North. For cargoes of sleepers, $42.50 a thousand would be paid readily, and for an Italian port $55 a thousand has been offered and declined by vessels. Rates from the New York side and from the Gulf of Mexico are much higher than they are here. From the Gulf as much as $60 a thousand to Buenos Ayres has been done, and they are offering $60 to $65 for the United Kingdom or French ports, and $70 to $75 to Italian ports.

Oriental Rates Lowest

The lowest frieghts on the Pacific are to and from the Orient, and we wonder that some of the steamers that are running backwards and forwards, trans-Pacific, do not come into the market for barley to the United Kingdom.

In time charters nothing more has been done on this side, but all the New York and Gulf of Mexico reports show that they are paying the full limits on time charters, namely, 35/- on neutral vessels and from $9 to $9.50 on American steamers, and sub-charters are ranging, from New York, etc., to ports in Europe, all the way from $45 to $60 a ton.

The tendency, since our last report, has been downward for lumber to the West Coast. The steamer Sierra was fixed at $32.50, Callao. The steamer Idaho was fixed also at the same rate, followed by the charter of the schooner Oceana Vance and Makaweli at $30, and within the last day or two the schooner Blakeley was chartered at $28 a thousand, freight prepaid in cash without discount.

Australia Is Nibbling

Australia at last has commenced to nibble again. For a long time no business was done. J. J. Moore & Company chartered the auxiliary sailer Malahat from Puget Sound to Port Pirie, and the schooner Lahaina at $30, also to Port Pirie.

We forgot to mention that the schooner S. G. Wilder, to two ports in Peru, was lucky enough to get $35 a thousand before the break came to the West Coast.

The schooner Puako has been chartered by Hind, Rolph for their own account, to South Africa. The rate is private, but we believe it is better than 225/-, and within the last two days the schooner R. R. Hind has been closed at the reported rate of $32.50 for Sydney and/or Newcastle. Shipowners are now asking $35.

Case oil charters are still low, the little wooden bark Laura having been fixed at 60 cents a case from San Francisco to Wellington or Wanganui. The bark Raupo, which has been lying in the harbor for the last month or so, is reported fixed at 4/- for case oil to New Zealand, but we are not sure that this is so. The charter certainly could not have been made except to New Zealand at this rate.

G. W. McNear has chartered the C. D. Bryant for a lump sum, San Francisco to Guam, as also the Mindoro, owned by them.

Messrs. Swayne & Hoyt have chartered their steamers Alvarado and Eldorado from Hongkong with rice for Cuba, on the basis of 90/- a ton.

Altogether we think the market for ships is going to be better.

G. W. McNear is credited with having paid $105,000 for the steamer Mindoro, and has resold the motor schooner Ozmo to the Northern Commercial Company for its Alaskan business at $100,000, and Mr. Scott, from the Gulf of Mexico, has bought the Blakeley at $50,000.

PAGE BROTHERS.

PACIFIC COAST FOREIGN TRADE

THE foreign trade situation on the Pacific Coast at the end of April may be summarized as follows.

Steel: Business from the Orient has been slow, despite a number of inquiries being received. If the English colonies are buying it is from the home country. Japan is overstocked. China is doing business, but Japanese merchants are flooding that market with their surplus.

Rice Goes Through Canal

Rice: The movement of rice from the Orient to the Pacific Coast and thence by rail and steamship to the West Indies, although still continuing in very small measure, is being replaced by full cargoes moving directly from the Orient via the Panama Canal.

Bags: The market is stronger and other advances are looked for.

Caustic Soda: The small quantities that foreign markets are taking are moving via New York because of the lower freight rates. Few shipments have left the Pacific Coast.

Good Inquiry for Oils

Vegetable Oils: There has been a good inquiry recently. The government bought much lard compound, and there were increased exports of domestic cottonseed. Cocoanut and soya bean oils may go higher.

Rosin: Prices are firm. Soda Ash: Much the same as caustic soda. There is no deamnd in the Orient. Tapioca: Moderate demand at nominal prices. Cinnamon: Good demand at moderate prices for export. Fuel Oil: No change; San Francisco and San Pedro, $1.62; Portland and Seattle, $1.85; Tacoma, $1.87; Honolulu, $2.15—barrel of forty-two gallons. Paper: Slightly better demand and optimistic feeling.

SAN FRANCISCO VERSUS SEATTLE

THE San Francisco Chamber of Commerce has issued the following statement as to the relative import and export business of San Francisco and Seattle:

The customs district of San Francisco includes three ports, viz., San Francisco (including Oakland), Eureka and Port San Luis. The customs district of Washington comprises twenty ports, viz., Seattle, Aberdeen, Anacortes, Bellingham, Blaine, Chopaka, Danville, Everett, Ferry, Friday Harbor, Laurier, Molson, Northport, Port Angeles, Port Townsend, Roche Harbor, South Bend, Spokane, Sumas and Tacoma. Properly to interpret the figures as given for the Washington customs district it is well to note the distance between Seattle and some of the other ports, as follows: Northport is 468 miles, Spokane 339 miles, Blaine 119 miles, Sumas 128 miles, Bellingham 97 miles, Tacoma 38 miles and Everett 33 miles from that city. The following are the imports and exports for the year ending December 31, 1918:

	Imports	Exports	Total
Seattle	$215,198,466	$191,281,673	$406,480,139
Tacoma	58,479,737	82,525,497	141,005,234
Blaine	11,925,504	13,334,135	25,259,639
Sumas	4,123,233	4,976,577	9,099,810
All other	11,263,196	4,072,896	15,336,092
Total	$300,990,136	$296,190,778	$597,180,914

It will be seen that Seattle did only 72 per cent of the imports and 65 per cent of the exports. During the same period San Francisco imported and exported ....$245,524,209 $210,562,365 $456,086,574 more than

Seattle 30,325,733 19,280,672 49,606,425

These figures should put the port of San Francisco in the light it is entitled to.

MARSHALL TEN BROECK DAVIDSON

MARSHALL TEN BROECK DAVIDSON, president of the M. T. Davidson Company, builders of the well-known line of "Davidson" pumps and pumping engines, died at his home in Brooklyn, April 10.

Old Member of A. S. M. E.

Mr. Davidson was one of the oldest members of the American Society of Mechanical Engineers; also a member of the Society of Naval Architects and Marine Engineers, the Naval Order of the United States, Associate Society U. S. Grant Post No. 327, the Columbia County Association, life member of the Navy League, and was, from its inception, an active and life member of the Union League Club of Brooklyn.

He was born in Albany, 1837, and from his early boyhood showed great interest in steam machinery, particularly the locomotive and steamboat engines. In 1857 he entered a marine engine machine shop, Ft. North Moore street, New York City, and later went to sea as assistant engineer on ocean steamers.

In the Civil War

Upon the breaking out of the Civil War, he was assistant engineer on a steamer running from San Francisco to the settlements on Puget Sound. He went East in 1862 as a volunteer, second assistant engineer in the naval service, but was requested to accept a position as chief engineer of an army transport, building at Wilmington, Delaware. He superintended the construction and installation of the machinery of this vessel, and after its completion received a commission as chief engineer in the revenue cutter service, and superintended the building and installation of the machinery for that service.

At the close of the war, Mr. Davidson became a contracting engineer, and in 1878 started the business which is now carried on in Brooklyn, building pumps and pumping engines.

New Ships for Our Foreign Trade

By A. C. Worthington

Vice-President, Maritime Navigation Company, Inc.

THE American shipowner and operator lacks one great essential in his mental makeup. Rather, I might say, he lacks two essentials: "ORIGINALITY AND IMAGINATION." Both are so important that I have put them in capitals. Now someone is already beginning to sputter. I can see the doubling of fists, the heaving of chests and hear the roar.

"Greatest Fellow in the World"

"Don't go and say anything you are sorry for. Why, the American is the greatest fellow in the world. He has a corner on all of the imagination and originality since the time of Adam and he can put it over all comers and—well, there you are! Now, what have you to say about it?"

That's right. Now you are through and perhaps you are willing to listen to me for a moment. I say again that the American shipowner and operator is woefully lacking in the great essentials. And I will prove it in the one word — MOTORSHIP.

There, you see, I have used the capitals again.

To Denmark for Originality

Let me tell you something. You say you have imagination and originality. Well, when we speak of the motorship I am compelled to go far away from here to find the essentials I spoke of. In fact, I must make the long trip across the waters recently infested with the little tin fish. I must go clear to Copenhagen. And there I proceed to send my card to the one man on earth who, as a matter of fact, seems to have a corner on all of the imagination and originality in the world insofar as it concerns the motorship. I really am sending my card into the inner office of Alfred Andersen, head of the East Asiatic Company, and I am really acting by proxy, for B. F. Hernandez, the president of my company, first called my attention to the Danish concern which stands alone in the field of motorships. For mark you, it is now more than a year since Mr. Andersen made public the fact that his company had decided to throw all of the steamships into the discard and substitute motorships. At that time Mr. Hernandez became keenly interested in the subject and ever since he has talked motorship until we who come in constant contact with him in New York could not help accumulating a mass of information regarding the type of vessel which already has commenced to revolutionize ocean commerce.

A. C. Worthington

We Would Control the Seas

A friend of mine who was associated with the Danish consulate at New York heard Mr. Hernandez discuss the motorship several months ago and then remarked:

"If all of the American shipping men believed as you do, Mr. Hernandez, your wonderful country would soon be filled with Andersens and then you could control the ships of all of the seven seas."

Believes in the Motorship

And the distinguished Dane was correct. He certainly spoke the truth, for Hernandez is a motorship admirer. He believes that we have missed the opportunity of a century by refraining from going in for the construction of ships driven or propelled by internal combustion engines. And because of that belief he is not in a hurry to expend vast amounts for the purchase of steamships—even if they are offered by the Shipping Board at what seems a bargain price. Sometimes bargain prices do not pay because the bargain may prove to be useful only to place away in a dark closet, or, if the bargain be a ship, it may be advisable in a short time to delegate the craft to the flats where the hull and machinery may rust and rot in peace. Because I am quite certain that bargain days will be presented to every Tom, Dick and Harry who wishes to expend money for ships from American ports, with the Stars and Stripes floating aloft, I am interested in doing my bit in informing the would-be American ship owner that there may be reefs and rocks just to the leeward. The wind is blowing toward financial disaster for some persons, in my opinion, and I am going to tell you why.

The experience which may be expected in the future for some Americans reminds me of a friend of mine who lived on a farm in Illinois. He just loved to attend an auction. Well, the result was that he accumulated more useless material than you could shake a stick at. He bought everything that was offered because it seemed cheap. The result was that he may have purchased goods for which he paid, say, $1000. He could not use it all, so he junked the most of it. He used probably one-tenth and this could have been purchased new at $200.

Now, I am of the opinion that the time will come when there will be a grand opportunity to purchase ships at bargain prices. Mr. Hurley has announced that the intention of the government is to sell the Shipping Board ships to the highest bidders. There you have it, an auction, if you please, and all who have the desire and the means to gratify the desire to handle ships will be afforded the opportunity to get the ships.

This is where the question of imagination comes into play. Just stop and think a moment and see where we are. It may be imagination on my part, but I am firmly of the opinion that many persons who buy these ships may find themselves in the same class as my friend from the Illinois farm. They will have purchased something at a bargain price (maybe) and it may not be long before the thing they bought will have to be junked. Why? Because they have secured a steamer and not a motorship.

Steamship as Freighter Is Doomed

Mr. Andersen of the East Asiatic Company had the imagination to conceive that the steamship as an ocean carrier, of freight at least, was doomed. He then had the courage to be original and the result is that his company is through with the type of ship that is doomed to go to the junk pile. His company has disposed of practically all of its steamers and is now operating bigger than ever with motorships. Others are being constructed and they are not little fellows, either. The smallest will be about 9000 tons deadweight and the present limit is something less than 15,000 tons deadweight. And that is the sort of competition the American ship operators are going up against in the near future.

I fear that many of our shipping men are forgetting another vital fact, and that is that America alone seems to be behind the times in the matter of motorships. Norway and Sweden are known to be forging ahead in this class of construction. But there is another country that is wide awake. Japan secured the rights to manufacture certain internal combustion engines long ago. The Japanese are now building the motorship and it will be but a few months until we will see them enter and depart at American ports.

England Launching Out

England is preparing to launch out upon the same sort of ship construction program, and you may be sure of one thing, and that is that at this time Mr. Hurley and his associates are busily engaged in preparing for the construction of the same type, and they will be big ships at that and as good as ships can be built. Think of it; American motorships, up to 15,000 deadweight tons capacity and driven by internal combustion engines, are ships that are destined to go after the commerce of the seven seas.

Then if we are going to get this kind of ship, why should we buy an inferior article? Why expend big money, even at bargain prices, to purchase ships which will not stand against the keen competition not only of the foreign motorships, but also of those now building for our American merchant marine. It is a time when the ship operator should stop and think. The danger signal is set. We have come to the cross roads. If we step in the wrong direction there may be financial disaster, for when the motorship gets into action on a large scale every steamship on the seas will be junked.

Time for An Inventory

It is high time that the men who control the shipping of America paused and demanded that we take an inventory of what we have. Steamships are being launched each day. Scotch boilers, triple expansion engines and turbines are being assembled to go into the hulls, and when all is said and done we will have a lot of bargain-counter ships in the end. There is not a right-thinking operator of ships today who does not know that the days of the steamship are numbered. Then why should we persist in going ahead and permitting the government to construct more?

I purposely refrain from entering into the details of the comparative costs of operating and maintaining steamships and motorships. There is not a week that passes in which there are not scores of articles written by men who are well qualified to write. They are expert engineers; technical men, if you please, and they have decided that the motorship can operate at a fair profit and the steamship in the same service will fail to make any showing at all. Now let us have a bit of imagination. Imagination at times is simply permitting the mind to function along rational lines. Some of us are a bit excited about the prospect of buying one, two or more of the Shipping Board steamers. That would be all well and good if all the other countries were confining themselves to building only steamships. But, unfortunately, this is not the case, as we have seen. The truth is that there will soon be a huge fleet of British, Scandinavian, Japanese and what-not motorships. They will flit about from port to port in all oceans. After the conditions become normal there will be a grand battle for cargoes. The rates will drop lower and lower and, of course, the concern offering to carry for the least rate will get the business.

What Chance Against Motorships?

Then suppose you are equipped with a fine fleet of steamers. What chance will you have against the concern possessing a fleet of motorships? They will cut the rate until there will not be enough in it to pay for your crew wages and fuel, and at that they will not go bankrupt. They will continue in business and the annual report will indicate a fair and substantial profit, but how about yourself? You will attend the last rites of your concern and listen to a solemn report written in red ink.

I do not wish to be an alarmist. I am an optimist by nature and prefer to smile and be happy, but for the life of me I fail to get any comfort in contemplating what will happen to our merchant marine if we center our efforts in the work of building steamships. They will be about as useful for the purpose of winning out as carriers on the seas in the not distant future as the old Constitution would be if revived and sent forth to battle against one of the modern battleships of the first class. This country has the reputation of being a place filled with smart people. Yankees, who never overlook anything, used to be the correct designation, but, to a man up a tall mast looking down into the huge funnel of a modern and wasteful steamship, it appears that we have got into the habit of thinking we are perfect for so long a period that we may be going to seed—along certain lines.

Ships That Can Survive

Let us wake up, therefore, and exercise our imagination a bit. Let us first imagine that we can give the world odds and then win out. Let us demand of Mr. Hurley and the Shipping Board that we plan and build ships of a type that will survive the great impending battle of commerce overseas. Let us demand that the best American minds be put to work to evolve a type of motorship that will be just a bit better than anything being built by any other country. Let us have as much imagination as Mr. Andersen, the great Dane, who only recently has been decorated by his king, because this original and imaginative man of ships has done more for Denmark than any other three Danes in the country's history. I could have become technical and indulged in figures galore. I could have told you in exact figures how much it would cost to operate a motorship for a given distance; the cost a unit ton for construction, for operation and other things. But you have read of these things frequently. I have but one purpose in view, and that is to get the shipping men interested enough to venture to protest against the existing shipbuilding program. We must shift to the motorship definitely in the future when competition compels us. Why not make the change now, when we will retain an advantage and not be forced to make a fight after we have lost all advantage? The entire matter must be solved by the men who operate the ships.

AUSTRALIAN FREIGHT REPORT

Sydney, April 1.

Since writing our letter of February 8 (published in Pacific Marine Review for April) the position has not changed; consequently we have not written. The policy appears to be one of "wait and see," but should the position change we will immediately write. BIRT & CO., LTD.

David Dorward

DAVID DORWARD, SR., pioneer transportation engineer, constructor of the first cable-road machinery in San Francisco, and first electric-road machinery in that city as well as the street railway system between Oakland and Alameda, died in April at his Alameda home, 1242 Bay street.

He was sixty-nine years old and a native of Arbroath, Scotland. He is survived by his widow and four sons—David, Jr., John G., George D., and Robert Dorward.

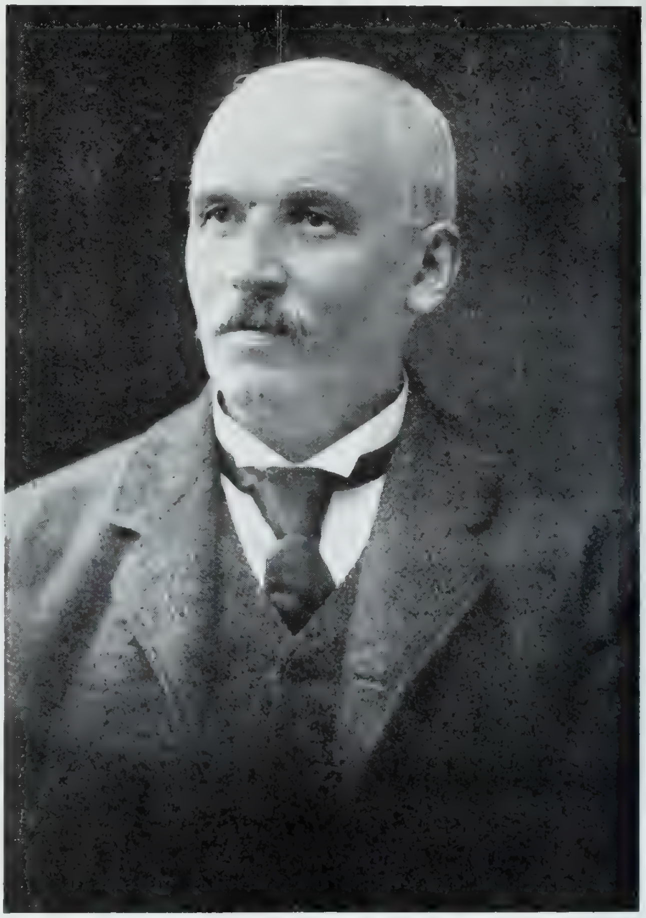
To San Francisco in 1873

Mr. Dorward came to this country in 1871, locating at Rochester, New York, where for several years he was connected with the mechanical department of the New York Central Railroad. He went to San Francisco in 1873, joining the Risdon Iron Works, with which company he was identified for the greater part of his career. For many years he was general superintendent of this company and had to his credit the handling of some of the most important installations of the time.

Developed Hydroelectrical Installations

During his association with the Risdon Iron Works he was a leading figure in the development of hydroelectrical installations on the Pacific Coast, also in the mechanical installation for the Comstock mines and the Spring Valley Water Company. His versatility extended his activities to every branch of the engineering profession, including marine work. He numbered among his friends some of the most prominent persons on the Pacific Coast.

When the Risdon Iron Works was discontinued, he organized and for the past ten years has been the senior member of the Dorward Engineering Company of San Francisco. He continued his business actively until three days before his death. For several years the Dorward Engineering Company has been in charge of the Heine boiler interests in San Francisco.



David Dorward

What Wooden Yards Have Done

THAT approximately 346,000,000 feet of lumber from the forests of Washington and Oregon is being used in the government's wooden shipbuilding program, now being wound up in the two states; that this equals about 5 per cent of the 7,000,000,000 feet of lumber cut in 1918 in the Northwest district, and figured at an average of $25 a thousand, represents about $8,650,000, are a few of the statistics recently compiled to show the importance of a continuance of the wooden shipbuilding industry.

Washington Has Launched Eighty-eight

Washington already has launched eighty-eight wooden ships of 322,080 tons, and has under construction thirty-four wooden vessels of 128,555 tons; and Oregon has delivered forty-one wooden vessels of 130,929 tons and still has to deliver fifty-two ships of 181,120 tons. This will make a grand total of 215 vessels, or 762,684 tons of shipping provided by the two states for United States Shipping Board—450,635 tons by Washington and 312,049 tons by Oregon.

In arriving at the amount of lumber contained in the two states' output of wooden hulls, the 205 vessels aggregating less than 4000 tons were estimated to contain approximately 1,600,000 feet of lumber; eight vessels in the Oregon district rated at 4500 tons were estimated at 1,750,000 feet of lumber each, and two 5400-ton ships building in the Washington district were figured as requiring approximately 2,000,000 feet of lumber to the vessel.

Value of Lumber $8,650,000

Figuring the 346,000,000 feet of lumber at an average cost of $25 a thousand, the total value of the lumber used in the Oregon-built vessels would approximate $3,750,000, and in the Washington vessels about $4,900,000, or a grand total of $8,650,000.

Estimating three men to the thousand feet of lumber, two men in the mill and one in the camp, and figuring an average daily wage of $5.50, the payroll for producing this 346,000,000 feet of lumber would total $5,709,000. The total, therefore, to the lumber industry, both employes and owners, in dollars and cents, from wooden shipbuilding of the two states has been an enormous sum. In addition to this the Northwest district realizes the benefit of the immense payroll of the shipbuilding industry itself, practically every dollar of the whole amount reverting into the channels of trade of the two states.

Grays Harbor Uses 86,850,000 Feet

The Grays Harbor district of Washington, recognized as one of the greatest lumber-producing districts in the country, used approximately 86,850,000 feet of lumber in building wooden ships, private and government, since the revival of the wooden shipbuilding industry. This equals about 6 2/3 per cent of the 1,300,000,000 feet of lumber cut in 1918 in the Grays Harbor district, and figured at an average of $25 a thousand, represents about $2,171,250. On the same basis of three men to the production of 1000 feet of lumber, and estimating $5.50 as the average daily wage, the payroll for getting out this material would approximate $1,430,000. Added to this is the payroll of the Grays Harbor shipbuilding industry, placed at about $5,650,000 for the period, making a grand total in wages alone of $7,080,000.

Vessels Contain About 1,600,000 Feet

In arriving at the total of 86,850,000 feet of lumber used in the Grays Harbor shipbuilding industry, the government vessels constructed in Aberdeen are figured as containing about 1,600,000 feet each, twelve vessels already launched and three on the ways at the Grant Smith-Porter plant, and fifteen in the water and six under construction at the Grays Harbor Motorship yard. The fourteen vessels built at the two Aberdeen yards previous to the beginning of the government program are estimated as consuming about 1,250,000 feet to the hull. In Hoquiam the ten vessels launched and one on the ways at the Matthews yard are taken as containing a total of about 10,750,000 feet of lumber, and the two auxiliary schooners built by the Chilman yard about 1,000,000 feet.

THE NAVY AND THE NEW MERCHANT MARINE

In a speech at New York, Vice-Admiral Albert Gleaves, U. S. N., said that the navy itself might be considered the backbone of sea-power and the merchant marine the sinews and muscle. Whether the merchant vessels be owned by the government or private interests, the admiral said that there still remained certain vital points.

"First—There should be no discrimination between the pay of a merchant seaman and a man-of-warsman, because both services are voluntary, and an equilibrium should be established and maintained in their compensation.

"Second—The merchant seaman should be as comfortable and his quarters as sanitary, and in general he should be as well taken care of as the man-of-warsman.

"Third—The captain of a merchant ship should have, as far as possible, the same disciplinary control over his men as a naval captain over his men."

In elaborating on the last point, Admiral Gleaves referred to the fact that it was possible for a seaman to quit his vessel when he chose, leaving his captain to make the most of it; but that, given good wages and conditions aboard ship, there was no reason why the sailor should not at least ship for the return trip to the port of embarkation.

AMERICAN-RUSSIAN TRADE IN 1918

The total trade between the United States and Russia fell off to $28,000,000 in the calendar year 1918, as against $438,000,000 in the preceding year. Imports from European Russia in 1918 ($7,000,000) were more than half of the 1917 figures ($12,000,000), and imports from Asiatic Russia showed an actual increase from $2,200,000 to $4,000,000, due to the $2,000,000 worth of platinum recorded in 1918.

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FRANK G. TAYLOR, GENERAL AGENT FOR WASHINGTON, OREGON, ALAS

Marine Insurance News and Comment

By Benjamin Rush

President, American Foreign Insurance Association

(An address delivered at the "group session on ocean service," National Foreign Trade Convention, Chicago, April 25)

THE root idea of marine insurance is extremely simple, namely, to distribute among a number of individuals a loss which otherwise would be crippling to any one of them. The absence of marine insurance would amount to the conferring of a monopoly on such individuals or corporations."

Shipping, Banking and Insurance

Mr. Rush proceeded to describe the functions of a marine insurance company, and pointed out that the union of shipping, banking and insurance under the American flag was essential to a successful foreign trade.

"Both Great Britain and Germany have founded their trade success on the uniting of these three factors. If any of the three are absent, the influence of the other two is greatly weakened. Furthermore, American merchants would find they would get certainly as good, and possibly better, treatment from American insurance companies than they would from the insurance companies of a nation in commercial competition; certain it is that even when rates and conditions in other respects were absolutely equal they would be wise to patronize domestic companies, for by so doing they keep capital at home instead of exporting it to strengthen the commercial position of their trade rivals, nor would they run as great a risk of their business operations becoming known to foreign competitors.

At Mercy of Their Rivals

"In time of war it would be a vital necessity to patronize the American insurance market, while in time of peace, if such a market were absent, they would again find themselves at the mercy of their commercial rival, in a foreign country.

"There is at present, I believe, ample insurance capacity to take care of American marine insurance requirements, and it is to be hoped, certainly from the merchants' and shipowners' point of view, that this large capacity will be maintained and increased because it is a guarantee against rates for marine insurance being unduly high."

The superiority of private insurance to that of the government was emphasized by Mr. Rush.

"It is the business of the private underwriter to see that his insurance rate is adjusted accurately to those hazards for each particular kind of cargo shipped, for every voyage, and by every kind of conveyance, and to all the various hazards which are generically lumped under the head of marine perils, and these hazards are changing continually.

No Adjustment of Rate to Hazard

"In its essence government insurance is a monopoly which takes away from marine insurance the stimulus of private profit; therefore, under government control I think it would not be very long before the merchants and shipowners of this country would find that the wise, the skillful, the able, the energetic and the intelligent, would be expected to make up for the loss of the idle, the negligent, and the easy-going. Under government operation there would be no inducement to adjust rate to hazard, or to distinguish between the business qualifications of individuals or corporations.

Government Gets the Shiftless

"The theory of government insurance is to insure properties of equal construction at an equal rate without taking into account the human equation. This is a wrong theory and bad underwriting. It would result in careful merchants transferring their business to the underwriters of foreign countries, where they got consideration for their business ability, in the rates which would be quoted to them, and it would leave to the government bureau the shiftless gentlemen, and the resulting loss would be ultimately unloaded on the shoulders of the long suffering tax-payer."

PACIFIC COAST LOSSES, 1918

FORTY-TWO Pacific Coast vessels were lost in 1918. They were: Steamers Stolt-Neilsen, Westover, Umatilla, F. A. Kilburn, Ravilli, Rosalie, Mary Olsen, Luz Blanco, Coos Bay, Blackford, Newburg, Breakwater, Quantico, San Gabriel, West Land, Benito Juarez, Princess Sophia, George Loomis, Iaqua, Dumaru and Mandalay. Motorships Ethel and Madrugada, Starsia; barge Wellacut; auxiliary schooners, Portland, Mahukona, Bertha Dolbeer, Jas. H. Bruce, Expansion,

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37-43 WALL STREET NEW YORK
D BRITISH COLUMBIA, 264 COLMAN BUILDING, SEATTLE, WASHINGTON

Crescent, Annie Larsen, A. M. Baxter, Ethel Zane, Ilwaco and Remittent; ships, Tacoma, Star of Poland, A. J. Fuller and Aryan; barkentine Koko Head and bark John Murray.

WON'T ASSUME MARINE INSURANCE

DIRECTOR GENERAL HINES of the United States Railroad Administration, has sent to the various steamship lines the following circular, which cancels the circular dated October 26, 1918, in relation to marine and war-risk insurance:

> Marine Risk—Effective May 1, 1919, except where rates, in tariffs applicable, indicate that they include marine insurance, these steamship lines and steamship companies will not assume the marine insurance on property while in their possession.
>
> Note.—In taking the above action, the conditions respecting marine insurance, which were in effect prior to October 10, 1918, on which date it was provided for the assumption by these lines and companies of marine insurance on all traffic handled by them, are restored.
>
> All rates which, on October 9, 1918, included marine insurance, are not affected, and will hereafter include marine insurance, as also will those rates which, prior to October 10, 1918, did not include marine insurance, but have, subsequent thereto, been advanced to the all-rail basis.
>
> War Risk.—The occasion for these steamship lines and steamship companies assuming war risk having disappeared, effective May 1, 1919, the assumption of war risk will be discontinued.

The lines controlled by the government are: The Coastwise Steamship Lines, Ocean Steamship Line, Old Dominion Steamship Line, Southern Pacific Steamship Line, Baltimore Steam Packet Line and Chesapeake Steamship Line. Lines not controlled by the government are: The Clyde Steamship Company, Mallory Steamship Company, Merchants & Miners' Transportation Company and the Southern Steamship Company.

A DECISION FOR UNDERWRITERS

A DECISION by Justice Bailhache, King's Bench Division, London, is of interest to underwriters and shippers. The circumstances were these: A warehouse firm of Liverpool, interested in the storage of nitrate from the West Coast of South America, wished to protect its profit if certain shipments did not reach its warehouse. A policy accordingly was written with this clause:

> "To pay a total loss if vessel does not reach the destination named in policy through any cause that may arise."

Total Loss Is Claimed

The policy was written by Lloyds' underwriters at 90s per cent, the current rate for war and marine risks. One of the vessels, the Glenaffric, loaded at Iquique and sailed for Liverpool or Birkenhead. Antony Gibbs & Sons, government agents, advised the warehouse firm that the vessel would go to Birkenhead, whereupon notification was made that the risk would attach to the policy. The government diverted her to Savona, where she discharged. The warehouse firm claimed a total loss, inasmuch as the vessel did not reach her intended destination.

Justice Bailhache gave judgment for the underwriters. His decision was:

"I take it to be a rule of marine insurance law that when an assured desires to insure against an unusual risk unconnected with marine or war risks, he must take one of two courses: Either he must procure the insertion in his policy of apt words descriptive of the special risk he wishes to cover, or, if he is content with wide general words, he must be prepared to show that the special risk he was minded to cover was brought to the underwriter's attention at the time he initialed the slip, or subscribed the policy, in such a way that the underwriter had his mind directed to it.

Risk Unknown to Underwriters

"When assured has in mind a particular and unusual risk known to himself and unknown to his underwriters, he does not cover that risk by general words in a policy which, taken by themselves, are, as a rule, matters of construction wide enough to cover that risk."

PACKING FOR CHINA MARKET

IT has come to the attention of the commercial attache at Peking, China, that American manufacturers generally do not appreciate the primitive conditions prevailing in a large part of China, which necessitates goods being strongly packed in small packages. Goods ultimately destined to other parts of China than Shanghai are subjected to many very rough handlings, and even at Shanghai goods have to be discharged in lighters. Goods coming to China are often transshipped at Kobe.

Pacific Coast Shipbuilding Returns

Albina Engine and Machine Works, Inc., Portland Ore.

Purchasing Agent, **W. L. Deute.**

Hulls Nos 11 to 19, 300 by 44 by 21.5; engines 22-36-60, 1400-h. p. Glymont launched April 23.

Allen Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **G. E. Hunt.**

Two Allen type vessels, 274.6 B. P. by 44.9 by 26.4.

American Concrete Pipe & Shipbuilding Co., Seattle, Wash.

One 7,500-ton concrete steamship.

One 150-foot steam concrete tugboat.

Two concrete scows, 120 feet long.

American Marine Iron Works, Portland, Oregon

Purchasing Agent, **Carl R. Jones.**

Contracts covering cast iron fittings for steel and wood yards of G. M. Standifer Construction Corporation, Vancouver, Wash.

Ames Shipbuilding and Dry Dock Co., Seattle, Wash.

Purchasing Agent, **Mr. C. A. Barron.**

Twenty-seven vessels under contract, mostly 8800- ton freighters. West Islay, launched April 26.

Anacortes Shipbuilding Co., Anacortes, Wash.

Purchasing Agent, **Will W. Dunn.**

Six wooden vessels, Ferris type, 281 by 46 by 23.6; engines 19-36-56; 1500- h. p. watertube boilers.

Anderson Shipbuilding Corporation, 602 Alaska Building, Seattle, Wash.

Purchasing Agent, **W. G. Hall.**

No. 6, 270 by 43 by 24, 1200-h. p. Scott water-tube boilers, 3-Island type; 3000 ton.

No. 7, 270 by 43 by 24, 1200-h. p. Seabury boilers, 3-Island type, for Oriental Navigation Co.; 3000-ton.

Nos. 8 and 9, 3000-ton dw. motorships. For Christoffer Hannevig, Inc.

Apex Manufacturing Company, Emeryville, Cal.

Purchasing Agent, **A. Youngholm.**

Three hundred metallic life boats for U. S. Shipping Board.

Thirty metallic life boats for shipyards.

Twelve Catamaran rafts for ship yards.

Astoria Marine Iron Works, Astoria, Ore.

Purchasing Agent, **Mr. J. A. Jackson.**

Completely outfitting 27 Hough and Ferris type wooden vessels.

Contractors for United States and French governments.

Overhauling and repair of ships a specialty.

Babare Bros., Old Town, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. Babare.**

Four wooden freighters, Ferris type.

Ballard Shipbuilding Co., Ballard, Wash.

Purchasing Agent, **Mr. T. W. Smith.**

Three wooden steamers, 215 by 40 by 18.

Ballin Water Tube Boiler Co., Portland, Ore.

Sixteen Ballin type water-tube boilers for eight steamers. For the Supple & Ballin Shipbuilding Co.

Twelve Ballin type water-tube boilers for six steamers building at the G. M. Standifer Construction Corporation.

Barnes & Tibbitts, Alameda, Cal.

Purchasing Agent, **Mr. J. J. Barnes.**

Installation of machinery and fitting out nine vessels for Emergency Fleet Corporation.

General repair and dry-docking business.

Benicia Shipbuilding Corporation, Benicia, Cal.

Purchasing Agent, **L. S. Jones,** Alaska Commercial Bldg., San Francisco, Cal.

Bethlehem Shipbuilding Corporation, Ltd. (Union Works Alameda Plant), San Francisco, Cal.

Purchasing Agent, **Mr. A. H. Williams.**

Three 12,000-ton steel freighters; hulls 170, 215 and 216.

Eighteen 12,000-ton dw. steel tankers.

Contracts for six additional freighters.

Howard, launched April 26.

Cameron-Genoa Mills Shipbuilders, Ltd., Victoria, B. C.

Purchasing Agent, **Mr. P. D. Bannerman.**

Four Wooden freighters, 250 by 43.6 by 25, 950 h. p., 2800 tons dw.

Ralph J. Chandler Shipbuilding Co., Wilmington, Cal.

Six wooden vessels, Ferris type, 281 ft. 6 ins. by 46 ft. by 26; engines 19 by 32 by 56 by 3; 1400 h. p. Two tubular boilers. For U. S. Shipping Board.

Chilman's Shipyard, Hoquiam, Wash.

Purchasing Agent, **Mr. Iver Chilman.**

Two 3-mast auxiliary schooners 130 by 33 by 14. One 300-h. p. engine, for Belgian interests.

Coast Shipbuilding Company, Portland, Ore.

Four wooden freighters, Ferris type, 281.6 and 268 by 46 by 26, 1400 h. p.

Columbia Engineering Works (Linnton), Portland, Ore.

Purchasing Agent, **Mr. C. W. Steele.**

No. 14, motorship, 173 by 36 by 15.5; single screw Avance 320-h. p. oil engine. Delivery March, 1919. For Chr. Christensen, Jr.

No. 15, topsail schooner, 178 by 36 by 15. Delivery April, 1919.

Columbia River Shipbuilding Corp., Portland, Ore.

Purchasing Agent, **Mr. H. A. Killam.**

Fifteen steel merchant ships, 8800 tons dw., General Electric and De Laval turbines, Scotch marine boilers. Deliveries 1919. Five of above now on ways.

Commercial Boiler Works, Seattle, Wash.

Purchasing Agent, **Mr. J. H. Fox.**

Contracts for:

156 Scotch marine boilers, 14.9 inside dia. by 11 ft. long, H. S. 2695.5 sq. ft., W. P. 210 lbs., for vessels building on Pacific Coast. Delivery, twelve completed boilers per month.

Coos Bay Shipbuilding Company, Marshfield, Ore.

Manager, **Mr. J. H. Polhemus.**

Contracts for four Ferris type vessels. Length over all 281.6, 3500 dw. tons. Deliveries starting November 1st.

J. Coughlan & Sons, Vancouver, B. C.

Purchasing Agent, **J. Joseph.**

Four 8100-ton dw. freighters, 400 by 52 by 31, 3000-h. p., three Scotch marine boilers. For Dominion Government.

Crowley Launch & Tugboat Co., San Francisco, Cal.

..Purchasing Agent, **John L. Crowley.**

Six 28-foot launches with 10-h. p. engines.

Four 45-foot launches with 50-h. p. engines.

Eight covered barges, 125 by 40 by 12.

Derrick barge, 75-ton lifts, 125 by 50 by 12.

J. F. Duthie & Co., Shipbuilders & Engineers, Seattle, Wash.

Purchasing Agent, **E. C. Gaumnitz.**

Fifteen 8800-ton cargo vessels, 2800-h. p., 425 feet by 54 feet x 29.9; Scotch boilers.

West Mamatite, launched April 26.

Elliott Bay Dry Dock Company, Seattle, Wash.

Local repair work, cleaning, painting and overhauling.

Elliott Bay Shipbuilding Co., Seattle, Wash.

Purchasing Dept., **C. A. Morrow.**

Six vessels, 260 by 46 by 26.

Contracts for five 3500-ton carriers.

Elliott Bay Yacht & Engine Co., Seattle, Wash.

Large amount of repair work.

Feeney-Bremer Company, Tillamook, Ore.

Contracts for three wooden ships, Ferris type, 281.6 by 46 by 26.

Foundation Company of British Columbia, Ltd., Victoria, B. C.

Purchasing Agent, **Mr. D. D. Long.**

Twenty 3000-ton dw. twin screw wooden steamers, 293.2 by 47.6 by 23.6, two Scotch marine boilers.

Winnipeg, launched April 26.

Foundation Co., Portland, Ore.

Local Purchasing Agent, **G. M. Raymond.**

Foundation Co., Tacoma, Wash.

Purchasing Agent, **Mr. Whiteside.**

Seattle Office: Smith Building.

Fulton Shipbuilding Company, Wilmington, Cal.

Purchasing Agent, **A. H. MacFarland.**

Four Hough design wooden steamers.

Nine Ferris design wooden steamers.

Grant Smith-Porter Ship Company, Aberdeen Shipyard, Aberdeen, Wash.

Purchasing Agent, **Mr. Z. A. Toye.**

Contracts for eleven Ferris type steamers.

The Grant-Smith-Porter Ship Co., Portland, Ore.

Purchasing Agent, **Mr. P. S. Sinnock.**

Contract for twelve Ferris type ships; length 286 feet, beam 46 feet, depth 28 feet; two standard E. F. C. boilers.

Grays Harbor Motorship Corporation, Aberdeen, Wash.

Purchasing Agent, Mr. H. L. Rich.

Twelve 4000-ton ships of Ward type. For Emergency Fleet Corporation. Deliveries about two a month.

Great Northern Concrete Shipbuilding Company, Vancouver, Wash.

Purchasing Agent, **Mr. Pacquet.**

Three concrete hulls, Nos. 4, 5 and 6, 100 by 25 by 12.6.

Hammond Lumber Co., Eureka, Cal.

Purchasing Agent, **W. R. McMillan.**

Four steamers, Ferris type.

Hanlon Dry Dock & Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **C. J. Foard.**

Twelve cargo vessels, 320.9 by 46 by 26.9; three water-tube boilers. For Emergency Fleet Corporation.

Harrison & Lamond, South Vancouver, B. C.

One auxiliary schooner.

Helser Machine Works, Inc., Portland, Ore.

Purchasing Agent, **Mr. H. P. Rasmussen.**
20 large size hawser reels for Pacific Coast Shipbuilding Co.
12 same as above for Pensacola Shipbuilding Co.
30 same as above for J. F. Duthie & Co.
44 same as above for The Columbia River Shipbuilding Co.
56 8¼ by 8 single geared winches, single gypsey.
28 8¼ by 8 single geared winches, double gypsey.
56 9 by 9 single geared winches, single gypsey.
All of above winches for Southwestern Shipbuilding Co.
180 cargo winches for Schaw-Batcher Shipbuilding Co.
200 9 by 9 cargo winches.
300 8¼ by 8 cargo winches.

Hesse-Martin Iron Works, Portland, Ore.

Purchasing Agent, **Mr. R. M. Hoffman.**

All auxiliary machinery for ten wooden steamers building by the G. M. Standifer Construction Co.

All auxiliary machinery for twenty-four wooden steamers building by the Grant-Smith-Porter Ship Co., at Aberdeen.

Anchor windlasses, cargo winches, steam capstans and steam steering gears for eight wooden steamers building by Supple & Ballin at Portland.

Forty steam cargo winches for ten steel steamers building by the Northwest Steel Company.

One hundred and thirty anchor windlasses, forty steam steering gears and fifty hand steering gears.

Herzog Electric & Engineering Company, San Francisco

Purchasing Agent, **H. C. Toumey.**

One Herzog double electric steering gear on M. S. "Katherine" at Hanlon Shipyard.

G. W. Kneass, San Francisco, Cal.

Purchasing Agent, **G. W. Kneass.**

Two tow boats, 60x15, 125-h. p. engine. For Peterson Tow Boat & Lighterage Company.

Three hundred metal life boats for Bethlehem Shipbuilding Corporation, Union Plant.

Kiernan & Kern Shipbuilding Co., Portland, Ore.

Purchasing Agent, **Mr. McCall.**
Six composite steamers of Ballin design.

Kruse & Banks, North Bend, Ore.

Purchasing Agent, **Robert Banks.**
Six hulls, Ferris design, 286 by 46 by 28.

Llewellyn Iron Works, Los Angeles, Calif.

Builders of Marine Engines, Boilers, Tanks, etc., for Emergency Fleet Corporation.

Present contracts include 1400-h. p. and 2800-h. p. marine engines with marine boilers for same, for most of the ships being built on the Pacific Coast.

Also reinforced concrete bars for concrete ships being built for the Emergency Fleet Corporation at the San Francisco Shipbuilding Company's yard in Oakland and at the Pacific Marine & Construction Company's yards in San Diego.

Long Beach Shipbuilding Company, Long Beach, Calif.

Purchasing Agent, **Mr. John Craig.**
Ten steel vessels of 9000 tons.
Eight steel steamers, 8,800 deadweight tons each.

Wallingford, 2302 gross tons; 244 by 42 by 26; 900 h. p.; engines 18 by 30 by 44 by 30; two watertube boilers. For U. S. Shipping Board.

W. Keene, launched April 26, 1919.

Los Angeles Shipbuilding & Dry Dock Co., Los Angeles, Cal.

Thirty-two 8800-ton dw. vessels, 410 by 54 by 29.9, 3500 I. H. P. three Foster water-tube boilers. For Emergency Fleet Corporation. Delivery 1919-1920.

West Montop, launched March 30.

The Wm. Lyall Shipbuilding Co., Ltd., North Vancouver, B. C.

Three auxiliary schooners, 235 W. L. by 44.6 by 20.6 moulded.

Two 200-h. p. Fairbanks Morse Semi-Diesel engines for these boats.

Eight full-powered steamers, 1500 tons deadweight. For Republic of France.

Marine Pipe and Machine Works, Inc., Seattle, Wash.

Purchasing Agent, **Mr. E. A. Lamb.**
One 6-cylinder Sumner type heavy oil engine, 650-h. p.

One 6-cylinder Sumner type heavy oil engine, 650-h. p. For Chilean Government.

Two 1200-h. p. triple exp. steam engines.

Martinolich Shipbuilding Co., 306 California Bldg., Tacoma Wash.; Yard at Dockton, Wash.

Purchasing Agent, **Mr. Martinolich.**

Three wooden 4-masted auxiliary schooners, 250 by 43 by 21; twin 240-h. p. Skandia engines. For Norwegian interests.

Matthews Shipbuilding Company, Hoquiam, Wash.

Purchasing Agent, **G. F. Matthews.**

Lumber carrier for Hart-Wood Lumber Company, 250 ft. long. capacity 1,500,000 ft.

Two auxiliary 4-masted schooners, 250 by 43 by 21. Twin 240-h. p. Skandia engines. For M. Isaakson, Norway.

McAteer Shipbuilding Company, Seattle, Wash.

Purchasing Agent. **Mr. Ramm.**
One steel vessel, 160 by 30 by 16.
Two four-masted schooners, 250 by 44 by 21; Skandia engines.

McEachern Ship Co., Astoria, Ore.

Purchasing Agent, **Mr. O. E. Draper.**
Three steamers, 286 by 46 by 28; Hough design.

Meacham & Babcock Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **Mr. W. N. Voegtly, Jr.**
Ten hulls, Ferris type.

Moore Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **M. G. Waites.**

Sixteen 9400-ton dw. steel freighters, 402 feet 6 inches by 53 feet by 34 feet 6 inches; 2800 h. p. For U. S. Shipping Board.

Ten 10,000-ton dw. steel tankers, 425 feet by 57 feet by 33 feet; 2800 h. p. For U. S. Shipping Board.

Fitting out:
Nokatay, Miskianza and Nockum, launched April 27.

Motorship Construction Co., Vancouver, Wash.

Purchasing Agent, **J. W. Dougherty.**

Large number of wooden and metal lifeboats and Columbia River fishing boats.

Also contract for 750 lifeboats for Emergency Fleet Corporation.

National Engineering Corporation, Wilmington, Calif.

Outfitting ships for Emergency Fleet Corporation.

New Westminster Construction & Engineering Co., New Westminster, B. C.

Purchasing Agent, **Mr. H. M. Fullerton.**

Four 2800 dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

Five 1500-ton dw. wooden freighters, 204 by 40.6 by 17, 550-h. p. twin engines, watertube boilers.

Nilson & Kelez, Seattle, Wash.

Purchasing Agent, **Mr. Kelez.**
Eight wooden hulls, Ferris type.

Northwest Steel Company, Portland, Ore.

Purchasing Agent, **Mr. W. C. Smith.**

Eleven freighters, 2500 I. H. P., 425 o. a. by 54 by 29.9, 8800 tons dw.; geared turbine drive; 3 Scotch boilers fitted for coal.

Four freighters, 2800 h. p.; dimensions same as above; 3 Scotch boilers.

Tripp, launched April 23.
Deer Lodge, launched April 11.

Pacific American Fisheries, South Bellingham, Wash.

Purchasing Agent, **Mr. B. U. Slyster.**

Pacific Boat & Iron Works, Portland, Ore.

Two hundred metal lifeboats and 100 liferafts for steel yard in this district.

Contract for several Corser's one-man simultaneous releasing hooks for lifeboats.

Pacific Coast Shipbuilding Co., 317 First National Bank Bldg., San Francisco, Cal.; Plant, Bay Point, Cal.

Purchasing Agent, **Mr. J. M. Duke.**
Ten 9500-ton dw. steamers.

Pacific Construction Co., Ltd., Coquitlam, B. C.

Purchasing Agent, **Mr. R. W. Holland.**
Two 2800-ton dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.
No. 3, Wooden steamer, 250 by 43.6 by 25, 1000-h. p. water-tube boilers.
No. 4, Same as No. 3.
Nos. 5 and 6, 1500-ton full-power barges, 204.8 by 39.8 by 17, 275 I. H. P. engines, 5 water-tube boilers.

Pacific Marine and Construction Company (Schofield Engineering Company) San Diego, Cal.

Contracts for two concrete ships of 7500 tons.

Pacific Marine Iron Works, Portland, Ore.

Purchasing Agent, **Mr. V. L. Hamlin.**
Contracts for four 1600-h. p. triple expansion engines.
Contracts for six 1400-h. p. triple expansion engines.

Patterson-MacDonald Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **W. J. Thomas.**

Ten wooden steamers, 281.6 by 46.10 by 27, twin screw, triple expansion engines, 1550-h. p. 30"-15½-25½-42. Two Heine boilers.

Pacific Shipbuilding Corpn., Seattle, Wash.

Purchasing Agent, **C. H. Jones.**
Yard designed with six building ways.

Peninsula Shipbuilding Co., Portland, Ore.

Purchasing Agent, **Mr. H. H. Fisher.**

Seven steamers, 287 by 49.8 by 27.6. To be equipped with Westinghouse turbines.

Four sailing vessels.

Puget Sound Boiler Works, Seattle, Wash.

One Scott Patent Water Tube Boiler, 200-h. p. pressure, for Anderson Shipbuilding Co.

Contracts for condensers, water feed tanks, boiler casings and smoke stacks.

Large amount of local marine repair work.

Puget Sound Bridge & Dredging Co., Seattle, Wash.

Purchasing Agent, **Mr. Moore.**
Complete installation of machinery for twenty-four wooden vessels.
Two wooden hulls, Grays Harbor Motorship type.
Six 5,000-ton wooden hulls.

Geo. F. Rodgers & Co., Astoria, Ore.

Purchasing Agent, **W. N. Browning.**
Contracts for two 3500-ton cargo carriers

Six hulls, Ferris type, 3500 tons dw., 281.6 by 46 by 26. For U. S. Shipping Board.

Rolph Shipbuilding Company, Eureka, Cal.

Purchasing Agent, **John D. Stelling.**

Nine steamers, Ferris type, for U. S. Shipping Board.

Two four-masted barkentines, 1,650,000 feet lumber capacity. To builders' account.

One tug-boat, 750 h. p., for Rolph Navigation & Coal Company.

Sanderson & Porter, Raymond, Wash.

Purchasing Agent, **Mr. Wm. Evans.**

Four wooden hulls, Ferris type, standard wood steamships. Delivery 1919.

S. S. "Biscayne," launched March 15, 1919.

San Diego Marine Construction Co., San Diego, Cal.

Purchasing Agent, **C. W. Stose.**

No. 132, "U. S. No. 2," 35 by 7 by 2, 150-h. p.

No. 135, "U. S. No. 3," 40 by 7 by 2, 200-h. p.

No. 136, Tow-boat "Pullet," 55 by 12 by 7.6; 100 h. p. Leary oil engines. Delivery April, 1919. For San Diego Tow Boat Company.

San Francisco Shipbuilding Co., 310 California St., San Francisco, Cal.

Purchasing Agent, **Mr. J. M. Cummins.**

Two 7500-ton dw. bulk oil steamers and one 7500-ton dw. freighter, reinforced concrete, at Government Island Plant, Oakland, Cal.

Schaw-Batcher Company, South San Francisco

Purchasing Agent, **K. I. Dazey.**

Three single-screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2500-h. p. Curtis turbines, 4 Heinie boilers.

Ten single-screw freighters, 8800-ton dw., 427 by 54 by 29.9; 2800-i. h. p. reciprocating engines, 24½ by 41½ by 72 by 48; three Scotch boilers. Deliveries 1919.

Seaborn Shipyards Company, Tacoma, Wash.

Purchasing Agent, **P. J. Anderson.**

Fourteen hulls, Ferris type. Deliveries by April, 1919.

Four-way yard prepared for any kind of wood construction.

Seattle Machine Works, Inc., Seattle, Wash.

Purchasing Agents, **Frank H. Wheelon** and **D. Crause.**

Eight 2700-h. p. triple-expansion engines for Skinner & Eddy Corporation.

Six 750-h. p. triple-expansion engines for Pacific American Fisheries.

One 500-h. p. triple expansion engine for McAteer Shipbuilding Co.

Seattle-North Pacific Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **F. H. Magune.**

Ten freighters, 402.5 by 53 by 34.5. Parson turbine, three Foster boilers. Deliveries 1919.

Skandia Pacific Oil Engine Co., Oakland, Cal.

Purchasing Agent, **Mr. L. M. Bliss.**

Twenty 825 B. H. P. Werkspoor Diesel engines for installation in 5600 tons steel fabricated motorships.

Six 500-h. p. Skandia oil engines; four 240 h. p. and six 120 h. p. engines.

Additional engines of smaller capacity.

Skinner & Eddy Corporation, Seattle, Wash

Purchasing Agent, **Ray Anderson.**

Contracts for sixty 9600-ton dw. freighters.

S. S. "Eldena," launched March 21.

Sloan Shipyards Corporation, Olympia, Wash.

Purchasing Agent, **Mr. L. P. Byrne.**

Sixteen freighters, 281.6 by 46 by 26, 19-32-56 by 36; 1400-h. p.

Smith & Watson Iron Works, Portland, Ore.

Purchasing Agent, **Mr. H. W. Bates.**

Contracts to furnish all castings, fittings, condensers and auxiliary machinery for thirty ships building by Columbia River Shipbuilding Corporation.

Somarstrom Shipbuilding Co., Columbia City, Ore.

Four wooden steamers, Hough design, 288 feet long.

Four wooden steamers, Ferris type.

Southwestern Shipbuilding Co., Los Angeles, Cal.

Twenty-three single screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2800 i. h. p. reciprocating engines; three Scotch boilers. For U. S. Shipping Board.

"West Cavanal," launched March 20.

West Cawhton, launched April 18.

Standard Vault & Metal Works, Portland, Ore.

Purchasing Agent, **Mr. R. G. E.** Cornish.

Life boats, life rafts.

Sheet metal equipment for ships.

G. M. Standifer Construction Corp., North Portland, Ore., and Vancouver, Wash.

Purchasing Agent, **Mr. H. Luckett**, Vancouver, Wash.

Four wooden freighters, 281 by 46 by 26; 1700-h. p., Ferris type.

Five composite steamers, Ballin design, 4500 tons.

Fifteen steel steamers, 9500 tons. Delivery early in 1919.

Akanaquent, launched April 26.

Stephens Bros., Stockton, Cal.

Two wooden towboats, 50 by 13 by 8, for Island Transportation Co.

One 65 ft. by 14 ft. butcher boat, equipped with 6-cylinder Wisconsin motor. For Pollard Brothers.

One 40 ft. by 7½ ft. raised deck runabout cruiser, equipped with 6-cylinder Wisconsin motor. For Mr. W. Q. Wright, of the Bay & River Dredging Company.

St. Helens Shipbuilding Co., St. Helens, Ore.

Purchasing Agent, **Mr. Barnett.**

No. 42, schooner, 286 o. a. by 48 by 27; to the order of Chas. R. McCormick & Co.

W. F. Stone Shipbuilding Co., Oakland, Cal.

Purchasing Agent, **Mr. Lester F. Stone....**

Four 150 foot wooden hulls for seagoing tugs, 30 foot molded beam by 17 ft. depth.

Miscellaneous repair work.

Supple & Ballin Shipbuilding Corporation, Portland, Ore.

Purchasing Agent, **Mr. Charles Burton.**

Four 4500-ton steamers, Ballin design, 309 feet o. a. by 44 by 26, diagonal planked, steel reinforcing on top sides, single screw; 1500-h. p.

Nos. 9 to 12.

Tacoma Shipbuilding Company, Tacoma, Wash.

Purchasing Agent, **Mr. D. D. McKay.**

Contracts for six Ferris type vessels. For U. S. Shipping Board.

T. R. Trahey, Ballard, Wash.

One oil barge, 110 feet long and 32 feet wide, capacity 150,000 gallons. For General Petroleum Company

Tregoning Boat Co., Seattle, Wash.

Purchasing Agent, **Mr. C .Tregoning.**

A large number of lifeboats and ship power launches.

Todd Dry Dock & Shipbuilding Co., Tacoma, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

Eight cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 watertube boilers.

Twenty-four cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 S. E. S. boilers.

All of above for Emergency Fleet Corporation. Deliveries by January, 1920.

Todd DryDocks, Inc., Harbor Island, Seattle, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

General drydock and repair work.

Union Construction Company, Oakland, Cal.

Purchasing Agent, **Mr. Chas. L. Froding.**

Contracts for 10 steel ships of 9400 tons, Isherwood type, 402.5 by 53 by 34.5; three watertube boilers, 2800-h. p. turbines. For the U. S. Shipping Board.

Hatchie, launched April 26.

Vancouver Shipyards & Engine Works, Ltd., Vancouver, B. C.

Contracts in hand for two wooden vessels.

Wallace Shipyards, Ltd., North Vancouver, B. C.

Purchasing Agent, **Mr. C. Wallace.**

Three steamers, 300 by 45 by 27, single screw, reciprocating engines.

Contracts for four 8,100 dw. steel vessels.

Western Canada Shipyards, Ltd., Vancouver, B. C.

Five 195 by 39.8 by 17 watertube boilers.

Willamette Iron & Steel Works, Portland, Ore.

Purchasing Agent, **Mr. R. B. Woodbury.**

177 high-pressure, three-furnace, Scotch marine boilers for vessels building in Pacific Coast yards.

Building and installing all machinery on Northwest Steel Company's hull, 15 to 24, inclusive.

Building and installing all machinery on G. M. Standifer Construction Corporation's wooden hulls, 24 to 29, inclusive.

Wilson Shipbuilding Company, Astoria, Ore.

Purchasing Agent, **W. G. Wray.**

Three wooden vessels, 281.6 by 46 by 26; Ferris type. For Emergency Fleet Corporation. Delivery March 1 to August 1, 1919.

Wilson Shipyards, Inc., Seattle, Wash.

Three building-ways ready for constructing wooden vessels up to 3500 tons.

Wright Shipyards, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. P. Wright.**

Two wooden steamers, "Elissa" and "Endymion," 3500 tons each, length 282 feet, beam 46, depth 26. For U. S. Shipping Board.

Yarrows, Ltd., Esquimalt, B. C.

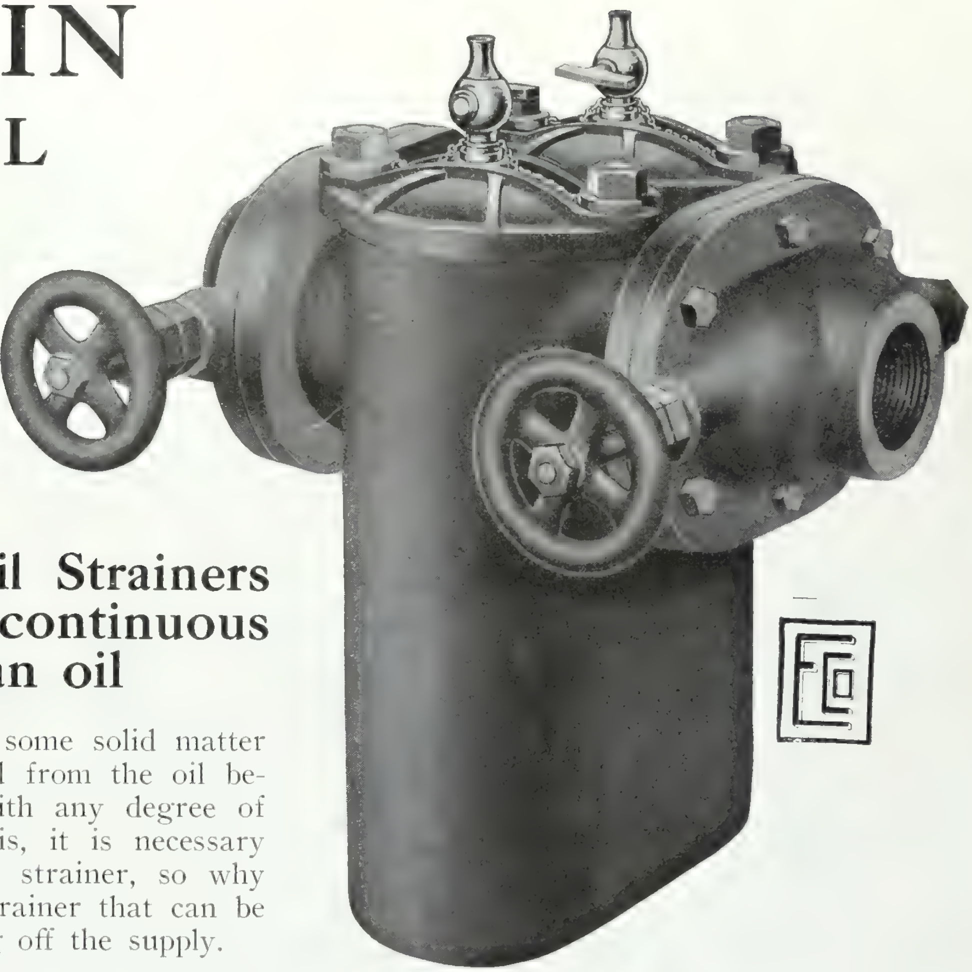
Two shipways suitable for building vessels up to 350 feet in length.

Marine repairs a specialty.

OTHER SHIPBUILDING COMPANIES

American Shipbuilding Company, Warrenton, Ore.
Ballard Marine Railway Company, Seattle, Wash.
Chico Shipbuilding Co., 4185 Arcade Building, Seattle, Wash.
Clapp & Reed Shipbuilding Company, Seattle, Wash.
Columbia River Shipbuilding Co., Vancouver, Wash.
Craig-Wilde Ship Company, Los Angeles, Cal.
Wm. Cryer & Son, Oakland, Cal. W. E. Cryer, Purchasing Agent.
Fellows & Stewart, Inc. V. B. Stewart, Purchasing Agent, Wilmington, Cal.
French-American Shipbuilding Corp., 418-420 Marsh-Strong Bldg., Los Angeles.
Halstrom Shipbuilding Co., Inc., Seattle, Wash.
International Shipbuilding Company, Columbia City, Ore.
King & Winge Shipbuilding Co., C. B. Winge, Purchasing Agent, Seattle, Wash.
Marine Iron Works, Seattle, Wash.
Mare Island Navy Yard, Mare Island, Cal.
Muller Shipbuilding Company, 410 I. N. Van Nuys Building, Los Angeles, Cal.
Oceanic Shipbuilding Co., Milwaukee, Ore.
John E. Price & Company, Hoge Building, Seattle, Wash.
Port Blakeley Shipyard, Port Blakeley, Wash.
Puget Sound Navy Yard, Bremerton, Wash.
T. B. Puck & Co., Honolulu, T. H.
Raymond Shipbuilding Co., Raymond, Wash.
Sehrs Shipyard, Port Townsend, Wash.
South Bend Shipbuilding Co., South Bend., Wash.
Southern California Shipbuilding Corporation, 405 Trust & Savings Bldg., Los Angeles, Cal.
H. D. Stewart Shipbuilding Company, American Bank Building, Seattle, Wash.
Union Timber & Products Co., O. L. Craven, Pres., Port Towsend, Wash.
United Shipbuilding Corporation, Hoge Bldg., Seattle, Wash.
U. S. Steel Shipbuilding Corp., Ltd., Los Angeles, Cal.
Varney Shipbuilding Corporation, Seattle, Wash.
Washington Shipbuilding Corp., C. E. McMasters, Pres., Burke Bldg., Seattle, Wash.
West Coast Shipbuilding Co., H. W. Hellman Bldg., Los Angeles, Cal.

STRAIN
YOUR OIL



Use Twin Oil Strainers and insure a continuous supply of clean oil

Oils commonly contain some solid matter which must be removed from the oil before it can be used with any degree of satisfaction. To do this, it is necessary to use some kind of a strainer, so why not use the Twin—a strainer that can be cleaned without shutting off the supply.

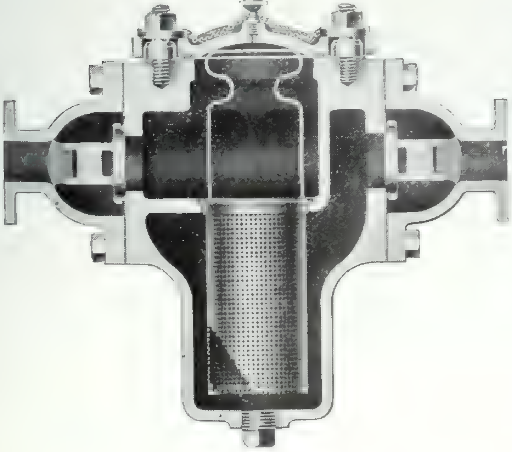
THE TWIN OIL STRAINER

gives the same service as two single strainers, but is more convenient to operate, requires less space for installation and does away with all extra valves and piping necessary to connect up. These are the features that led to its being used in submarines and destroyers now being built for the United States Navy and in cargo boats now being built for the United States Merchant Marine.

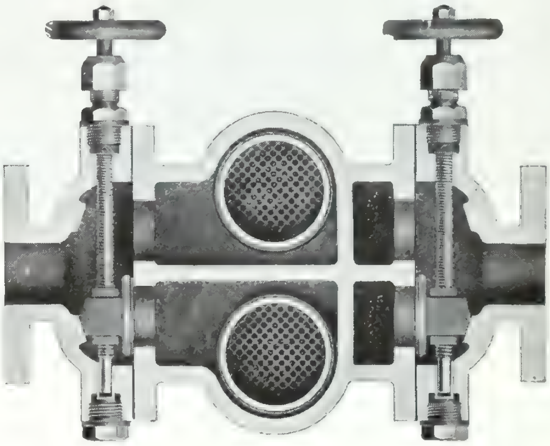
Sizes range from 1 to 5 inch. (2½ inch and larger sizes have flanged connections). Basket mesh 1/64 inch or larger. See Bulletin "AA" for details.

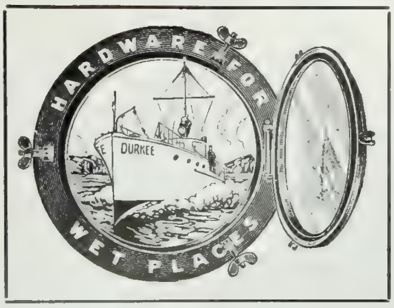
ELLIOTT COMPANY, 443 Grant St., Pittsburgh, Pa.

The oil enters the Strainer at the left and empties into and passes through the straining basket, then up and out at the right. All solid impurities are retained in the straining basket.



When a basket is clogged, the valves are shifted to direct the flow of oil into the clean basket, which is in reserve. The compartment containing the dirty basket is then opened up, the basket removed, cleaned and replaced, and held in reserve until the basket then in service needs cleaning.





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OF
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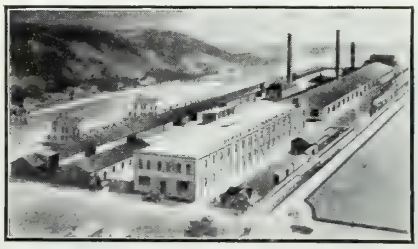
Factories: Grasmere, N. Y. City



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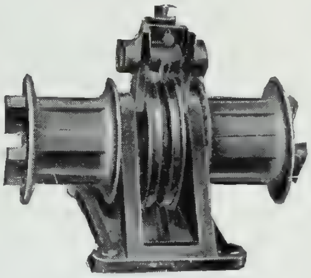
ANDRADE WINDLASSES
COMPASSES
LOGS
LANTERNS

CIRCULARS ON APPLICATION
Fully Describing the
"EELLS" Stockless Anchor and
"ANDRADE" Automatic Windlass



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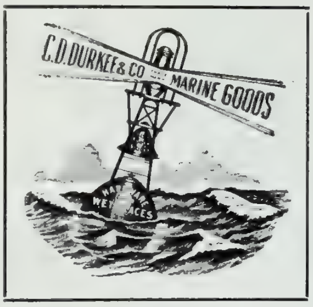


DURKEE-MADE

D

TELLS THE STORY

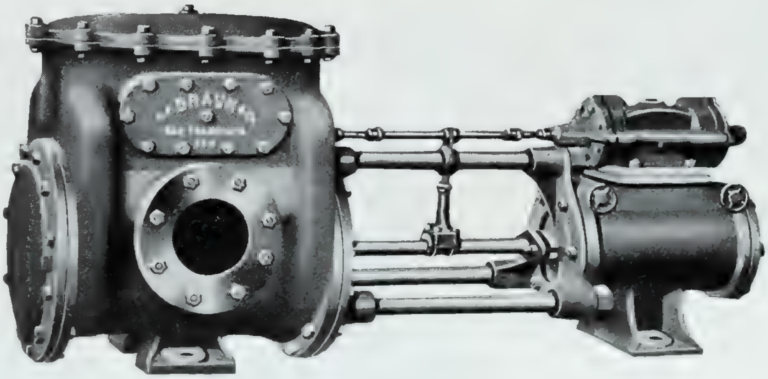
Braun Marine Auxiliaries

"The Standard of the Pacific"

(Made on the Pacific Coast)

Manufacturing Mechanical Engineers

C. F. Braun & Co.



Braun Horizontal Simplex Pump (Light Service)

Condensing Apparatus
Feed Water Heaters
Twin Strainers

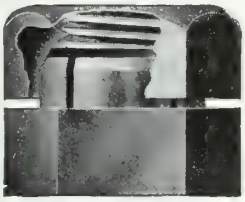
Oil Heaters and Oil Coolers
Evaporators and Distillers
Vertical Marine Pumps

Works: Folsom, Alice, Shipley and Louisa Streets
Pattern Shop—Foundry—Copper Coil Shop

Office: 503 Market Street, San Francisco
Plate Shop—Machine Shop

Think this over!

The strength of a chain only equals its weakest link and the best engine or machine built is useless if a vital nut jars loose.



¼ to 1" S. A. E.
¼ to 2" U. S. S.
¼ to 3" to order.

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TRADE MARK REGISTERED U.S. PAT. OFF.

"NEVER JAR LOOSE"
NO PINS OR DRILLED BOLTS; TIME SAVED PAYS COST.

DRAKE LOCK-NUT CO.

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San Francisco, Cal., U. S. A.

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Leading Supply Dealers in U. S. A.,
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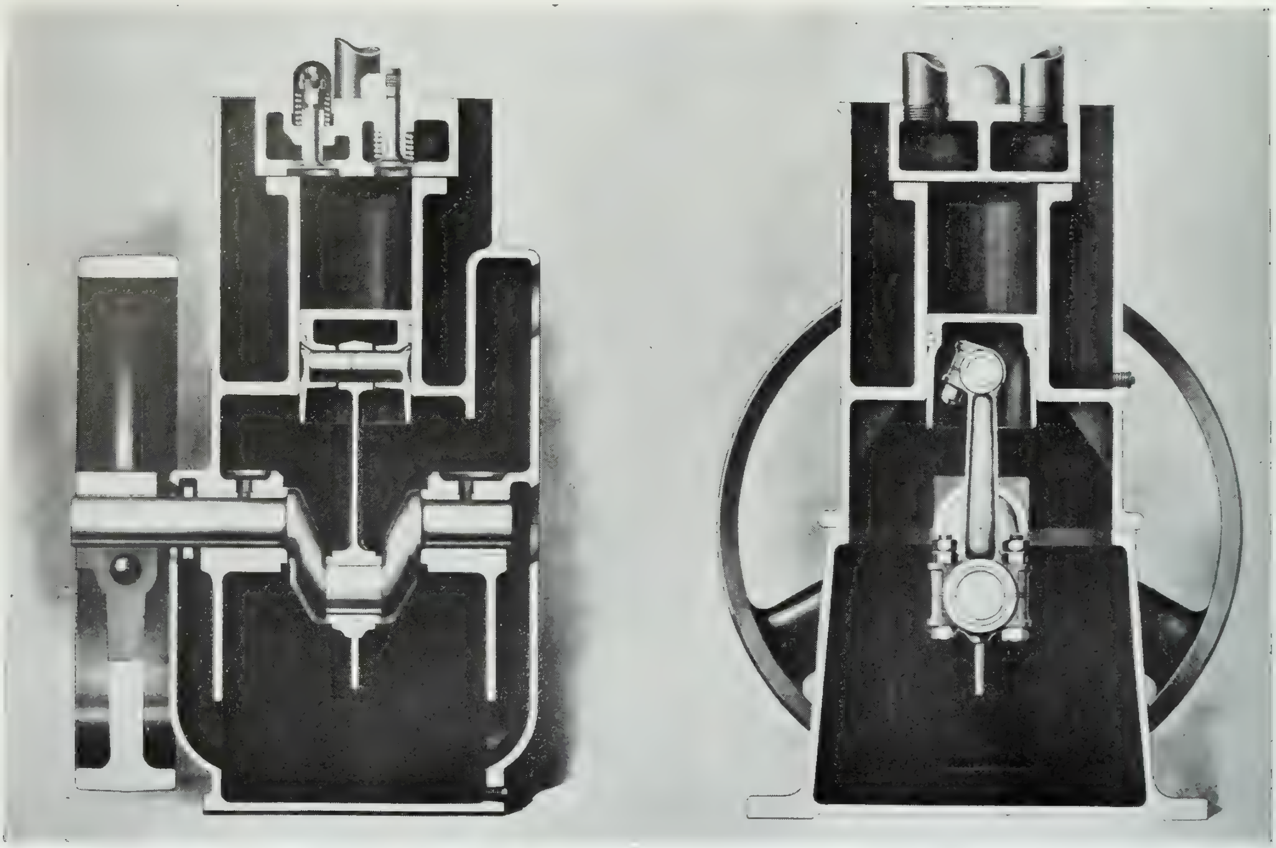
COLBY "SAMSON" CRANE
FOR SHIPYARDS, DOCKS, LUMBER MILLS
5 and 10-Ton Capacity
Clear Height 40 to 70 feet—Booms 40 to 76 foot Radius
Over 20 in operation
QUICK DELIVERY
Ask for Catalogue "C"

COLBY STEEL & ENGINEERING COMPANY
446-447 Central Building, Seattle, U. S. A.

The Latest in Small Air Compressors



A section of the Imperial Fourteen compressor—three-, four- and five-inch tsroke with reservoir water cooling

WHEN, in the emergency at the outbreak of the war, there was a sudden call for a large number of small air compressors for service where reliability was imperative, the Ingersoll-Rand Company's offer, to produce for immediate use the Imperial Fourteen compressors which it had just completed testing out and had adopted as the new standard small compressor type, was accepted. The field performance of these built-on-hurry-order machines was watched with critical eye, but after a year's service their record was clear. They had proved themselves efficient, reliable and inexpensive to the operator.

Placed on General Market

Now these little machines have been placed on the general market. There are four sizes and the capacity range runs from three to forty-five cubic feet a minute at pressures to 100 pounds a square inch. The small compressors, however, can be used for pressure requirements up to 200 pounds a square inch, the horsepower needed being slightly increased, of course. They are single-acting machines of the vertical type built for belt drive. When driven from line shaft, tight and loose pulleys are supplied; when the use of independent motor is planned they ordinarily are furnished as a unit complete with motor, endless belt and short drive attachment. In the latter case a hardwood base plate is included with the standard equipments.

The machines are so well balanced as to operate satisfactorily if bolted to any solid flooring, but when permanency of installation is desired the building of a concrete foundation is advocated. The smallest size is built with ribbed cylinder for air cooling when the service is intermittent and with water-cooled cylinder of the reservoir type for continuous operation. Larger machines are water-cooled only, employing the reservoir jacket system, except that, in the case of the largest size, a closed jacket for connection to pressure system is optional. In this connection it is worth noting that the reservoir cylinder design affords unusually ample water capacity and that both cylinder barrel and head are cooled. The manufacturer states that a single filling of the water space will suffice for a ten-hour day's run.

Resemble Automobile Engines

In general design the Imperial Fourteen compressors remind one strongly of automobile engines.

(Section continued on page 171)

Badenhausen Co.

HIGH EFFICIENCY

MARINE WATER-TUBE BOILERS
AND SUPERHEATERS
SCOTCH MARINE BOILERS

1425 Chestnut St., Philadelphia, Pa., U. S. A.

Branch Sales Offices: New York, Pittsburgh, Chicago, San Francisco

Works: Philadelphia, on Delaware River

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Consulting Engineers and Naval Architects
Shipyards, Shops and Vessels Designed,
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Sail, Motor, Auxiliary, and Steam
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Astoria Marine Iron Works

ASTORIA, OREGON

Engineers and Ship Outfitters

The Largest and Best Equipped Ship Fitting Plant on the Pacific Coast—at the Mouth of the Columbia River.

Within Ten Miles of the Pacific Ocean—Modern Coaling Facilities—Deep Water Dockage—Three Monster Locomotive Cranes.

A Complete Marine Iron Works.

Prompt Aid to Your Vessels in Need of Overhauling or Repair.

Marine Railway—Capable of Handling Ships up to 12,000 Tons Deadweight—Under Construction, at New Permanent Location of Company Plant on Young's Bay, with 11,000 Feet Waterfront.

BUILDERS OF THE HIGHEST TYPE

Ocean Going Vessels

WHO KNEW HOW BEFORE THE WAR

We Now Offer You the Entire Facilities of Our

MODERN THOROUGHLY EQUIPPED PLANT

WILSON SHIPBUILDING COMPANY
ASTORIA OREGON

A. J. DICKIE, Editor,
Pacific Marine Review,
San Francisco.

A WIRE FROM THE CHIEF

"Libby Maine" arrived Seattle Apr. 27th, 8 p. m., from Manila via Hongkong, completing a non-stop voyage. Engines in perfect condition. Total miles 14,170. Fuel consumption 17.25 barrels per day.

A. FABEL, Chief Engineer.

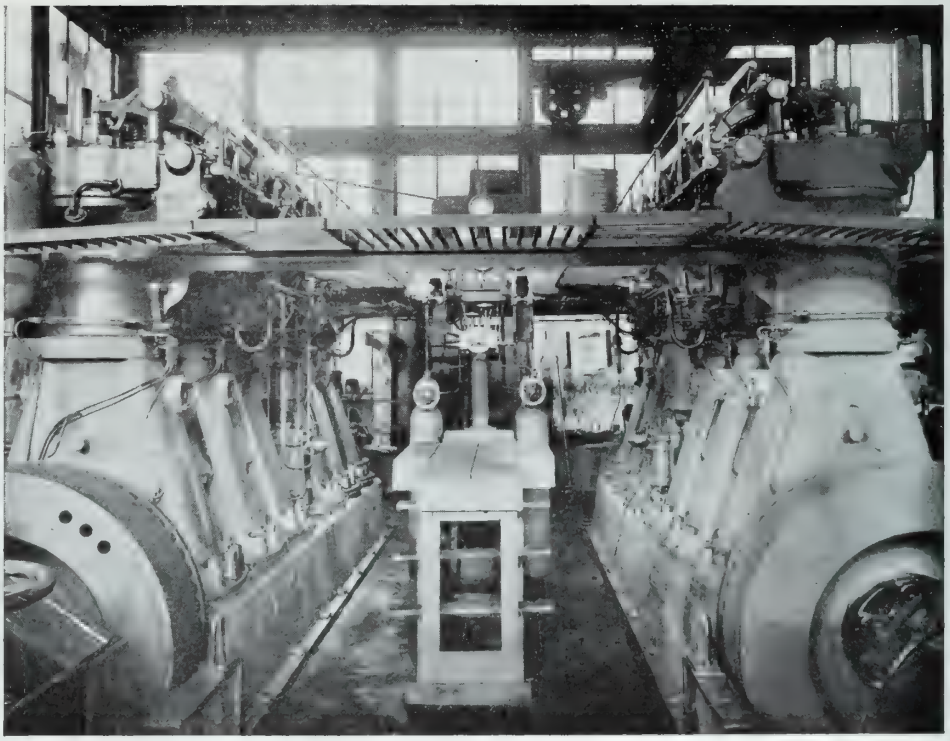
DOW FULL DIESEL TYPE OIL ENGINE

The superiority of the Dow Full Diesel Type Marine Oil Engine is proven on every trip made by the full - powered M/S "Libby Maine."

The full-powered motorship "Libby Maine" equipped with Dow Full Diesel Type Oil Engines

This 3000-ton ship logged 7424 miles in 43 days and 19 hours with a fuel consumption of 4.154 gallons per mile at an average speed of 7 knots per hour.

We are prepared to make prompt delivery of 320 B.H.P. and 500 B.H.P. Engines.



DOW PUMP AND DIESEL ENGINE CO.

GENERAL OFFICES

ALAMEDA CALIFORNIA

The Talbot Marine Boiler

THE Talbot marine boiler utilizes the principle of forced contra-flow circulation through water tubes at high velocity. Steam drum and water drum are unnecessary, so that danger from explosion is reduced to a minimum. Oil is sprayed by superheated steam into the combustion chamber, which is lined on all sides with heating surface.

The tubes are screwed into headers, one end of the tube being free to expand. A field tube is placed inside a generating tube, and circulation is through the field tube and the annular space between the two tubes. The tubes are accessible from the front of the boiler and can be removed and replaced rapidly.

Water Through Regulator Valve

The supply of feed water passes through a regulator valve before entering the boiler. This valve is controlled by the expansion of one of the tubes of the boiler so that it opens and closes with varying temperatures of the steam within the tube. The fuel valve is also controlled by the expansion of this same tube so that the fuel supply is cut off if the temperature of the steam becomes greater than is desired. The control of feed and fire thus becomes automatic. A gage is provided for indicating to the operator the relative temperature of the steam.

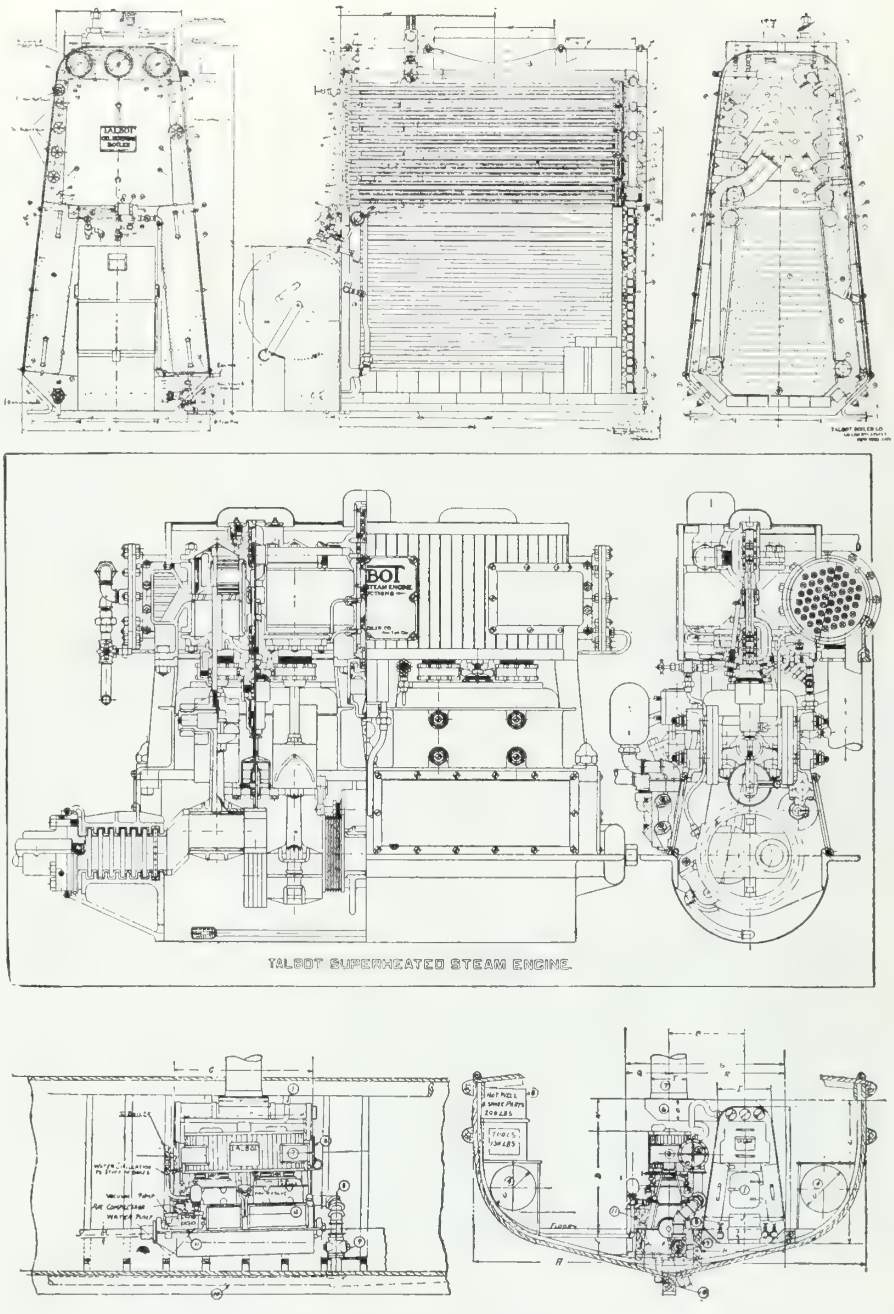
The high velocity of water and steam over the heating surface prevents the formation of scale. Steam jets are provided for blowing soot from the outside of the tubes.

High Rate of Evaporation

A high rate of evaporation is obtained, the average, including economizer and superheater surface, being eight pounds of water a square foot (sixteen pounds on forced draft).

Because of the contra-flow principle, the effect of increased draft and higher evaporative rates is to increase the economizer surface of the upper tubes and to modify the stack temperature.

(Section continued on Page 172)



Top, Talbot marine boiler; middle, Talbot superheated steam engine; and, bottom, an installation in a towboat

---

Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of August 24, 1912,

Of Pacific Marine Review, published monthly at San Francisco, Calif., for April 1, 1919.
State of California,
County of San Francisco, ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared B. N. De Rochie, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the Pacific Marine Review, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—J. S. Hines, 576 Sacramento street, San Francisco.

Editor—A. J. Dickie, 576 Sacramento street, San Francisco.

Managing Editor—A. J. Dickie, 576 Sacramento street, San Francisco.

Business Manager—B. N. De Rochie, 576 Sacramento street, San Francisco.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock).

J. S. Hines, 576 Sacramento street, San Francisco.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is......... (This information is required from daily publications only.)

B. N. DE ROCHIE,
Business Manager.

Sworn to and subscribed before me this 26th day of March, 1919.

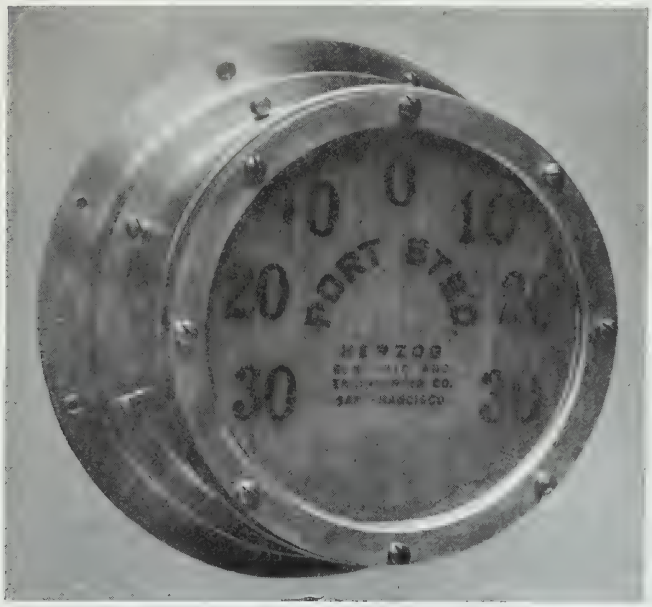
(Seal) S. I. CLARK,
Notary Public in and for the City and County of San Francisco.

(My commission expires February 15, 1921.)

The Herzog Rudder Angle Indicator

THE Herzog Electric and Engineering Company of San Francisco, one of the most progressive marine manufacturing concerns on the Pacific Coast, has added to its long list of successful appliances a rudder angle indicator. It is of a special design to meet the severe conditions of marine work.

The receiver is made entirely of brass, having a plate glass dial, with large black figures indicating in either 5 degrees of 10 degrees. This case is entirely waterproof and contains the sockets, lamps and connections. The lights are installed so that only the number indicating the position of the rudder is illuminated, thus avoiding any possible confusion. A dimming switch is furnished, so arranged that there is a brightly-lighted dial in the daytime and a dimly-illuminated dial at night, when bright lightsinterfere with the steerman's vision.



Herzog rudder angle indicator

Transmitter, Herzog rudder angle indicator

The transmitter is of heavy cast-iron and entirely waterproof. It is of exceptionally rugged design to withstand the very severe service met with near steam steering-gears, escaping steam, leaky decks, salt air, etc.

This indicator is so well built and substantial that it can be depended upon under all conditions.

FOR SALE

One launch, 24 ft. long 4 ft. wide; three-cylinder 18 H. P. Fairbanks-Morse gasoline-kerosine engine; folding auto top; six 100 H. P. new Fairbanks-Morse Marine oil engines, complete; four American centrifugal bilge pumps.

Inland Navigation Co.
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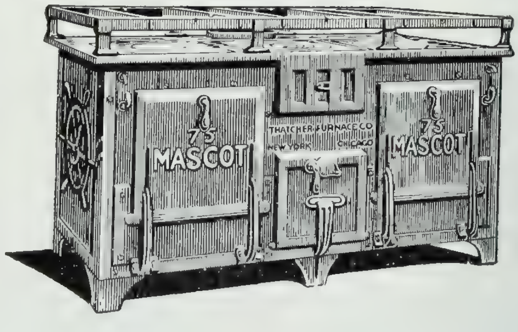
MASCOT SHIP RANGE



The Double Oven No. 75 Thatcher "Mascot" Ship Range for Cargo Vessels, and Other Large Ships

THIS range, the largest of the "Mascot" line, has double the capacity of the ordinary ship range and is massive yet compact in construction.

A FEW "MASCOT" FEATURES

1. The two large ovens may be operated independently with separate dampers, which makes it easy to regulate the amount of heat desired for each.

   When only one oven is required the saving of fuel is evident as it is possible to confine almost all the heat to one side of the range.

2. The doors are supported horizontally, when open, by sturdy braces so that heavy utensils may be placed on them without strain.

   The heavy clamp handle holds the doors firmly in place when closed.

3. The hinge pins are made of "rust proof" brass so that they will always work easily.

4. Burns either coal or wood.

The "Mascott" Ship Range is made in eight sizes. —Asuitable size for every Ship.

Send for our Latest Catalog No. 6. It tells the whole story of the marvelous "Mascot" Range that makes Home Cooking comforts possible on Ship Board.

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MACHINE MADE

DREDGER SPUDS — SPARS — BOOMS

MADE ACCORDING TO YOUR BLUE PRINTS

THE BLUE PRINT METHOD

is the modern, ECONOMICAL way to buy your Dredger Spuds, Spars and Booms. This shipment of masts from our plant, each measuring 117 feet in length and 25 inches at hounds, was photographed on arrival at Hanlon Drydock and Shipbuilding Company, Oakland, California.

We invite your inquiry.

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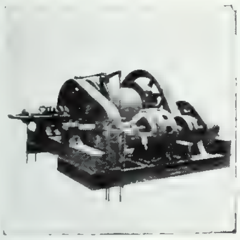

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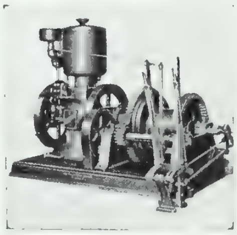
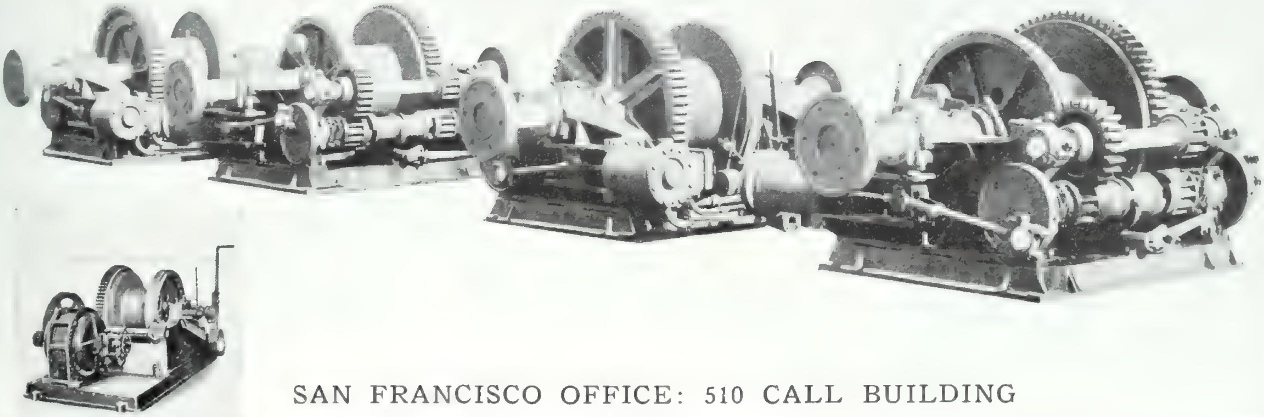
The Fulton Engine Works

NORTH MAIN STREET AND ALHAMBRA AVENUE
LOS ANGELES, CAL.



HOISTS

WINCHES CAPSTANS WINDLASSES



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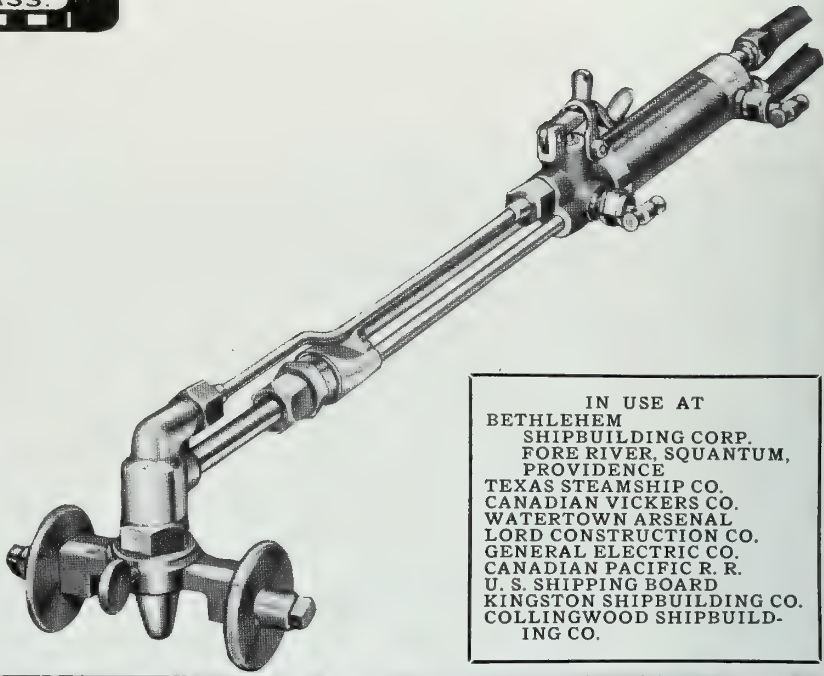
CUTTING TORCH

The construction of a first class tool should combine two essentials: first, efficient and economical work, second easiness of repairs and maintenance, so that the operator can do everything himself, making him independent of the manufacturer.

Both essentials are covered with our Cutting Torches. First they are used by the thousands and by the most prominent concerns, which proves their efficiency. Second, all essential parts are easily accessible and exchangeable and by carrying a few spare parts, even a smashed cutter can be fixed up like new in less than one-half hour by your own man.

Many concerns standardized on our Cutting Torches, impressed by their efficiency and by their marvelous open and simple construction. Why not send in a trial order?



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"Coes" Wrenches

Wrenches that will not slip or round the corners of the stiffest nut; that will hold firmly anything the jaws can grip. Practical tools, their long wearing qualities are known to mechanics everywhere. Every wrench stamped "Coes." Order "Coes Wrenches" *by name* from your dealer—for your own protection.

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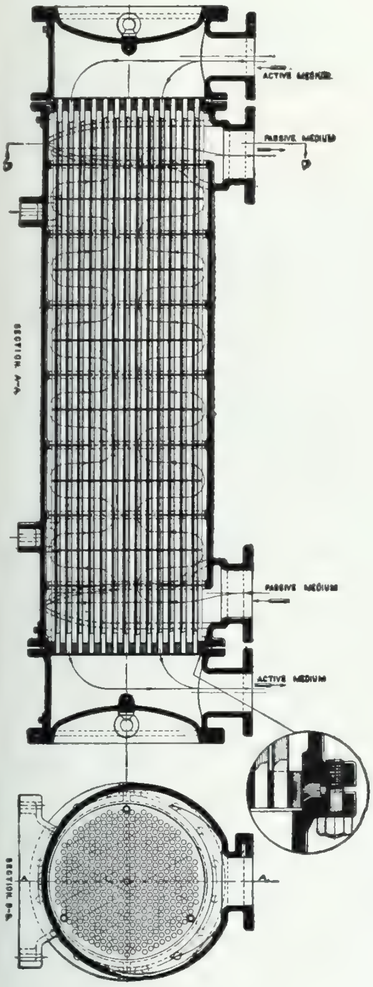
THE OIL TO YOUR TURBINE AND ENGINE BEARINGS WILL BE KEPT AT THE PROPER TEMPERATURE BY USING



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Oil Coolers

Now being fitted on ships

being built by

American International

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WE ALSO MANUFACTURE:

Evaporators, Distillers,
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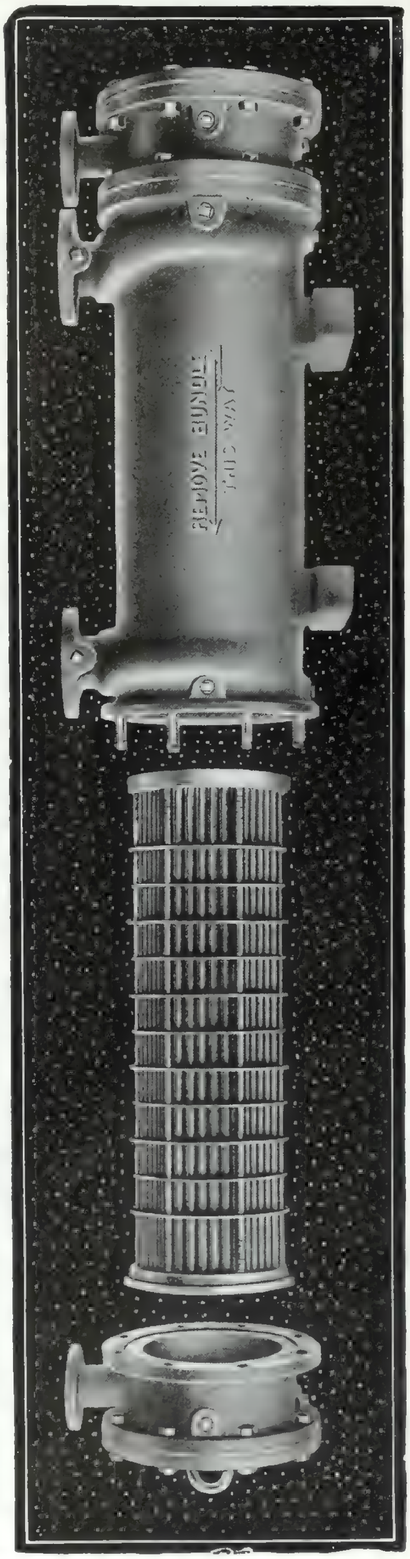

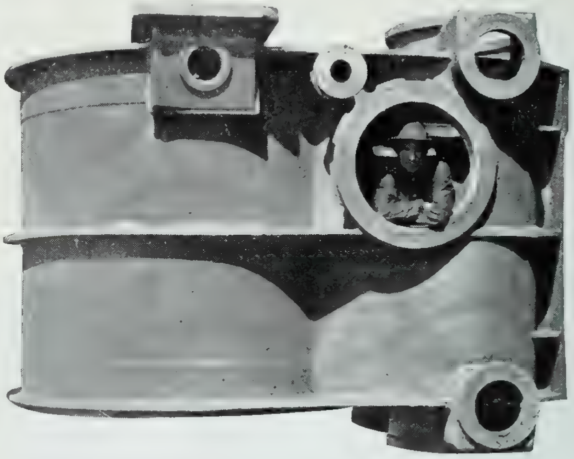

Top, Olympic Foundry, Seattle; left, C. W. Kucher, president and general manager; and, right, low-pressure cylinder for 2700-horsepower engine; weight, 26,500 pounds Castings, Union Tool Company

Olympic Foundry

IN the year 1900, in a small shack on the corner of South Eighth and Plummer streets, Seattle, C. W. Kucher opened a foundry. Under his management the plant prospered and in 1906 he moved to Argo Station and built a larger foundry, which grew into the present establishment, employing 200 men and enjoying an enviable reputation for reliability and quality of work. C. W. Kucher is president and general manager; F. D. Moore, secretary and treasurer; Gus Nord, general superintendent; and Arthur Smith, foreman of the cylinder foundry. The Olympic Foundry makes a specialty of large castings. During 1918 it cast 110 of the large marine engine cylinders shown in the illustration and twenty large propellers, as well as nearly all the cast parts for the thirty triple expansion 2700-horsepower marine engines. About 75 per cent of the work is in castings ranging in weight from one to fourteen tons. The facilities for shipping at the plant are very good, the shop cranes loading the heavy castings directly on to the railroad cars.

(Section continued on page 178e)

FLUE GAS RETARDERS
DAN E. ERICKSON CORPORATION
Marine Equipment
93 First Street, Portland, Ore. H. H. Erickson & Co., Chicago, Ill.

Preservo

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Make your canvas covers ABSOLUTELY WATERPROOF and double their wearing qualities by treating them with PRESERVO. Go to your ship chandler for complete details; address our nearest office for special literature.

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LET THE
W. G. McPHERSON Co.
PORTLAND, OREGON
Build the **VENTILATORS**
for YOUR SHIPS

W. T. Cleverdon

Average Adjuster

FOR SALE

Salvage from the Passenger "S. S. Bear"

4500 H. P. Engines, Anchor and Cargo Winches, and General Equipment

Also numerous other Engines and Boilers (up to 1200 H. P.) from other vessels

Steamers and Tugs for Sale

Nickel Steel Hull, 170x17x5′ 11″
Torpedo Boat "Rowan" and
3 Thornycroft Boilers, 3200 H. P.

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ICE MACHINES

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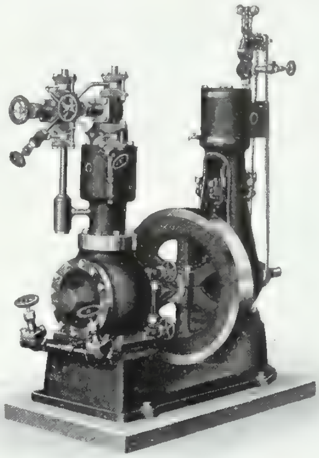
"ON-TIME" DELIVERY



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BEDELL ENGINEERING CO.

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We offer our experience of many years as specialists in Marine Refrigeration.

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HARDWOOD

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VENEERS
PANELS

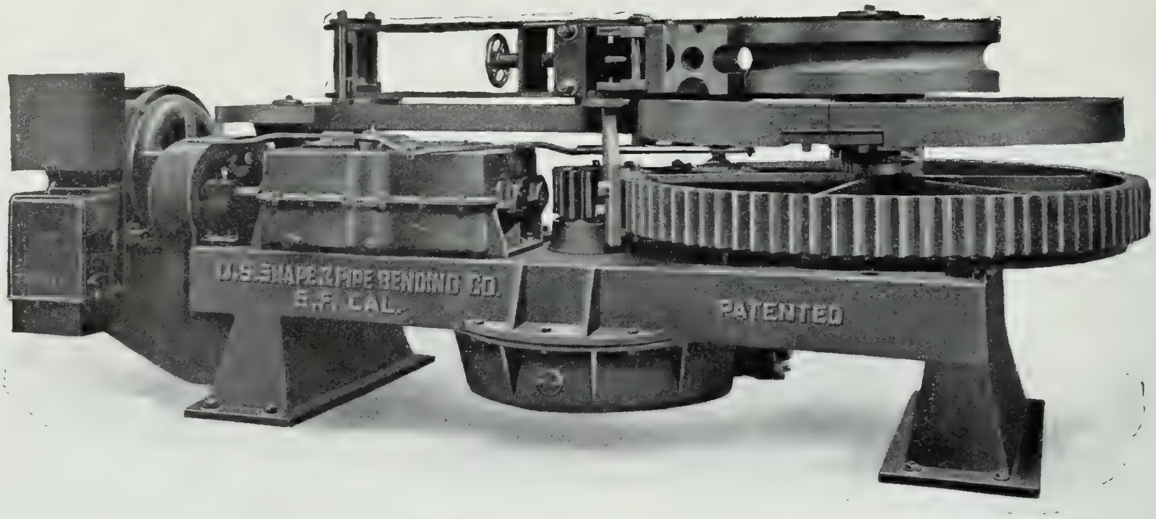
FIFTH and BRANNAN STREETS

SAN FRANCISCO, CAL.

THE LARGEST STOCK OF HARDWOODS IN THE WEST

U S

U. S. Power Pipe Bending Machine



Number 2 model—3 to 6" incl. capacity

This Machine is Friendly with the Pipe

Bends Pipe

Cold, Accurate, Quick

U. S. Power Pipe Bending Machine bends pipe to any radius or angle desired with absolute accuracy. Pipe bent cold up to 6 inches diameter without filling. Eighteen-hundred pound hydrostatic tests made without a failure on standard pipe.

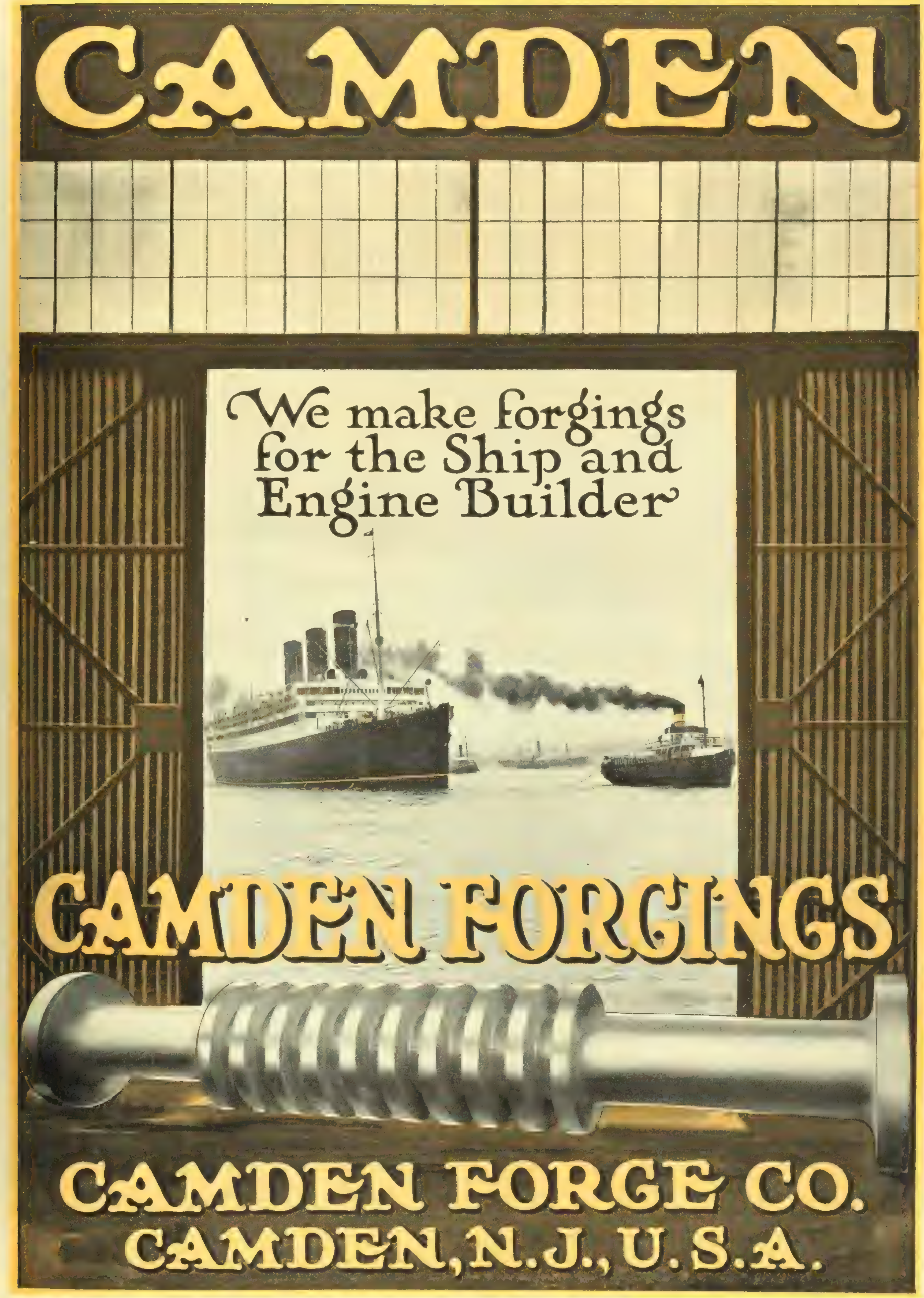
U. S. Machines are made to meet your pipe bending requirements. Our engineering department will gladly advise you regarding pipe bending costs by the use of these machines.

Write for particulars—we can serve you well.

U. S. Shape & Pipe Bending Co.

Commercial Pipe Benders and Manufacturers of Pipe Bending Machinery

315 HOWARD STREET SAN FRANCISCO



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We make forgings
for the Ship and
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CAMDEN FORGINGS

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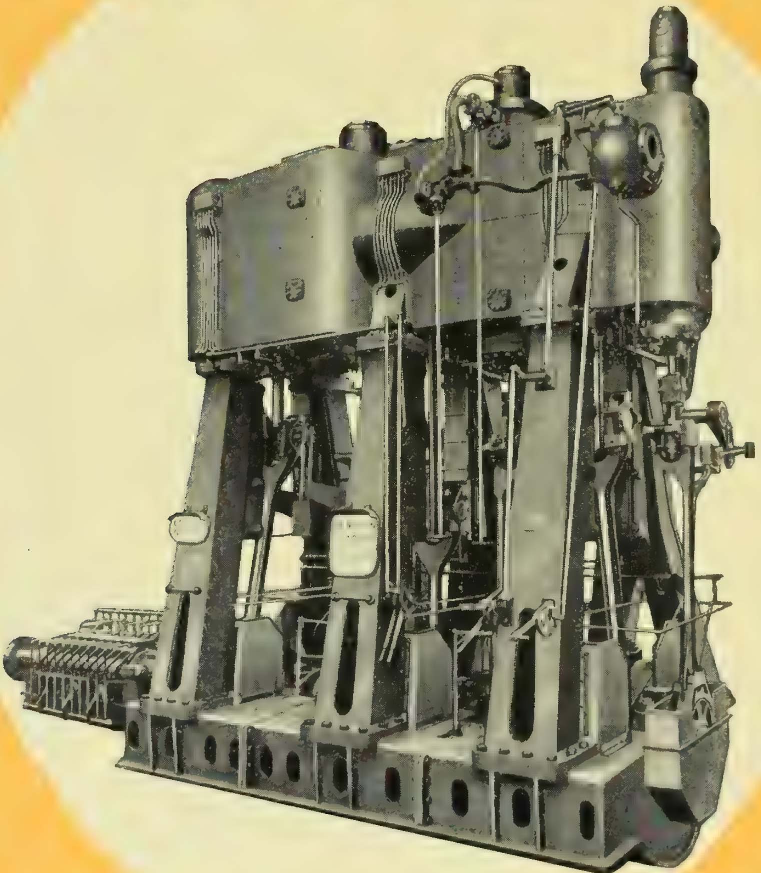
PRODUCING ALL ESSENTIAL PARTS IN THEIR PLANTS FROM THE RAW MATERIAL & COMPLETING A 2800 H·P· MARINE ENGINE EVERY 6 DAYS



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LARGEST PRODUCERS OF MARINE ENGINES
FOR THE
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SERVICE

WEST OR EAST COAST

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SAN FRANCISCO
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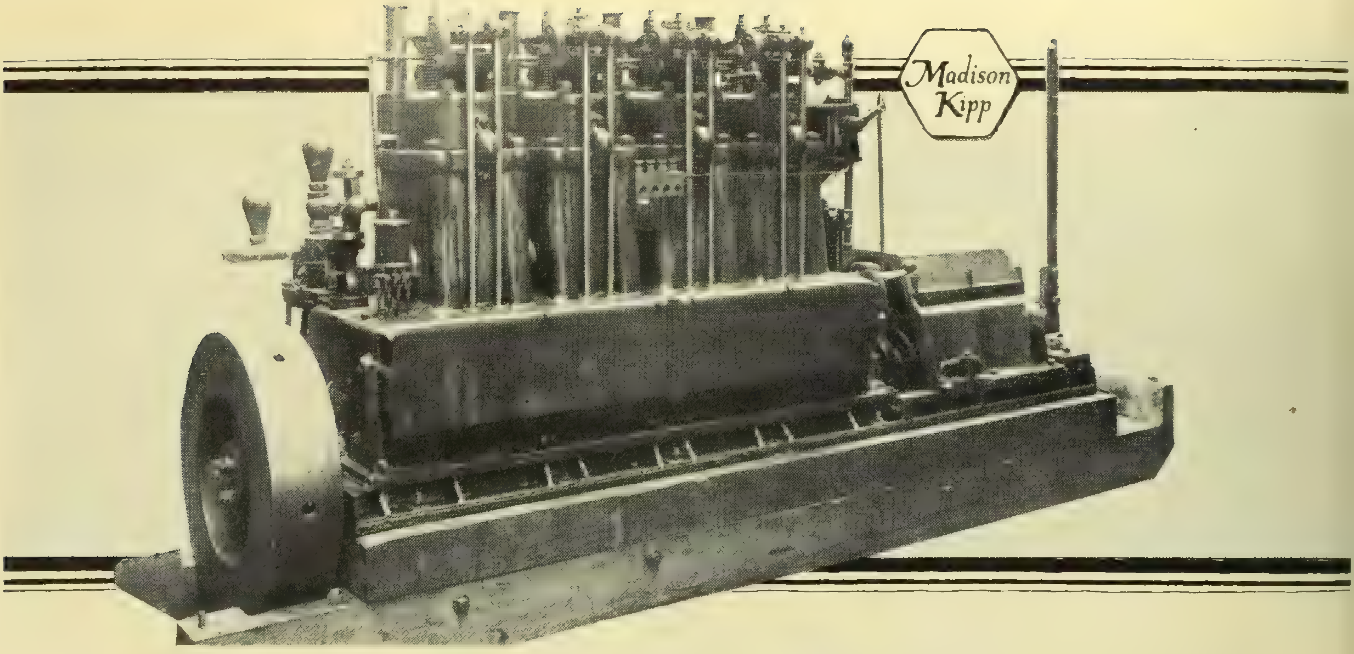

Latest design Burnoil engine equipt with Madison-Kipp fresh oil lubricator.

The Registered Port Principle

The feed adjustments of the Madison-Kipp Lubricator are positive.

The plunger stroke never varies and a full supply of oil is unfailingly drawn in from the reservoir.

The amount desired for delivery is then *measured out* automatically by means of the Kipp registered-port principle.

Ports in the Plunger-sleeve, and barrel register in accordance with a simple adjustment device, and do away with all need for ball and spring valves.

In consequence Madison-Kipp Lubricators not only free you from adjustment troubles but also from all valve troubles.

Their design is so straight and clean that the entire operating mechanism is immersed in oil and cannot be fouled by dirt.

For many years the advantages of the registered-port principle and the compact design have made Madison-Kipp Lubricators the standard equipment for steam-hammers, dredges, compressors, and auxiliary engines.

During the recent great advance in motorship building they have also been adopted by some of the largest builders of ship motors.

Send for our brochures dealing with their design and its application to ship motors.

MADISON-KIPP CORPORATION, MADISON, WISCONSIN

Madison-Kipp Lubricators

FRESH OIL SYSTEMS

Established 1887

SUZUKI & CO.

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HEAD OFFICE
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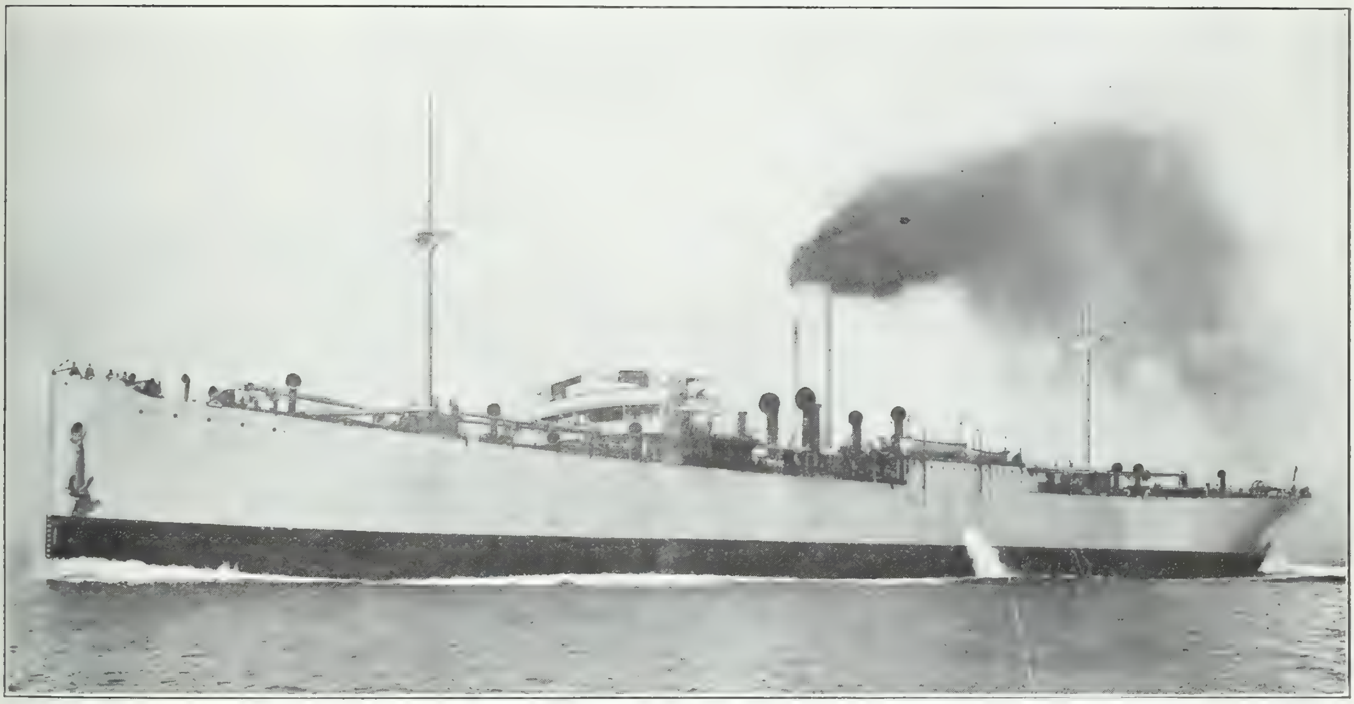
S. S. EASTERN SHORE



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Manufacturers and Distributors of the World's Staple Products

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BRANCH OFFICES THROUGHOUT THE WORLD

They built 112 more Locomotives with a third less tool cost

IN a great locomotive plant only one thing delayed the rapid completion of contracts.

Men and machines worked at top speed—but tool-troubles halted deliveries on schedule time.

The long taps that cut the threaded holes in the great steel boiler-plates kept breaking again and again.

Men lost patience. Thousands of dollars worth of time and spoiled work were being sacrificed.

They sent for a Greenfield Engineer.

He said that screw-cutting tools ought not to break —*if they were right*—and after investigation sent on for trial samples of the G T D improved staybolt taps, specially designed for this type of work. *Those taps stayed on the job.* They cut breakage to the minimum. They pleased the men, finishing more boilers, with less effort, in fewer hours.

More were ordered, and at the end of twelve months, the previous year's production record had been beaten by 112 engines—and the cost report of these particular tools showed a saving of $12,000, or one-third the former tool cost.

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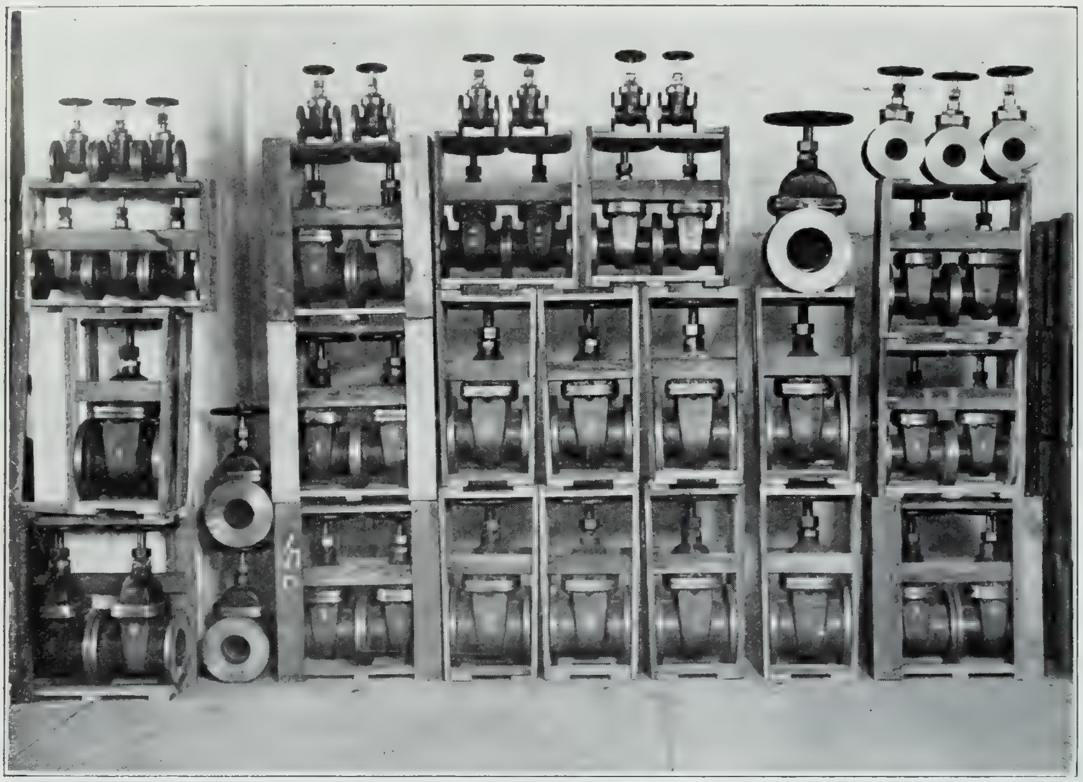

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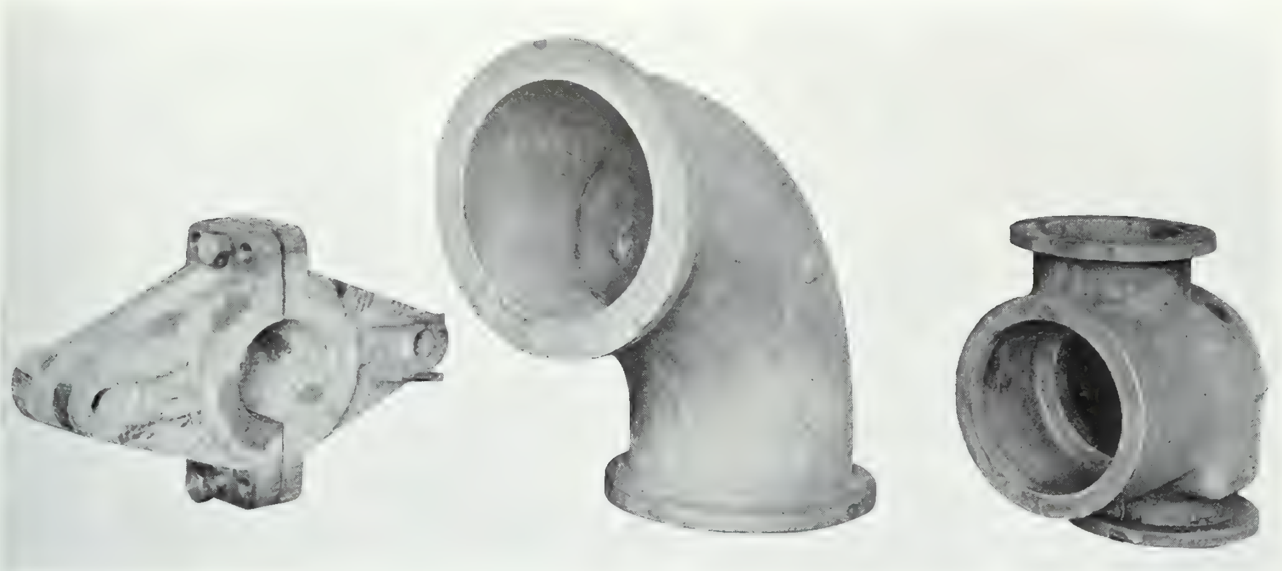
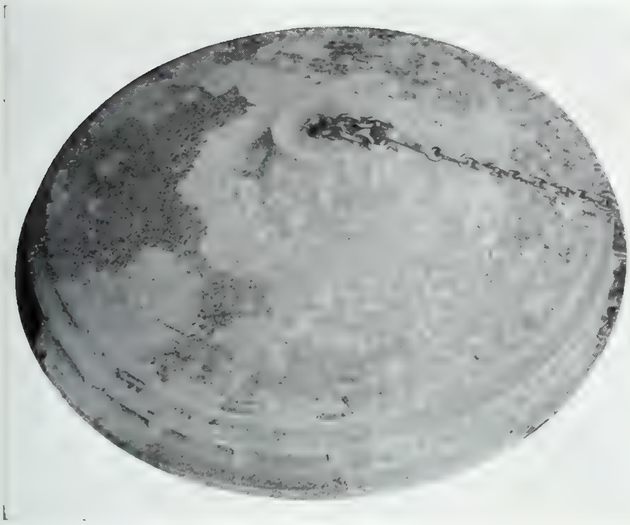
Steel-making Facilities of the Union Tool Company



Marine castings, Union Tool Company



A Union Tool casting for eighty-inch piston

A stern frame for a 8800-ton vessel, Union Tool Company

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The large casting work in hand includes stern frames, rudder yokes, low-pressure pistons and tillers. In fact, the Union Tool Company is pouring all the steel castings used by the Los Angeles Shipbuilding & Dry Dock Company and by the Southwestern Shipbuilding Company. One of the orders from the latter firm is for eight complete sets of steel castings for the stern and rudder, including rudder arms, rudder stocks, yokes, pintles, relieving tillers, stern frame, etc., all to be cast and machined and assembled ready for the ship. Each of these sets will weigh approximately 40,000 pounds.

The illustrations show very well the character of work being done and Henry Ford, who visited the Torrance plant in February, 1919, declared that the steel castings produced there were the finest he had ever seen.

(Section continued on page 178h)

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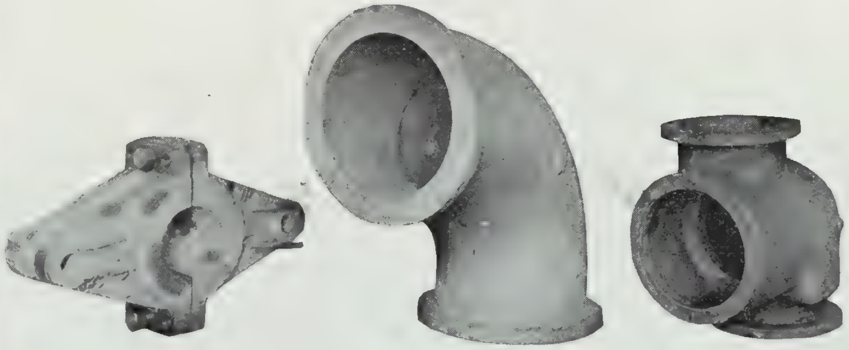

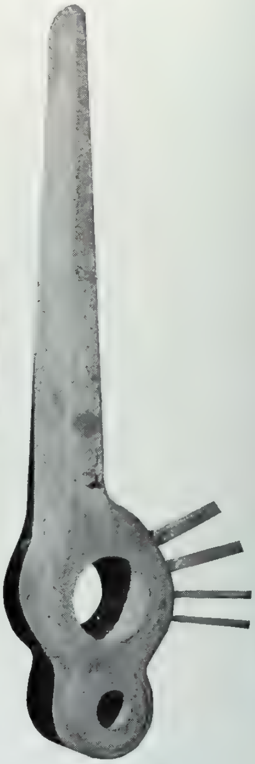

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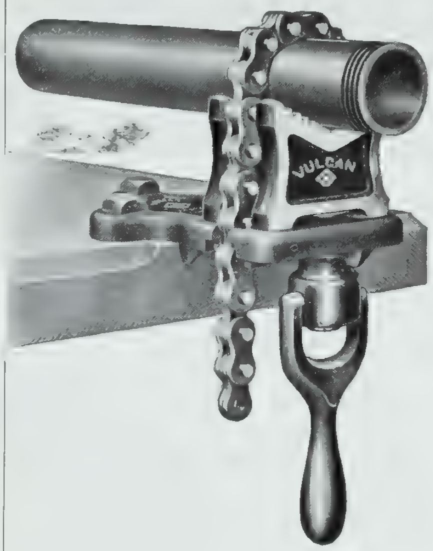

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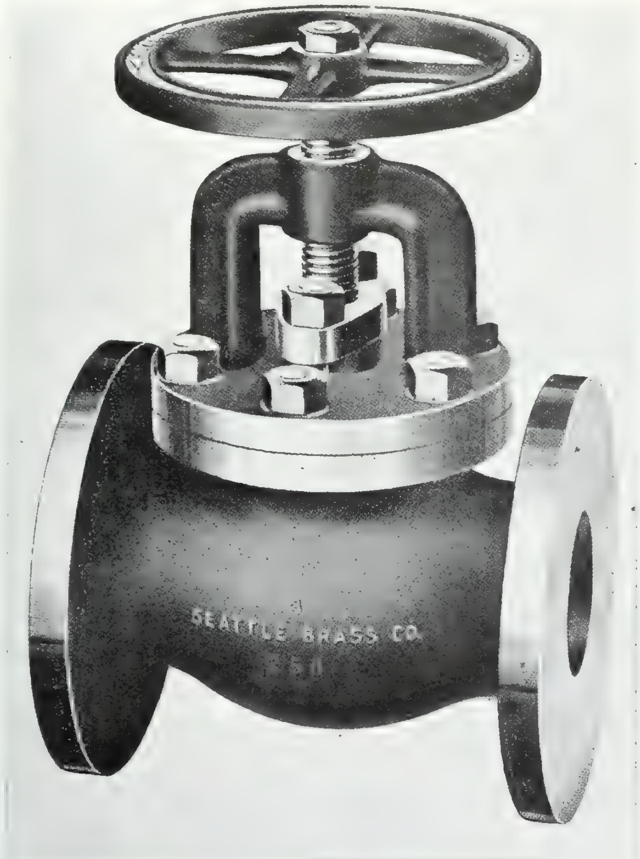

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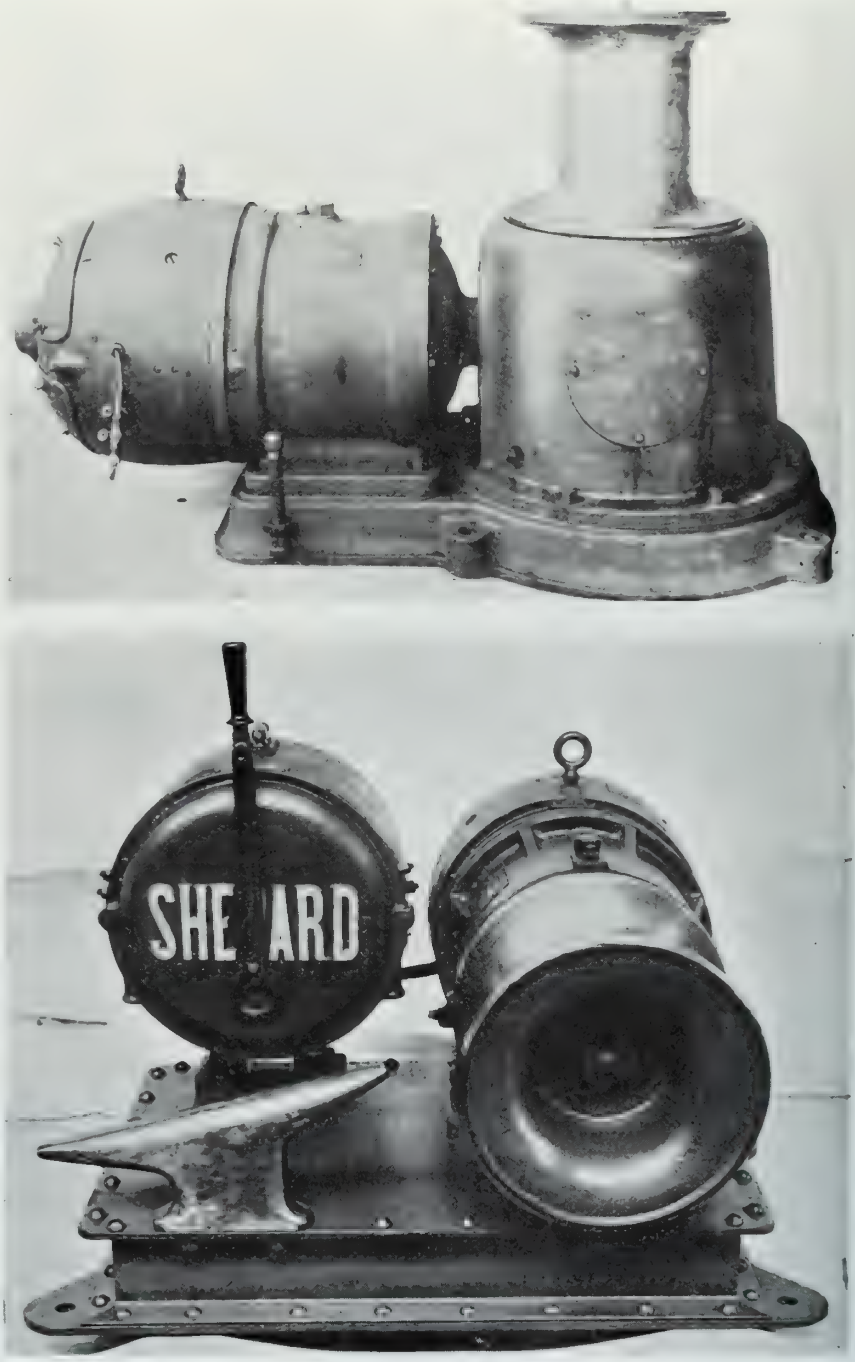

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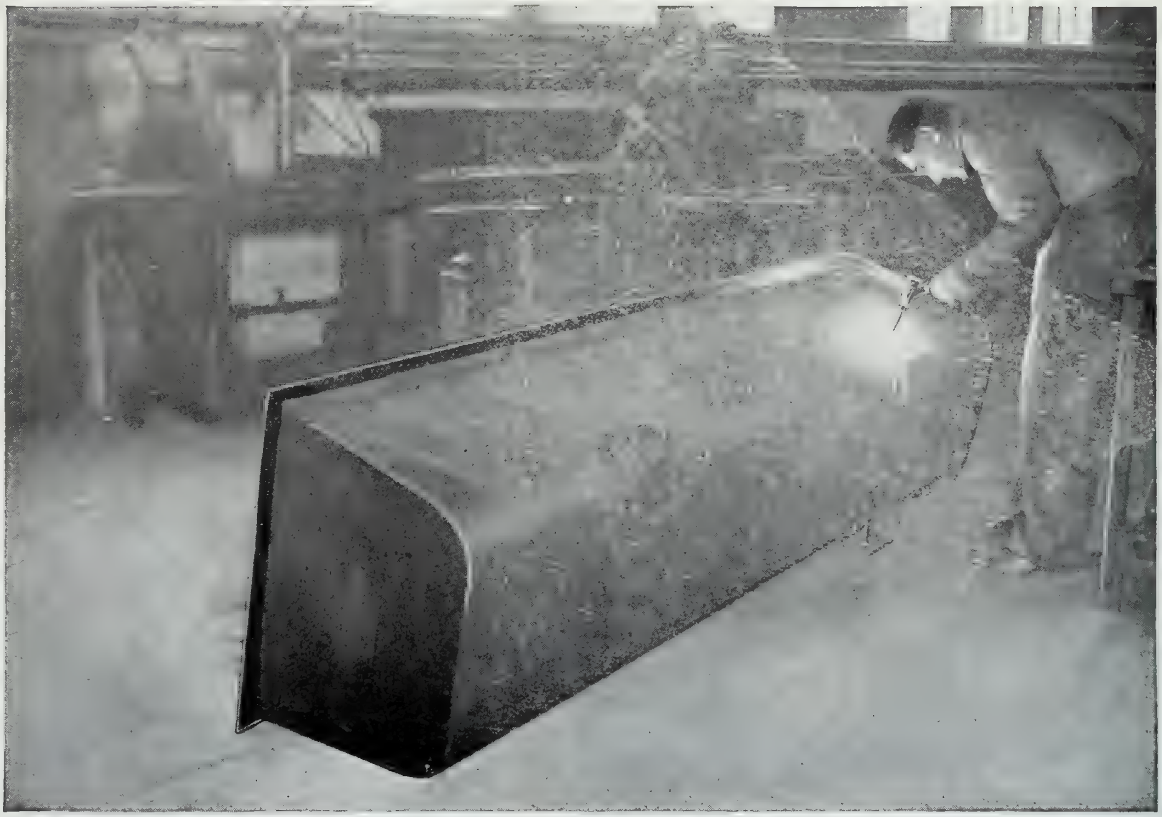

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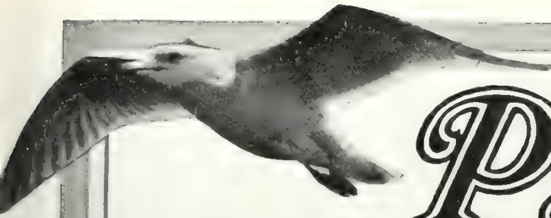

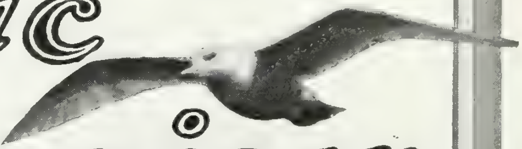

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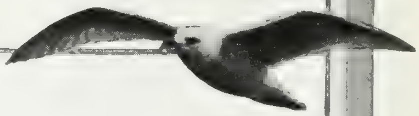

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The National Magazine of Shipping

June, 1919

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Government-Owned Ships in Service—What Shipowners Say

By Winthrop L. Marvin

FROM the first of January up to May 7, no fewer than 204 steamships, of an aggregate tonnage of 781,980 gross register, had been completed by American shipyards and formally delivered to the United States Shipping Board. During April alone, 93 steamships of 320,280 gross tons were delivered. Most of these new steamships, or 161 out of 204, were of steel construction. As rapidly as possible all of these vessels not required for especial governmental purposes were turned over to American shipping firms or companies for operation. Many of these concerns were already operating government-owned ships—so that a considerable amount of practical experience in the actual handling of this new American fleet has already been accumulated.

Because of the urgent need of feeding hungry Europe, Atlantic shipowners have naturally had the handling of many more of these steamers than their brethren of the Pacific Coast. When you ask these Atlantic shipowners what the results have been, you receive answers that reflect various and mixed emotions. Let it be said in the beginning that the operation of these new, hastily constructed vessels, many of them of novel and untried designs, with strange, experimental machinery, has proved an undertaking that measures up to all of the executive vigor, ingenuity and perseverance reputed to characterize business men of our American race. Faced by all kinds of harassing official restrictions, and expected to achieve almost the impossible, these American shipping men are giving an admirable account of themselves. They are steadily working up to windward—there can be no doubt of that. Again, after two generations, the Stars and Stripes are seen in the Mediterranean, on the coasts of Africa, and through the devious channels of East Indian archipelagoes. The "flowery flag" is less a stranger in the ports of China and Japan, and, borne by steam and sail, it flies beyond the equator, east and west of South America.

Still Too Much Red Tape

If the utmost practicable use is not being made of the new merchant marine, no fault belongs to the men by whom its operation is immediately guided. But all of these men agree, significantly, that there is still too much "government red tape" for the highest efficiency and best welfare of the shipping business. "The Shipping Board," as one stalwart ship manager declares, "has allocated steamships to us, it is true, but keeps too many strings to them." There is still in a sense a double management. Who shall control the repairs and overhauling of the Shipping Board fleet? Nominally, this would rest with the private firms and companies that are handling them—but, as a matter of fact, Washington has a great deal to say about it and is prone to forget that a ship in service with officers and at least a part of a crew aboard burns up money very fast and is an exceedingly expensive plant to have on hand unless it is actually carrying cargo.

With repair bills chargeable to the Shipping Board there is widespread, serious complaint that cumbrous governmental bookkeeping methods delay payment so long that even the most prosperous repair yards are gravely embarrassed—to such an extent that even the best of these yards threaten to decline Shipping Board business altogether. This is not at all necessary; the obvious moral is that these bookkeeping methods must be simplified and shortened. Quick decision, prompt dispatch, mean everything in the shipping industry. The successful ship operator is the one who keeps his fleet moving. Because designs in many cases were so new and construction work so hurried, repairs will inevitably be above normal for a long time, until the war-built ships have become thoroughly conditioned.

What Atlantic shipowners complain most of in the government-owned fleet is the failure of the experimental turbine machinery, either because it still is not familiar to seagoing engineers, or because of faulty plans and workmanship. It should be said, however, that not all turbine types are equally condemned. Some have proved more dependable than others. But the operating manager of one of the largest New York fleets declared the other day that not one of the new turbine steamships allocated to his company had succeeded in making a voyage without a more or less serious machinery derangement. This is unmistakably disquieting. But the same gentleman added that he had already observed that engineers sent to the Stevens Institute, for example, and trained there in the actual operation of turbines, were producing notably better results. Not only have the main propulsion engines developed defects, but there have been many failures of auxiliary machinery built by concerns without adequate "seagoing" experience. This is all the more regrettable because the windlasses, winches and general auxiliary outfits of American vessels, supplied by firms of recognized standing, had won such an enviable reputation before the war—as had the work of well-established American shipyards.

But, after all, what else could have been anticipated, from the grim emergency in which these ships and their main and auxiliary machinery were designed and constructed? All things considered, America has done well. Most of these machinery faults are faults than can be remedied by patience and experience. As to the hulls of the new steamers, adverse reports from the men who are operating them are few and far between. "Fine ships," "strong ships," "well designed," "good carriers," are the dominating verdicts, and among the steamers thus commended are not a few from the ways of well-managed yards of the Pacific Coast.

Changing for the Better

Eastern ship operators uniformly state that they are making money—not an extravagant amount, not so substantial a profit as would accrue if they were less hampered by government restriction and delay, but yet a satisfactory profit, all things considered. And all agree that operating conditions are becoming better and not worse. When the Shipping Board determined to establish administrative districts, with an assistant director in charge of each, and with agents at all ports of importance, it took a step that has been heartily commended. Under this plan, New England will constitute a district reaching northward from Boston toward Halifax and south to the Connecticut river; New York and its neighborhood another, Philadelphia and Delaware Bay another still, Baltimore and Chesapeake Bay another—a South Atlantic district, with headquarters at Norfolk and agents at Charleston, Savannah, Brunswick, Fernandina and Jacksonville; a Gulf district with headquarters at New Orleans and a Pacific Coast district with headquarters at San Francisco and resident agents at Seattle, Portland, Los Angeles and Honolulu.

If these assistant directors and agents are entrusted with proper authority, so that they can make prompt decisions on all matters of administrative detail without a necessity of consulting the overcrowded central board in Washington, a great gain will have been achieved in business-like efficiency of operation. Already ship operators say that improvement is manifest, and that local representatives of the board are meeting the shipping men in a true spirit of co-operation. It makes a great deal of difference, when the ship manager in New York or New Orleans or San Francisco can secure an answer in a few minutes over the local telephone, instead of waiting many days for a reply from the National capital. This radical shortening of the governmental habit of red tape is perhaps as deeply appreciated as anything which the Shipping Board has done—for a vast amount of valuable time has been lost under the system of dual control by the necessity of reference to Washington. So serious had this evil become that one of the largest and most efficient of our Atlantic steamship organizations had favored the surrender of all government-owned ships just as soon as its own original fleet was wholly released from government service. This company preferred operating a smaller fleet in its own unhindered way to managing a larger fleet under divided power and responsibility.

What of Officers and Men?

Of the personnel of the new fleet, there are varying opinions. For masters, the Atlantic ship managers have preferred men trained in their own service, under their own eyes—men of whose personal loyalty they were very certain. But all managers, of course, have had to receive into their employ new mates and assistant engineers, some of whom have proved highly efficient and some disappointing. "Out of all these new officers," one manager is confident, "we shall finally find many good ones." Just now it is still a trial, transition period. Among the best of the young officers have naturally been fine fellows of birth and education from the naval training courses, who manifested remarkable quickness and intelligence and an instinctive fitness for the sea. Some of these young men after a few months of practical experience were commended by their merchant captains as thoroughly dependable watch officers. Though many of these volunteers for the war have a business or a profession to which they must return, yet a certain proportion will remain in the merchant service, to the advantage of our fleet and to the honor of the country.

With the sailors and firemen it will admittedly be more difficult. Through the sea training service of the Shipping Board there has come into the merchant marine a substantial number of young Americans who require further experience. Thus it is stated that while before the war only 10 per cent of the members of the firemen's union at New York were of American nationality, fully 40 per cent are now our own countrymen. Whether these lads who entered the merchant service in war from a spirit of adventure will remain in times of peace is something for the future to determine. Enlisted for a year, some of the new apprentices of course desert, though the proportion is said to be not serious, and thus far the number of new entries is encouraging. For purposes of permanence and discipline some of the Atlantic ship operators undoubtedly desire that their seamen and firemen might be enlisted in and furnished from the naval reserve.

American and British Wages

A very important statement little noticed thus far is contained in the Shipping Board report on "Marine and Dock Labor," recently submitted to the Board in Washington. This is a full, comprehensive statement apparently well-considered. It presents with other things the results of an analysis of the comparative wages of seamen and firemen on American and on British vessels at the port of New York in 1918 and the early part of 1919. The report states that the predominant British rate for seamen and firemen in 1916 was £8 per month or a little less than $40, while the American Atlantic rate for the same period was for seamen $45 and for firemen $50 a month—the American Pacific rate for both seamen and firemen being $55. British wages, of course, had risen to a somewhat higher level because of the hazards of the war.

In the spring of 1917, American wages in both the Atlantic and Pacific for both seamen and firemen had risen to $60 a month. The British Admiralty in January, 1918, fixed British wages for seamen and firemen at £12 a month, or somewhat less than $60. But in May, 1918, the American rate for seamen and firemen was raised by the Shipping Board to $75 a month. For the time being the cost of manning American vessels was again considerably higher than the cost of manning British vessels. Under the new Seaman's Act, British seamen and firemen were entitled to demand half wages and leave their ships in American ports without being apprehended and returned by our own government, with the result, as stated by a British investigator, that "The higher wages offered to seamen in America have led certain British crews who found themselves in American ports to go over to the more lucrative employment."

It is added:

"To counteract this tendency the British Ministry of Shipping has, since August, 1918, required that every member of a British crew provide himself with an identity and service book which he must be always ready to produce. Failure to show it or procure it exposes him to the operations of the Military Service Acts. The important stipulation attached to this certificate is that the holder may not take service on the merchant vessels of any other nation. By this restrictive device it is hoped that the British crews may be retained intact despite the attraction of higher wages elsewhere."

But this expedient seems to have proved a failure, for in October, 1918, the British Admiralty began to grant a war risk bonus of £3 or nearly $15 a month to British seamen and firemen, bringing their actual income up to £15 a month or almost equivalent to the $75 of American seamen and firemen. After the signing of the armistice this British bonus was long continued, until the International Seamen's Federation in session in London demanded that the $75 rate for British and Scandinavian seamen and firemen should be recognized as permanent in time of peace.

A Comparison with Scandinavians

Agents of the Shipping Board early in November, 1918, examined the shipping articles of several British and Scandinavian vessels at the port of New York. Other examinations were made in December, 1918, of a larger number of British and Scandinavian vessels. Many of these foreign ships had secured all or a part of their crews at the port of New York, and were paying $75 a month—the regular American rate—to seamen and firemen. Those British vessels that had crews shipped abroad were then paying $57.50. Subsequently a bonus of £3, or a little less than $15, a month was added. On eight Norwegian vessels that cleared for New York in December, 1918, both seamen and firemen were paid the American wage scale of $75 a month. Other Scandinavian and Dutch vessels clearing from New York at the same time increased the regular wages of their crews by high bonuses, making altogether $75 or more. The Shipping Board report states on this point that "the conclusion to be drawn from these figures would seem to be that, as far as the larger maritime nations are concerned, vessels touching at New York in December, 1918, were, with very few exceptions, in one way or another paying the American wage scale. The wages of American sailors had since 1914 gone up about 150 per cent, and American firemen's wages approximately 90 per cent; but foreign wages had risen a much larger per cent and are now equal to the American rates."

Further inquiries were made by agents of the Shipping Board in February and March, 1919. Out of twelve Norwegian steamships that cleared from New York between February 23 and March 1, it is stated that nine paid all and two a portion of their crews $75 a month; that of ten Danish steamships seven paid $75 in both departments, and that of six Swedish steamships three paid $75 and one paid $75 when "away from home." A Brazilian vessel at the same time paid its seamen and firement $82.50 a month, or considerably more than the American wage rate. The French vessels, on the other hand, were paying wages as low as $32 to $38, though there may have been bonuses that did not appear on the shipping articles.

Another surprising fact that was developed was that licensed officers on Norwegian vessels were in some cases paid very much more than the American rates. For example, a first officer on a large Norwegian steamer received $400 a month and the chief engineer $440. These salaries, however, must have been quite exceptional.

Will These Conditions Last?

Never before in our maritime history, so far as is known, have European ship wages been as high as American wages. Even in the early years of the nineteenth century in the very beginnings of our merchant marine, American seamen were paid substantially more than the seamen of Great Britain or the continent of Europe. This extraordinary rise in European ship wages during and since the great war has its counterpart in increased wages in many lines of European manufacture. Whether the new rates of wages will be permanent no man can yet know. The president of the Lamport & Holt (British) line of steamships, arriving in New York the other day from London, declared that "it costs just as much and perhaps more nowadays to man and maintain British steamships than to man and maintain steamships under the American flag."

It will be maintained that this leveling up of American and European wages is in great part a result of the La Follette Seamen's Act. But it is wholly probable that the great war itself, with its heavy loss of life among seafaring men and its increase of hazards, has been a far more potent agency for the time being. In any event, this leveling process, however produced, is unquestionably an important factor toward a fair and even competition on the ocean. This is true especially in regard to Scandinavian ships which have historically been manned so cheaply that on certain routes in certain trades they have made British competition almost impossible. Costs of living have risen in the Scandinavian countries to a point probably as high as anywhere in the world. German submarines took particularly heavy toll of Scandinavia's seafaring population. Never again will the shipowners of Norway, Sweden and Denmark be able to man their vessels on the exceedingly low levels that prevailed before the war, when it was practicable for them to hold their crews to their ships by ironclad contracts that permitted the full paying off of seamen and firemen only on the return to their home ports or after the expiration of a two or three-year period. This was long an exploitation of labor that made very difficult the maintenance of an American merchant marine.

The Menace of Japan

But as to Japanese and other Asiatic sea wages, all records show that they have not materially changed. The Shipping Board report states that wages of Japanese seamen on vessels sailing from San Francisco, which were $9.27 a month in January, 1914, had risen only to $10.43 a month in December, 1918, and that wages of firemen on Japanese vessels had advanced in the same period only from $10.27 a month to $12.37. That is to say, the wages of Japanese sailors in December, 1918, were less than one-seventh of the standard American wage rates of the Shipping Board, and the wages of Japanese firemen were less than one-sixth of the standard wages of American firemen.

Not the slightest provision has thus far been made by the United States government to meet such a condition as this—no remedy has thus far been suggested. While freight rates stood at war figures in the Pacific Ocean, this wide difference in wage scales did not bar American competition, for even American ships found their voyages profitable. But when normal competition returns, as it certainly will before many months, it must be demanded of the Shipping Board and of Congress that they frankly face the Pacific situation and do something to give fair play to our Pacific marine—and, indeed, to all American ships in trades where Japanese competition is a factor.

It is quite possibly true that a slight difference in ship wages would not prevent the development of an extensive carrying trade in American vessels, provided that the original costs of the ships and costs of fuel and other items of maintenance were fairly equalized. A slight difference might be overcome, as the Shipping Board has urged, by more forceful initiative and enterprise in operation and management. But the present difference between American ship wages and Japanese ship wages is so formidable that the solution of the problem can be found only in some form of positive national protection and encouragement.

Address by Charles Piez Before Illinois Manufacturers' Association at Chicago, May 16, 1919

AFTER eighteen months in the government service, involving complete severance from friends and my business, I am glad indeed to be welcomed back in this generous fashion. And yet my pleasure is not without some regret; for the work with the Emergency Fleet Corporation, while arduous and exhausting, was, because of the variety and magnitude of the problems presented, of absorbing interest. I am not referring to the problems of management, but rather to those problems which are of such vital importance to the commerce and industries of the United States.

What to do with the ships that the necessities of war have placed in our hands, how to find profitable employment for them, how to further our foreign commerce through the establishment of new trade routes, and how to maintain in fair vigor the shipbuilding industry, developed at so large a cost to the nation, are questions appealing to the highest statesmanship, questions that merit the widest consideration and the fullest discussion.

It is hardly necessary to mention to the manufacturers of Illinois the importance of encouraging exports of raw and finished materials so that payment for the use of foreign capital, payment for foreign products imported into the United States, and for foreign services, may be made in American products rather than in American gold; and merchants and manufacturers everywhere recognize the advantages of broadening the market for American products. In spite of this, however, I often wonder whether we are keenly alive to the pressing importance of our overseas transportation system as one of the vital factors in meeting international competition. Those engaged in the export business have complained for years that our foreign trade lacked the stimulus of American ships, that foreign competitors controlling more or less directly their own lines had the advantage of fast and regular service, while America had to depend on slow and uncertain sailings, had to suffer from discrimination in freight charges, and place its business secrets as to the nature of the consignment and the name and address of the consignee into the hands of foreign shipowners for possible betrayal to foreign competitors.

But the use of a large merchant fleet for the transportation of our foreign commerce is secondary to its use as an important arm of the National defense. Congress recognized this paramount need, for the act of Congress approved September 9, 1916, states that the United States Shipping Board was created for the purpose of encouraging, developing and creating the naval auxiliary, naval reserve, and a merchant marine, to meet the requirements of the commerce of the United States. The war showed how sadly deficient we were in the number of vessels necessary to support the naval fleet we had in European waters, and how wholly lacking we were in troop transports, hospital, refrigerator and cargo ships to carry on even a limited land campaign.

A large merchant fleet, if we will keep in mind the lesson taught by the war and the obligations we expect to assume in the peace pact, is absolutely essential to our national safety, and this need should be pointed out to those members of the new Congress who seem to feel that economy in expenditure is the only consideration that should weigh.

Every possible effort should, of course, be made to limit expenditure, so that the heavy burden of taxes on our industries and our commerce may be reduced, but this limitation should not go so far as to jeopardize the national safety or to sacrifice work already well under way. The control of future ship construction and the determination of a suitable plan for the establishment, operation and development of an American merchant marine, rests, after all, in the hands of Congress and the Shipping Board can but act as advisers.

The present activities of the board are therefore concentrated on an analysis of conditions that affect American ship operation as compared with foreign operation, a survey of the possibilities of American foreign trade and a determination of the character of vessels that would best meet the needs of that trade. Mr. Hurley, in order to insure fairly full employment of the fleet, has wisely laid down the rule that the fleet should not be larger than necessary to take care of 50 per cent of our water-borne exports. In June, 1915, our

(Continued on page 176)

Analysis of Rosseter's New Ships

By The Traffic Manager

MR. R. L. HAGUE, manager, department of construction and repairs, United States Shipping Board, division of operations, has just completed a tour of inspection of the Pacific Coast shipbuilding plants. Our friend the "Traffic Manager" was able to arrange a conference and secured from Mr. Hague, so far as his time would permit, some interesting details on the latest developments and ship designs in connection with the government's new building program. Cancellations of some shipbuilding contracts were, in the main, due to antiquated designs, and now that the war is over, time is being taken to produce up-to-date plans and specifications, so that our vessels may be of the latest and most economical type, and that is as it should be. The wooden ship is too small to compete in the foreign trade, as are also some of the smaller type of steel vessels contracted for, and a pause was therefore inevitable if what we are going to build is to stand up in competition with the rest of the world's fleets.

Up to date, four designs have been completed by Mr. Hague's staff, and are known as types "A," "B," "C" and "D." A short description of each type follows:

Type "A" is a 15,000-deadweight-ton Isherwood system, twin screw, general cargo vessel, the plans showing one type fitted with engines amidships and one type with engines aft; the engine aft design shows the greater simplicity and more economical installation, but the engine amidship design gives better vessel trimming facilities for shoal draft ports. The dimensions of this type are: Length over all 526 feet, b. p. 500 feet, beam molded 68 feet, depth molded to shelter deck 45 feet 6 inches, depth molded to upper deck 37 feet 6 inches, depth molded to main deck 27 feet 6 inches, draft loaded 30 feet 8 inches, speed 13 knots on an i. h. p. of approximately 6600, cubic measurement of cargo holds about 780,000; six boilers, 15 feet 6 inches by 12 feet. The engines will be practically duplicates of those designed by the Bethlehem Shipbuilding Corporation, San Francisco, and installed in the Standard Oil tank steamers D. G. Scofield and Astral, which have shown great efficiency and economy in actual operation. These engines, briefly described, are quadruple expansion, direct acting, surface condensing, balanced on the Yarrow, Schick, Tweedy system, sequence of cylinders from forward, H. P., second M. P., L. P. and first M. P.

Type "B" is a 12,500 d. w. t. Isherwood system single screw general cargo vessel with engines amidships. Length over all 489 feet, B. P. 470 feet, beam molded 62 feet, depth molded to shelter deck 43 feet, depth molded to upper deck 35 feet, depth molded to main deck 26 feet, loaded draft 29 feet 2 inches, speed 13 knots, I. H. P. 5600, and cubic capacity approximately 675,000.

Type "C" is a 9600 d. w. t. Isherwood system single screw general cargo vessel with engines amidships. Length over all 440 feet, length B. P. 425 feet, beam molded 56 feet, depth molded to shelter deck 38 feet, depth molded to upper deck 30 feet, depth molded to main deck 20 feet 9 inches, loaded draft 27 feet 9 inches, three Scotch boilers, and a sea speed of 11½ knots; triple expansion engines of 3800 h. p. (Notice the departure from quadruple expansion engines in this design. In the short time Mr. Hague was able to give the writer, an explanation from him as to the reason for departing from the quadruple engine in this type of ship was overlooked.)

Type "D" is of the same general design as type "C," except that twin screws are specified and two 2000 I. H. P. Diesel engines of the Burmeister & Wain type, foreign built. The American built Diesel type engine will be adopted later, when American design, instruction and reliability in operation can be assured the Shipping Board. The American marine Diesel engine of the power specified for this vessel is still considered to be in an experimental stage.

General Remarks on Special Features Which Apply to All of the Above Types

The plans show evidence of the highest type of construction throughout. They will not be cheap stock ships built to sell. The greater first cost will result later in less cost for upkeep, greater sea speed than the ordinary cargo vessel, greater dispatch in loading and unloading; therefore general all-around economy in operation.

They will all be built to the highest classification of the American Bureau of Shipping and Lloyds, making the question of insurance an easy problem.

The cruiser stern has been adopted because of greater speed on a given power over the ordinary elliptical stern vessel. The efficiency of the cruiser stern has been proved by a series of model tank tests in Washington, and as a result of these tests ship lines have been developed which will give about one-half a knot greater speed for the same horsepower over the ordinary elliptical stern vessel.

Two hatches have been fitted to each cargo hold, which will eliminate the drag of freight in the holds by affording a straight lift to all cargo; also allowing the loading of cargo to start in one end of a cargo hold while the other end is still being discharged.

Bunker oil will be carried in the usual double bottoms, and an additional supply in deep tanks fitted forward and aft, instead of amidships, thereby utilizing the fine ends of the vessel undesirable for cargo for bunker purposes, and leaving the large cubic amidships section available for cargo, thus increasing the cubical contents of the vessel.

Ample heater coils will be provided in the bunker tanks for the easy handling of the heavy Mexican oil.

Masts have been eliminated, and the king post system of handling cargo adopted, which will save time in cargo swing over the old system of amidship masts and booms. Double winches will be installed at each king post to provide facilities to keep as large a gang of stevedores busy as possible. Steam winches have been adopted, as all tests show them to have double the speed of an electric winch as developed to date.

Last, but not least, these vessels, by their lines, cruiser stern, and superstructure, will readily be distinguished in all ports of the world as distinctly American ships, of which our American export trade seekers abroad may well feel proud.

Pacific Marine Review
The National Magazine of Shipping

576 Sacramento Street
SAN FRANCISCO, CALIFORNIA U. S. A.

Official Organ of the Shipowners Association of the Pacific Coast

Subscription Price, per year (Domestic) $3.00
(Foreign) $3.50
Single Copies . . . . 25 cts

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B. N. DeROCHIE . . . . . . Business Manager
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NEW YORK OFFICE
339 Hudson Terminal Bldg.
30 Church Street
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NORTHWESTERN OFFICE
560-561 Empire Building
Seattle, Wash.
J. A. KENNEDY, Mgr.

Pacific Marine Review is sold at all leading News Stands
Entered as second class mail matter at Postoffice
San Francisco, California

Published on the First of Each Month. Copyright
1919 in the United States by J. S. HINES

THE FUTURE OF AMERICAN SHIPPING

IT augurs well for the future of our American merchant marine that so many minds are applied to the formulation of a policy that will insure its re-establishment and permanency. Our recent rude awakening to a knowledge of the dangerous condition into which we had let ourselves fall by permitting our sea supports to rot and die, and the humility which this lesson forced home, will not be soon forgotten. Little do we, as a nation, realize how serious our position really was, and what a miserable situation we confronted as a result of our carelessness and neglect. For years men familiar with the necessity of an adequate American merchant marine have pointed out the commercial benefits that would accrue to us from its operation and its indispensability in case of war. These repeated appeals, however, fell on deaf ears and all argument was neutralized because the country prospered and capital found employment with more lucrative returns from other protected sources. As an auxiliary to our navy at war, the requirement did not appear to be urgent; so, for want of sympathy and support, especially from inland sections whose antipathy encouraged legislation inimical to its interests, almost the last vestige of shipping under the American flag, except such as enjoyed the protection of our coastal laws, disappeared.

The farmer from Nebraska or the merchant from Kansas City awoke one day to bid a son good-bye. The boy was going overseas. The anxious father and the loving mother realized that Uncle Sam would exercise every care in protecting his life and health, and they could rest assured that every possible safeguard would be placed about him. But they soon learned that the starry banner for which he was to fight and under whose folds he marched from home would not fly from the taffrail of the ship that would transport him through the submarine-infested area. Fortunately, however, our staunch ally, England, had provided his carriage, and a grateful world knows the sacrifices of her brave sailors and appreciates how well they did their noble work. But when that merchant and that farmer next go to the polls, their votes will carry the conviction to the hearts of all congressmen that this nation, henceforth, is determined to extend the protection of the American flag to her sons and her commerce, whether on land or sea or air. Now this same farmer and this merchant have seen the Shipping Board and the Emergency Fleet Corporation spending huge sums of their good money on the building of ships and they have been content in the press-propagated knowledge that the American merchant marine was once more supreme upon the high seas. The fact that the same competitive forces and the same harmful legislation which formerly swept the American flag from the sea are still in operation and may again have a like result, should be brought home to the farmer and the merchant now so that they may rise in their just wrath, and, wiping that legislation off the books, give their merchant ships a chance for an unhampered fight against that competition.

For many years practical, ship-minded men of broad vision and wide experience have been urging certain legislative and constructional reforms in our shipping policy. These have been briefly summarized by one of our foremost Pacific Coast shipbuilders:

Helpful legislation and the repeal of vicious and foolish laws.

A strong and efficient mail subsidy policy for intercourse with the world in American ships.

A naval reserve subvention policy in support of our lines for the engrossment of American commerce with the world.

An American surveying society, under which American ships shall be built.

Load line rules enforced by an American board of survey.

American insurance policies on hulls and cargoes favorable to American ships.

An American chartering policy with American ships as the standard.

Co-operation of American railroads with American shipping.

Shipowners, merchants and underwriters combined in mutual self-interest to control the trade and transportation of the United States with the countries of the world.

The correction of our system of measurements.

We find ourselves under a false policy which operates to create a dependency in our navigation. Shall we continue this condition? The war has revealed to us our weakness. Shall we further impose upon ourselves?

We can sail our own ships and conduct our own commerce just as easily as we can build them. We have only to provide by law that ships of our flag **shall enjoy their right.** Give them the preference in the carrying of American merchandise. Let Congress know your sentiments. Fearless and intelligent representation is what the interests of the country demand.

The issue is not one of business consideration alone, but one of **national necessity.**

AMERICAN PACIFIC STEAMSHIP ASSOCIATION

A MOVEMENT has been on foot recently among ship operators and owners on the Pacific Coast to consolidate the various associations which have been formed from time to time among the different classes of freight carriers. At a meeting held in the Merchants' Exchange Building on May 12, 1919, by representatives of the off-shore passenger and freight steamers, coastwise passenger and freight steamers, and oil carriers, at which there was representation from the Union Oil Company, the Standard Oil Company, Pacific Steamship Company, W. R. Grace & Company, Pacific Mail Steamship Company, Matson Navigation Company, Oceanic Steamship Company, Dollar Steamship Company, Williams-Diamond Company, and the Gulf Mail Steamship Company, it was decided to form an organization. Mr. Daulton Mann of the Pacific Mail was elected temporary chairman and Mr. J. C. Rohlfs of the Standard Oil Company, temporary secretary.

The chairman appointed a committee consisting of Daulton Mann, Andy Moran, F. M. Barry, J. C. Rohlfs and F. S. Samuels. This committee met and decided that the name of the new association would be "The American Pacific Steamship Association," having as its object the forming of a federation to include the former Pacific Coast shipowners or lumber carriers, the oil carriers, the bay and river craft, the foreshore craft and the coastwise passenger and freight steamers.

On account of the peculiarities incident to these various classes, it was thought wise to adopt a divisional plan of organization in which any similar associations or federations now in existence could retain their identity and work together through a central body composed of delegates.

This organization is certainly a movement in the right direction and one that is very timely. Foreign competition on the Pacific Ocean, strengthened by four years of near monopoly, has become entrenched, and any move made by Pacific Coast shipping interests to offset the great advantage which these foreign competitors enjoy must be concerted action undertaken by a body in whom the various divisions of those shipping interests have implicit confidence.

Here on the biggest ocean shall sail the biggest ships
  The big world markets to supply.
And if we pull together we will build them on our slips
  And our own star-spangled banner they will fly.

POLICIES OR POLITICS?

THE United States Shipping Board was instituted by Congress for the purpose of investigating American merchant marine matters in general, and more particularly that portion thereof which pertains to overseas foreign trade. The Shipping Board was given by Congress $50,000,000 with which to build a fleet of ships for foreign trade routes, in order that American foreign trade might be stimulated, and that the Shipping Board might be able to investigate all the details of operating costs from the raw material that enters into ship construction up to the most complex problems of international marine freight carriage.

Just as this program began to take shape on paper, the United States entered the European war and the Emergency Fleet Corporation, formed by the Shipping Board to build and operate a $50,000,000 fleet, was suddenly confronted with a much more gigantic task. Considering the difficulties that faced them these two organizations have accomplished wonders. But just as they reach a point where high pressure steam is up throughout the whole system and all the auxiliaries working full speed ahead, the war ends—the emergency is over, and they are facing the difficult duty of readjustment—a duty all the more difficult on account of the great publicity campaign which seemed necessary to rouse enthusiasm for the first task.

Now then we, as a nation, are come to the turning point in our maritime life. We may turn back on our track and arrive at our pre-war state of maritime dependence, or we may go forward guided by right policies into a safe haven of maritime independence and helpful trade relations, or again we may go forward hampered by politics and red tape on a very stormy sea to a possible shipwreck.

Every right-minded American wishes to go forward and he is looking to the Shipping Board for guidance. Congress is looking to the same source and on the action of the present Congress the future of our American merchant marine largely depends. If they will forget politics and give the nation a commonsense policy for carrying out its marine business, then we may see American initiative and ingenuity triumph over the competition of our great trade rivals. If, on the other hand, the Shipping Board and Congress decide to use America's merchant marine as a pawn in the game of politics, then, to paraphrase one of Abe Lincoln's homely illustrations, business will have to stop every time politics wants to blow the whistle.

It's up to you, Mr. Chairman of the Shipping Board. Yes, Congressmen and Senators, it's up to you. America is referee—the world is in the bleachers—Mr. Hurley is at the bat.

CANCELLATION OF CONTRACTS

IN connection with the proposed changes in the program of the Emergency Fleet Corporation and the United States Shipping Board, a delegation of practical shipbuilders, consisting principally of the active managers of steel shipyards, met Chairman Hurley at Washington on May 23. This conference with the head of the Shipping Board was arranged by the shipbuilders' division of the California Metal Trades Association.

California shipyards now employ 80,000 men. Prior to the emergency caused by the late war, at the peak of production the maximum number of men employed in this industry was 6000. In getting together the organization and the workers who compose the 80,000 total mentioned above, men were brought from all over the world, and it is the contention of the shipbuilders that any change in program which even temporarily causes an interruption to the work will inevitably break up this organization, for the reason that the Pacific Coast has outside of the shipping industry no manufacturing interests of sufficient magnitude to carry over this surplus of labor. When it is considered that the annual payroll of the shipbuilding industry in the San Francisco district alone amounts to more than one hundred million dollars, the importance of this matter to the commercial life of the Pacific Coast is very evident.

For the first time in the history of the shipbuilding industry, the government-imposed Macy scale of wages places Western and Eastern labor on an equality. The practical shipbuilders consider that the handicap of freight on raw materials is offset by the advantages in the climatic conditions, which enable shipbuilders on this coast to work efficiently every working day of the year. The Pacific Coast is now for the first time on a substantial basis to compete with the Anglo-Saxon world on shipbuilding orders, provided that the present program is continued long enough to give an opportunity for the executive organizations of the yards to make ready for building different types of ships. In this connection even substitution of types without ample opportunity for making ready is a very dangerous and delicate operation and is likely to upset the entire organization on the coast.

When the shipbuilders' division of the California Metal Trades Association recognized the danger that was confronting them, they called a mass meeting at the Civic Center in San Francisco in order that the entire personnel of the shipyards and commercial bodies interested in their welfare could be given a chance for public expression and thus bring the pressure of public opinion to bear on Washington. They immediately telegraphed Chairman Hurley asking for a meeting and he set a date, requesting that the men sent be practical executives of shipyards. The association then got the North Pacific division on the wire and arranged that Seattle and Portland send representatives together with those from California.

WHY SHIPPING INTERESTS SUPPORT THE JUNIOR NAVAL RESERVE

By H. H. Raymond

It is an axiom that seaborne commerce must have sea-trained men. "American crews for American ships" is not a mere slogan; it is a statement of a necessary correlative to our country's maritime position. American ships must have American crews, and such crews must be men maintained and trained under American standards and officered by American brains and discipline, with the imagination, self-reliance and Yankee initiatve that in the days of the clipper ship made our flag the wonder of the sea. Even before the war and prior to our country's great program of ship construction, American shipowners were painfully aware of their dependence upon alien labor. This well understood weakness need not be dilated upon here. A single instance is that on 453 American ships, of the lake and coastwise trade, the personnel was less than fourteen per cent American.

The United States Shipping Board has a well-planned and carefully-extended recruiting service and training system, which in connection with the like effort of the Navy Department to help merchant marine needs, has accomplished splendid results. But the training and opportunities offered under these plans have been necessarily restricted to service age requirements in an effort to gain immediate results. The Shipping Board recruiting service place their entrance age requirement at twenty-one years, and boys below eighteen are not allowed to enlist in the United States Navy.

The reason that the shipping interests of this country are interested in the work of the Junior Naval Reserve is not only because our future sailors are hidden in the boy members of the organization, but because by encouraging the coming generation in discipline and love of the sea, the support and growth of our merchant marine is assured for all time. In line with any constructive policy to man our newly-built and newly-building ships, and in co-ordination with present efforts of the United States Shipping Board, it is essential that an organization like the United States Junior Naval Reserve, with a broad and systematic plan for interesting and training the younger boy, be encouraged and helped. By proper extension of the work of the Reserve another quarter of a century would see the crew of every American ship successfully dominated by American seamen and an almost native personnel insured.

No opportunity has been ever neglected by England to foster her maritime supremacy, and English shipowners have long been aware of the value of a sea-training system for boys of fourteen and older. Committees of English shipowners have worked intelligently to establish such training and have supported the several agencies now working in England along lines similar to that of the Junior Naval Reserve.

To foster our country's spreading flag upon the seven seas is a paramount duty of every American. It is the need and demand of the shipping interests of our country that such fostering be done under an intelligent and far-seeing policy. As a part of such a policy, the Junior Naval Reserve is an established institution, well equipped to play a most important part.

NAVAL RESERVE CREWS FOR MERCHANT SHIPS

By A Naval Reserve Officer

The United States created a great reserve during this war, all members of which, except in certain branches, were supposed to be American citizens. No serious attempt, that I know of, was made to encourage these men to take to the sea after the war. Out of these tens of thousands of men there are undoubtedly thousands who would have a better future if they kept to the sea, and they will keep to the sea if the proper inducement be found.

All recruits to enlist for a minimum of one year, with increased payments for each re-enlistment and after a certain length of service to be eligible for advancement to officer rank.

The officers to hold such rank in the reserve as they are qualified for and not to be promoted in rank until a certain specified time has been served in each rank, regardless of what position they may hold or be ordered to on board ship. The rules and regulations of the navy, with such modifications as may be necessary to make them applicable to merchant ships, should be retained as well as discipline.

The personnel and all men in authority connected with the personnel should be naval men, familiar with naval organization.

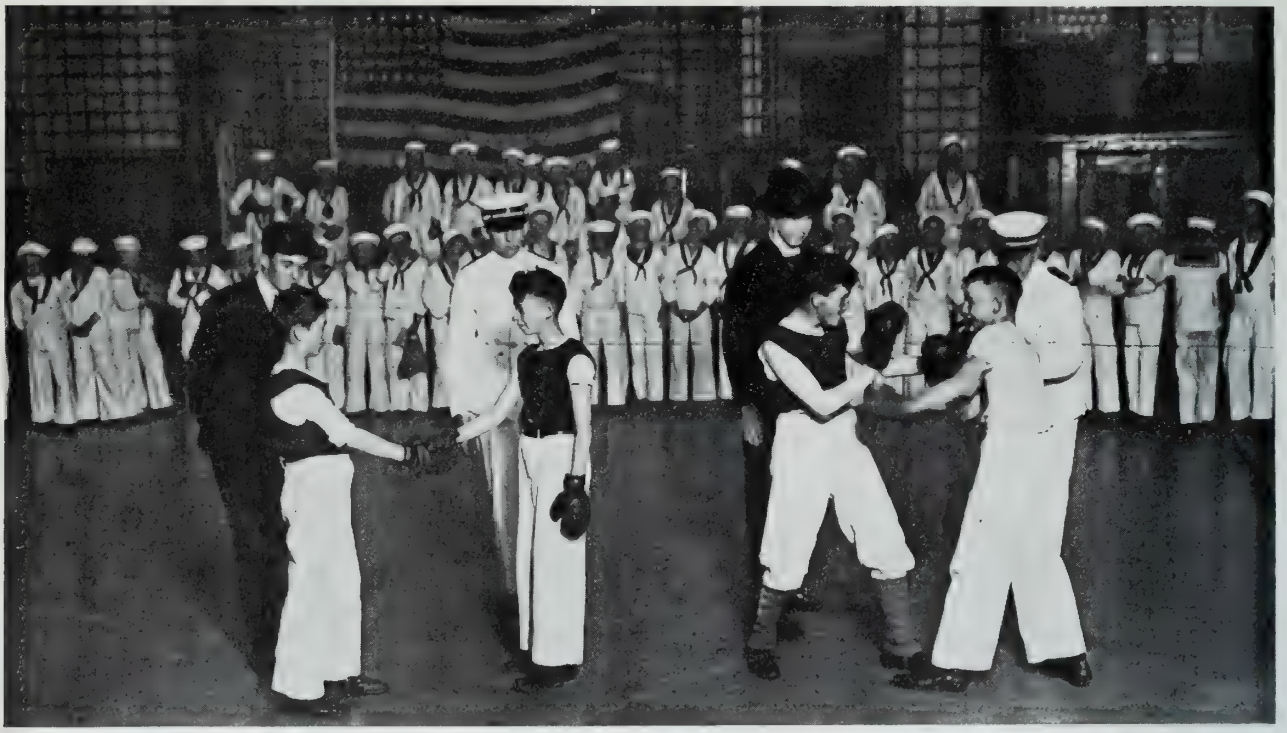
The government should pay the men the full amount and allowances that their rate calls for in the navy. The steamship company to whom they are assigned should pay an equal amount and furnish adequate subsistence and bedding.

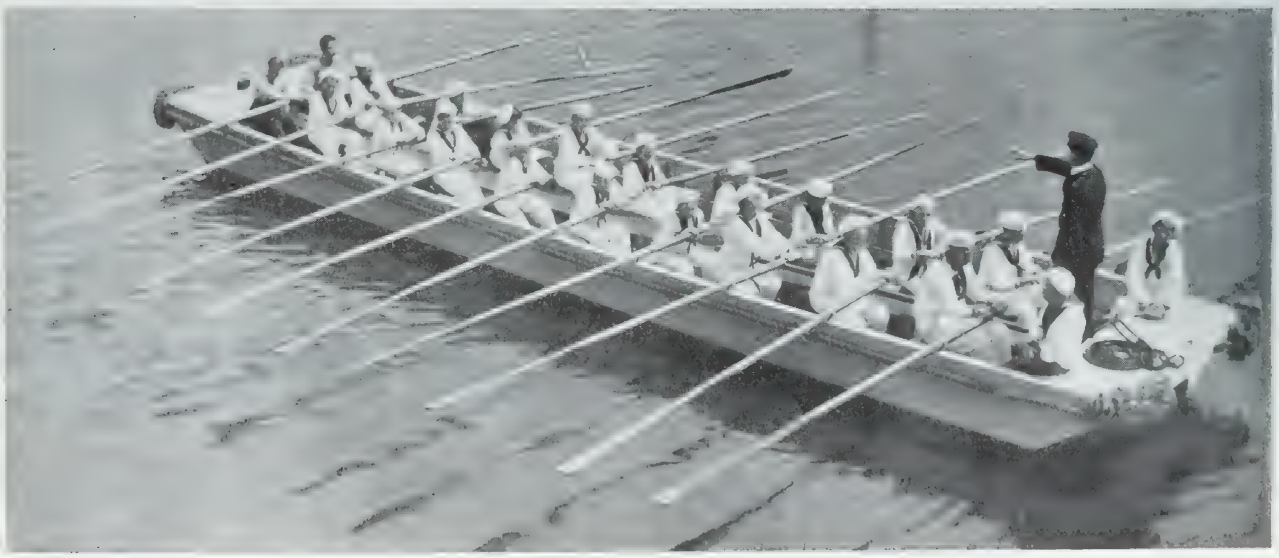
The government should pay the officers at least two months' base pay a year for the rank that they hold in the reserve. The steamship companies should pay the balance between retainer pay and agreed upon salaries for the positions they hold, as well as furnish quarters, subsistence, linen, etc.

The steamboat inspection service could also be turned over to this organization.

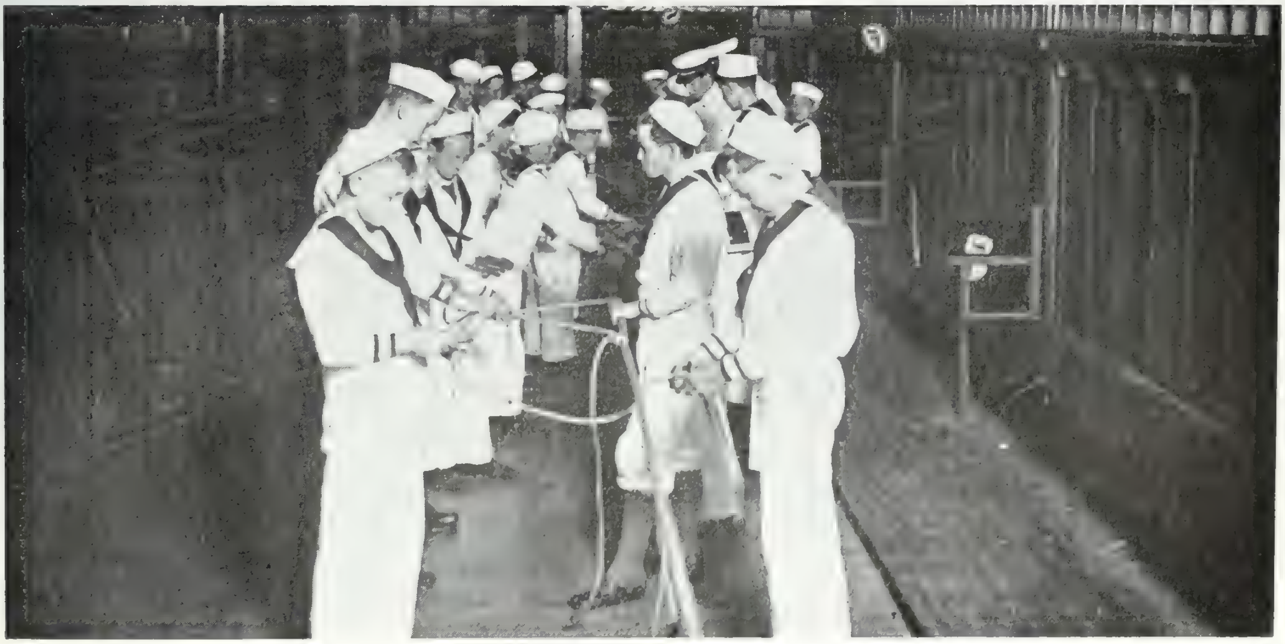
J. J. Tynan, Manager of the Union Iron Works plant of the Bethlehem Shipbuilding Corporation and better known to San Francisco boys as Father of the California Naval Cadets

California Naval Cadets —





—American Boys for American Ships



California Naval Cadets

WHILE the work of the training division of the United States Shipping Board is of excellent quality and has proved very efficient in providing crews for the emergency fleet, it does not include work among boys of the grammar school grades, and these boys are the material out of which must come the seafaring men of the future. In San Francisco this work has been undertaken by the California naval cadets, and a Pacific Marine Review representative recently had the pleasure of visiting this organization and inspecting its very interesting methods of training.

The boys meet two evenings a week in a rented hall. Here the younger boys under the instruction of their cadet officers are taught knots, splicing, rigging—in short, marlin spike seamanship. The more advanced cadets are given lectures with the aid of blueprints on various subjects, such as ship construction, rigging systems, marine engineering. Practice is given in military drill and the social phase is remembered in friendly bouts at boxing, wrestling and other sports.

The organization was effected early in 1919 under a naval form of administration with E. Pomeroy Commander C. N. C., Roy Olson, Lieut. Commander C. N. C., and A. Kaufman Lieut. C. N. C. as executive officers. Messrs. Olson and Kaufman have had both Naval and Merchant Marine experience and Mr Kaufman is an instructor in the Training Division of the Shipping Board. All three men have taken a great interest in this work and the success of the organization is due to their enthusiasm and hard work and the generous backing of J. J. Tynan of the Bethlehem Shipbuilding Corporation. Mr. Tynan has been a father to this movement from its inception.

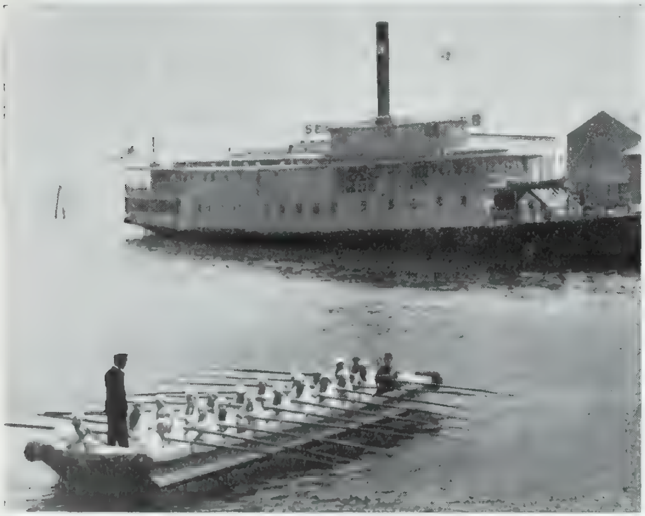
The ultimate aim is to arouse the love of the sea in the minds of California boys. The boys are given a very thorough training and when they apply themselves and show merit are promoted on passing examinations to the rank of petty, warrant and commissioned officers in the corps.

Two hundred and seventy-five boys are enrolled and many are clamoring for a chance to get in.

The organization needs and merits the support of the shipping interests of the community. Captain Hibbert, of the training division of the United States Shipping Board, recognizing the importance of this movement, has voluntarily offered the cadets free use of the training ship at the local Shipping Board shore station every Saturday afternoon, and a special rowing barge, which is shown in our illustrations, has been built for their use. But as the enrollment increases the needs grow, and with additional equipment much more could be accomplished.

Used rope, rigging fittings, old nautical instruments, charts, peloruses, binnacles, any of these would be welcome. There must be in the shops, or on the ships of San Francisco, many of the items of this list which, while now in disuse through unseaworthy condition, could be of great value in the work of the naval cadets. If any of our readers have such articles and are disposed to put them to this great service, they would do Pacific Marine Review and the California naval cadets a great favor by communicating with this office.

There is a large waiting list for enrollment, and it is expected that before the year is over the membership will reach 500. They have followed the very practical plan of using cadet officers as instructors for the younger boys. These cadet officers have had to pass a very searching examination on the various phases of seamanship, on military discipline, on the qualities necessary in an officer, and on their own personal aims and ambitions in taking up the training for a seafaring life. Some of these boys have shown remarkable aptitude in this work and are unmistakably splendid material for future officers on our merchant marine.



Left: California Naval Cadets in barge at the Shore Station Training Division of the United States Shipping Board. Right: Close up of same boys

PACIFIC MACHINERY

Efficiency in Marine Engine Production

By G. N. Somerville

SINCE the last issue of this journal there have been in Pacific Coast shipbuilding circles many rumors of wholesale cancellation of ship contracts. These have been denied by the Shipping Board officials, after stating that cancellations would be put in effect only where inefficient conditions existed in the shipyards. At the same time, the very pleasing news has been received that American shipyards can now accept orders for tonnage on foreign accounts, which will give shipbuilders throughout the country an opportunity to continue on their first shipbuilding program originally outlined for the government's mercantile marine.

The hint dropped by the Shipping Board that cancellations would develop where inefficiency existed, is enough to make the shipbuilder awaken to the needs of efficient production, and it goes without saying that efficiency must exist to obtain foreign orders. When we speak of shipbuilding, the fact must not be lost sight of that not only hulls is meant, but the main and auxiliary machinery as well. It is therefore an opportune time to consider what makes for efficiency.

First, we must have efficient management to plan, schedule and direct the operations of our manufacturing establishments, and this must be based on experience gained through the actual manufacturing of the parts or machinery involved. The standardized ships, and engines used to drive them, manufactured in large numbers during the recent war period, no doubt opened the eyes of Pacific Coast manufacturers to the advantages of duplicate production, for where duplicate production is possible, special fixtures and tools will reduce the cost of manufacturing to a fraction of what the cost would be under the old-time jobbing methods.

Along with our efficient management we must have co-operation between labor and the employer. This question is now being discussed by far more competent minds than mine, and I will not attempt to present a solution thereof at this time.

Next, we must have efficient and modern machine tools and factory appliances that go to make more rapid and economical production. Electric cranes and industrial railways, probably, will save more time in actual machine shop hours than any other single element in the category of machine shop equipment. Electric cranes of the cab control type, where a sufficient amount of work will warrant the employment of an operator, will well repay the investment involved. These cranes should be equipped for the particular class of work by a careful selection from the large variety of especially designed slings and handling attachments now being offered for sale by wire rope manufacturers.

In the manufacture of marine engines, the majority of the work is of a large and bulky nature, calling more for the use of overhead crane service

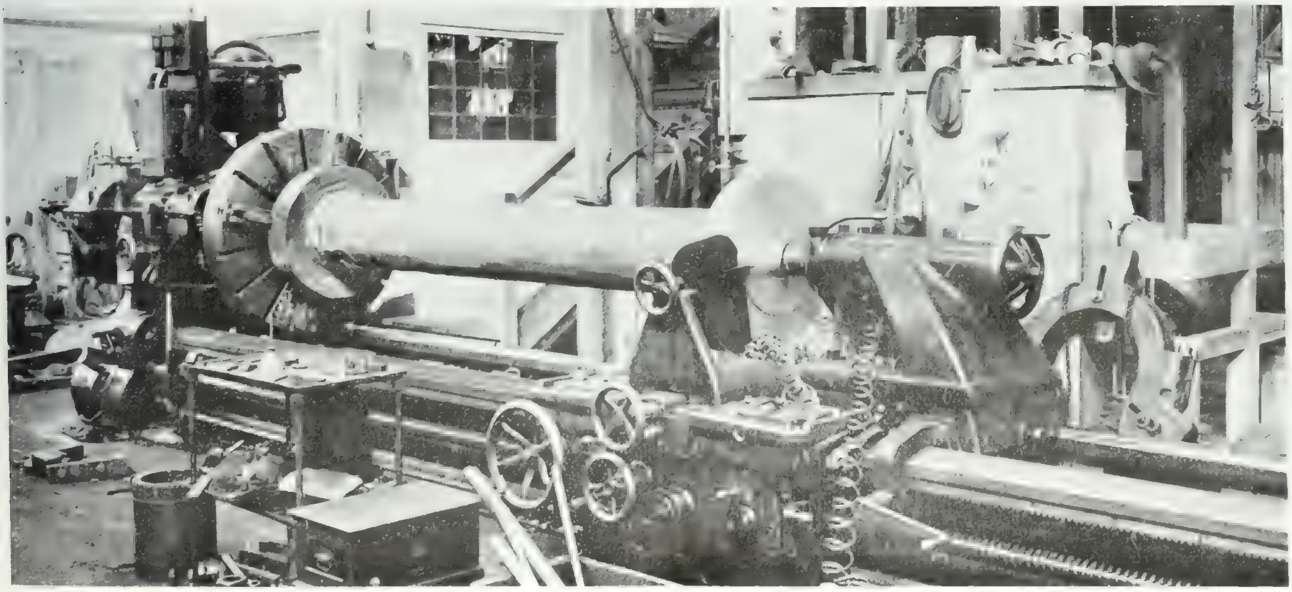


Figure 1

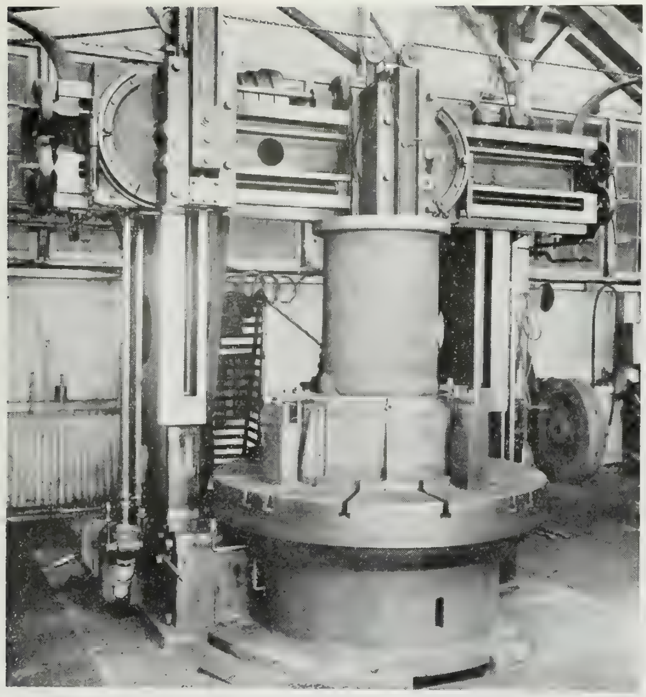


Figure 2

than the floor type of railway, but where machinery is manufactured in sufficient quantities to call for a large duplication of small parts, the movement of these parts between departments is greatly facilitated by the use of industrial railways. Much study can profitably be given to the planning and laying out of these important parts of the machine shop equipment, and it is well to plan for the inevitable extension of the business that must come after the plant is operating efficiently.

The machine tools themselves play no small part in promoting economy and the fixtures and special tools attached thereto should be given careful consideration to properly adapt them to the work in hand. One large engine manufacturer in the bay district has spent many thousands of dollars in special tool equipment, which has paid enormous interest in the saving of time in the manufacture of marine engine parts.

Figure 1 shows a forty-eight-inch Houston, Stanwood & Gamble electric-driven gear head lathe, comparatively new on the American market, but one that has given an excellent account of itself during two years of service manufacturing marine engine shafts. In the present cut this lathe is shown turning one of the flanges of a fourteen-inch tail shaft. The material is Lloyds' open hearth steel. This lathe is very rigid in construction. Four-throw crankshafts have been turned out by this lathe in large numbers and the adaptability of the machine is well shown when we consider that cuts of one-eighth-inch feed and of a depth of one inch on a side have been removed. At the same time the lathe is capable of turning crankpins to within .00025 of size and to within the same limits of roundness. Specifications on this class of work have always allowed limits of .002 inch, but the lathe has repeatedly turned out shafts the truth of which has been so nearly correct that it has been almost impossible to measure it with micrometers. Such machine tools as this have had a very important part to play in the establishment of efficiency in marine engine shops.

Referring again to Figure 1, note the rigid construction of the tool post, which is specially designed by the lathe manufacturers for making deep cuts on marine engine crankshaft pins and journals without sacrificing rigidity. The central blade or plate is a steel forging and the small hand-wheel draws in the wedge, which in turn tightens the tool proper. On the lower surface of the tool a tongue is provided which registers in a groove in the tool plate to prevent chatter or side movement. A rigid iron casting supports the entire tool holder and ribs are well arranged for preventing radial or longitudinal displacement. The extreme accuracy of crankpins and journals produced on this lathe is no doubt due in a great measure to this remarkable tool post construction. This construction has been found to be so well adapted to this class of work that the owners of this lathe have obtained permission from the lathe builders to equip their other lathes with a similar fitting. One of their own design and manufacture will be noticed in Figure 4, on a Bridgeford forty-two-inch lathe, shown turning single-throw crankshafts.

Another remarkable tool for rapid production and accuracy is the seventy-two-inch King boring mill shown in Figures 2 and 3. This machine is shown set up for boring out and finishing the top and bottom flanges of the main cylinder. An extra cylinder is shown standing on the floor in front of the mill in Figure 3, where it will be noted that the top flange (somewhat larger in diameter than the lower flange) is finished on the outer edge, top and bottom faces. On the bottom face of the large flange, a register ring is turned and the extreme top surface of the cylinder is finished all over. Figure 2 shows a close-up view of the machine set up with a special cradle fixture to hold the cylinder. It might be here noted that the height of this cylinder when set in the fixture comes to within one inch of the under side of the cross rail when the latter is in the highest position. The clearance is so small that it is necessary to remove the entire fixture from the boring mill table every time a cylinder is to be removed and a new one to be replaced. A register ring on the bottom face of

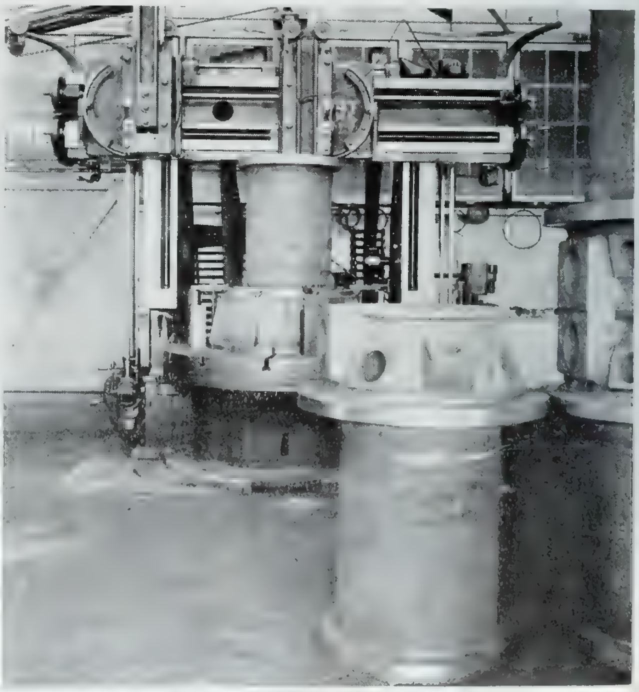


Figure 3

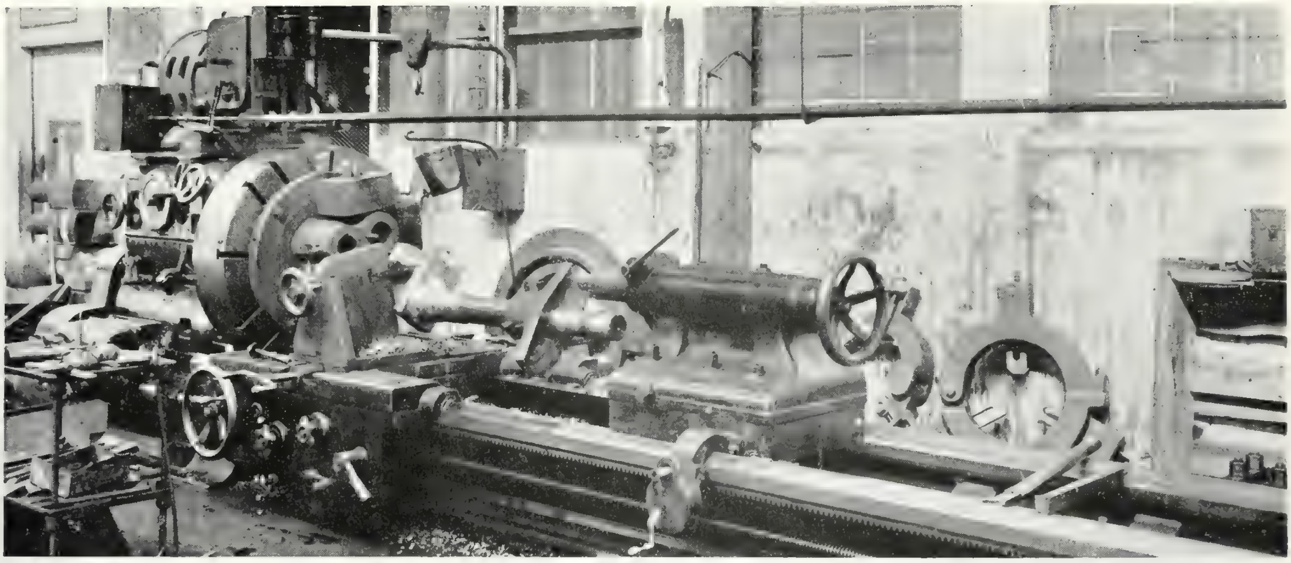


Figure 4

the cradle fixture, registering with a ring in the boring mill table, accurately locates the work centrally on the mill table. The central bore of this cylinder is twenty and one-half inches in diameter finished, and the finished surface is approximately thirty-five inches long, both top and bottom ends being counterbored for the over-run of the piston, the counterbore being approximately three inches long and one-fourth inch deep. The specifications on these cylinders allow for limits of .002 inch, plus or minus, in the diameter, and also specifies that the sides must be parallel with limits of .002 inch, plus or minus. This machine tool is of such rigid construction that in all cases the cylinders are brought to within .0005 inch of the specified diameter and to within .0005 inch of being parallel in the bore. This is remarkable when we consider that the work is up to the limit of the machine, and that the boring is done entirely by means of a single ended tool in the ram.

It will probably be of interest to here describe the method in which this work is done. The cylinders, as received from the foundry, have one-fourth inch allowed for finish on the inside bore, and in order to prevent the loss of a casting, the cylinders are first set up as shown in Figure 2, in the cradle jig. They are centrally located with reference to the rough cored surface of the cylinder bore. When thus centrally located the surface of the smaller flange is faced off and the outer diameter is turned. Both of these surfaces are rough finished only. After this operation the cylinder and fixtures are removed from the mill, and the cylinder is then reset in the reverse position from that shown in the figure, using the previously finished face of the flange and the outer diameter to accurately locate the work for turning the top face of the larger flange and the extreme upper surface of the cylinder head. It might here be noted that these cylinders are really a cylinder head and liner in one casting, and because there was not a hole through the cylinder head concentric with the cylinder bore, it became necessary to machine these cylinders in the manner being described. There is no support from the lower end of the boring ram; hence the remarkability in the accuracy obtained.

After the top surface of the larger flange of the extreme upper surface of the cylinder head is machined off, the cylinder is removed and again placed in the cradle fixture, as shown in the Figures 2 and 3. At this operation the cylinder is bored in three

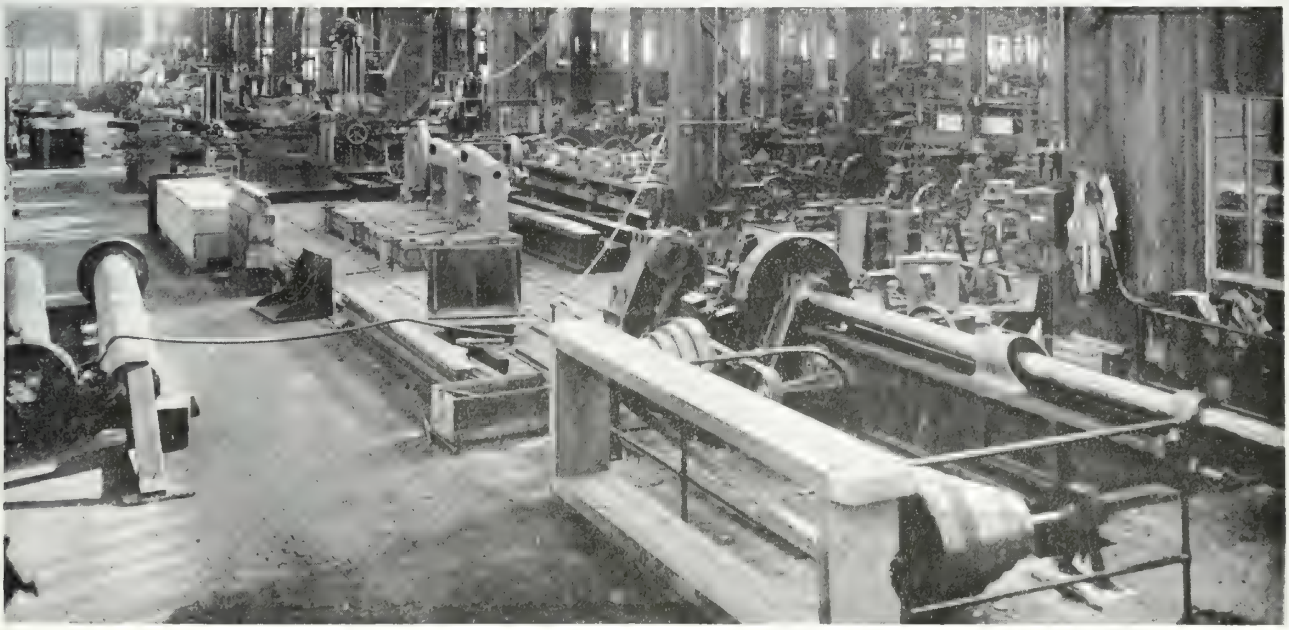


Figure 5

cuts—the first being a roughing cut of one-eighth inch at seven r. p. m., which is equivalent to thirty feet cutting speed; the second and semi-finishing cut is at the same speed, but with a feed of one-half inch per revolution; next, the final or finishing cut is taken at a one-quarter-inch feed at seven r. p. m. or thirty-foot cutting speed. It has been found that by reducing the final feed to one-quarter inch with a broad-nosed tool a much better and more accurate surface can be obtained. After the cylinder is bored and counterbored and before removing the work or fixture from the mill, the outer diameters of the smaller flange and register ring are finished turned. This insures that the center line of the cylinder will be accurately located with reference to the jacket, as the register ring and smaller flange locate the cylinder head and liners within the jacket when assembled on the engine. By these methods it is possible to completely machine one cylinder from a rough casting in nineteen hours, the first and third set-ups together requiring about ten hours, and the second set-up requiring nine hours. On the larger flange the diameter is thirty-two inches and the work is rotated at five r. p. m., corresponding to a cutting speed of forty-two feet a minute.

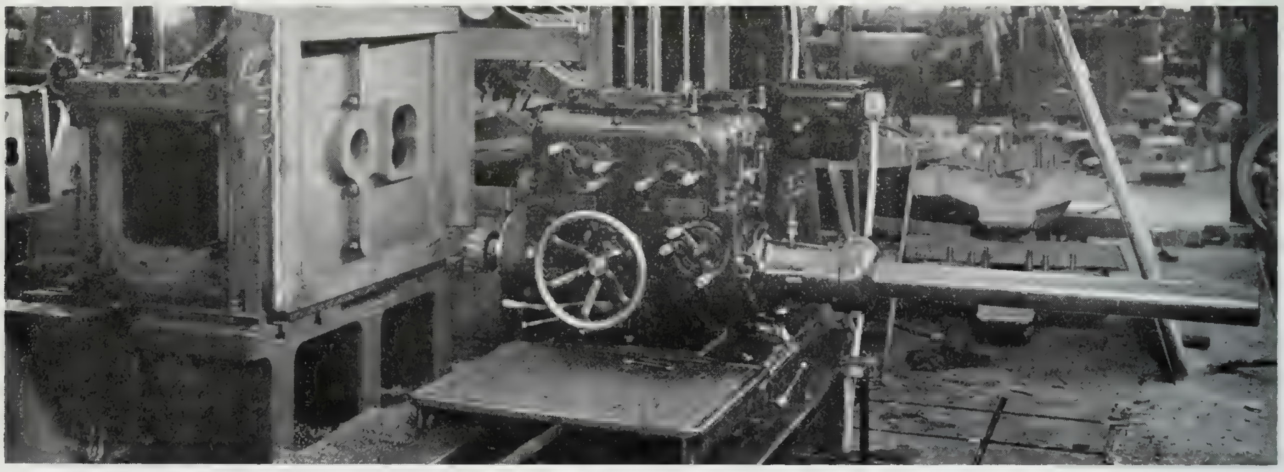


Figure 6

Figures 5 and 6 show the method which one large marine engine shop has adopted for producing certain parts of their large marine engines. A large cast iron floor plate, consisting of eleven sections, each five by fifteen feet by one foot thick and weighing about 132,000 pounds, has been installed in their erection shop. These sections are all mounted on concrete piers and provision is made for occasional relining, as settling may occur. This relining may be done from beneath the plates where space has been left between the concrete piers for the workmen to conveniently move about. This floor plate will be used for setting up and laying off such parts as must be partially assembled before final erection, and it will be used further for bolting down work for machining on the three principal tools mounted on this floor plate, consisting of a six-inch spindle Barrett cylinder boring machine, a No. 35 forty-eight-inch Newton rotary planer, and a three and one-half spindle Landis floor mill. It will be noticed that the arrangement of these three tools is such that no interference is encountered when each is set up and working, as ample space has been left around each tool to guard against such a possibility.

Figure 5 shows the Newton rotary planer starting a cut across the flanged face of a pair of marine engine frame sections, which are shown bolted down to a small portable table. This table is really one of the small sections similar to that employed in the larger floor plate, but is so designed that it can be moved about as a utility plate for various kinds of work. The location of this floor plate under the crane makes it quite a simple matter to handle this table, together with even the largest work.

It is planned to use this large floor plate for setting up engine frames, for laying off work when jigs are not to be provided. The practice of this shop is to carefully investigate all operations at a meeting of the shop foremen each week, at which time possible saving with jigs and fixtures is discussed, and, if found advisable, such equipment is made. There are many operations, however, where the cost of such fixtures and special tooling is far more than the expected saving due to their use, and it is to expedite this class of work on which jigs cannot be afforded that the floor plate is used.

All of the tools mounted on the floor plate are provided with independent motor drive, using alternating current at 220 volts. By thus eliminating line and countershafting, the head room above the floor plate is conserved and efficient crane service is the result.

In another shop I noticed a novel time-saving device. A large crankshaft lathe was driven by a constant speed alternating current motor, and to avoid the necessity of frequent turning over and reversing the lathe by means of hand pulling on the belt when measuring and gauging, a three-pole, two-way knife switch was installed and so wired up that the leads from the motor were reversed on opposite sides of the switch. By means of the common shifting rod, the lathe could be started and stopped, and by the additional turning of the shifting rod through half a revolution, the direction of rotation of the motor can be reversed. An oil switch, also connected to the shifting rod, breaks the current, so that no burning occurs on the knife switch plates and wires.

These examples show a few possibilities of efficient, effective and economical manufacture, as applied to large machine shop work. In previous articles I have described some methods for realizing economy in the manufacture of small, duplicate parts, but if we are provided with efficient management, well planned shop equipment and well planned and scheduled shop operations, we have taken a big step in the direction of efficiency, and efficiency we must have in order to compete with our foreign competitors in the shipbuilding field. It is possible, according to present reports, to purchase ships in Great Britain today on a tonnage cost far below that existing in this country, but we can successfully compete with the foreign shipbuilders if the proper methods are employed.

Standardization of the output of the shipyards is greatly to be desired; or, better still, standardization of the cargo carriers of the entire nation. If we had three or four sizes of ocean-going vessels, machinery of which were duplicates in any given size, it would greatly reduce the manufacturing cost because of the repetitive nature of the manufacturing operations involved in the building of the machinery. It would then be possible to obtain parts on the Pacific Coast for machinery originally built on the Atlantic, and vice versa. Not only would this reduce the original cost, but by avoiding the necessity of special patterns and the extra work involved in casting special work in the foundry, would reduce the operating cost because of the reduction in repairs and up-keep of the vessels. Such a policy is probably above the possibility when we return to competition, because it prevents the manufacturer from exercising his originality in developing new and possibly more efficient types, but it certainly would be ideal, from the shipowner's point of view, his view being necessarily dependent upon the earning capacity of the ship.

The Pacific Coast enjoys quite an advantage over the other sections of the country from the shipbuilder's standpoint, because of the climatic conditions. It is hard to imagine any amount of work being efficiently done during the severe winter months on the Atlantic, Gulf and Lake Shores, whereas climatic conditions on the Pacific Coast are such that a man can work comfortably 365 days of the year.

We now have an industry on the Pacific Coast which should be given every attention and chance to stabilize, an industry that has grown in the last five years from employing 5000 men to its present employment of 80,000 to 100,000 men. These men have all been more or less thoroughly trained, and it would be a big loss to employers and labor if this training must now be thrown to the winds.

The Pacific Coast—A Market for Machine Tools

IN company with manufacturers in almost every other line of industry, the machine tool makers of the United States have during the war period been working overtime on orders either directly from the army and navy ordnance departments or from the shipyards, marine engine and machinery plants and factories of every description, all striving for greater output to meet the emergency.

An analysis of the various factors that affect the machine tool market at the present time makes an interesting study.

Ordnance Stock of Tools

The immense stock of tools owned by the army ordnance department, many of them never used, bulked hugely last December as a factor in the market. Up to the present writing very few of these tools have been sold, and so cumbersome is the machinery of the government that it is said the navy ordnance department is now buying on the open market machine tools of which the exact duplicates are in the army ordnance warehouses. It can be confidently expected, therefore, that these tools will be disposed of so gradually, if at all, that they will have no effect in depressing the market. Another point that is stressed in this connection is that many of these tools have been stored so carelessly that they can never be sold as anything but second-hand.

Some manufacturers when trying to buy from the government tools which, for war production purposes, had been placed in their own plants, have found the red tape surrounding the negotiations so involved that they have had to buy in the open market, rather than delay production by waiting for a government decision.

War Rush Production

This factor has given a certain stimulus to the machine tool trade. It can readily be understood that many machine tools were during the last two years operated often at work beyond their capacity, or by inexperienced operators, or without proper cleaning and lubrication, with the result that there is a very active demand for replacements, spare parts, repairs, etc. This factor is especially pertinent to the Pacific Coast market, where during the war much of the rush work was done on ancient tools made over, or on home-made makeshifts.

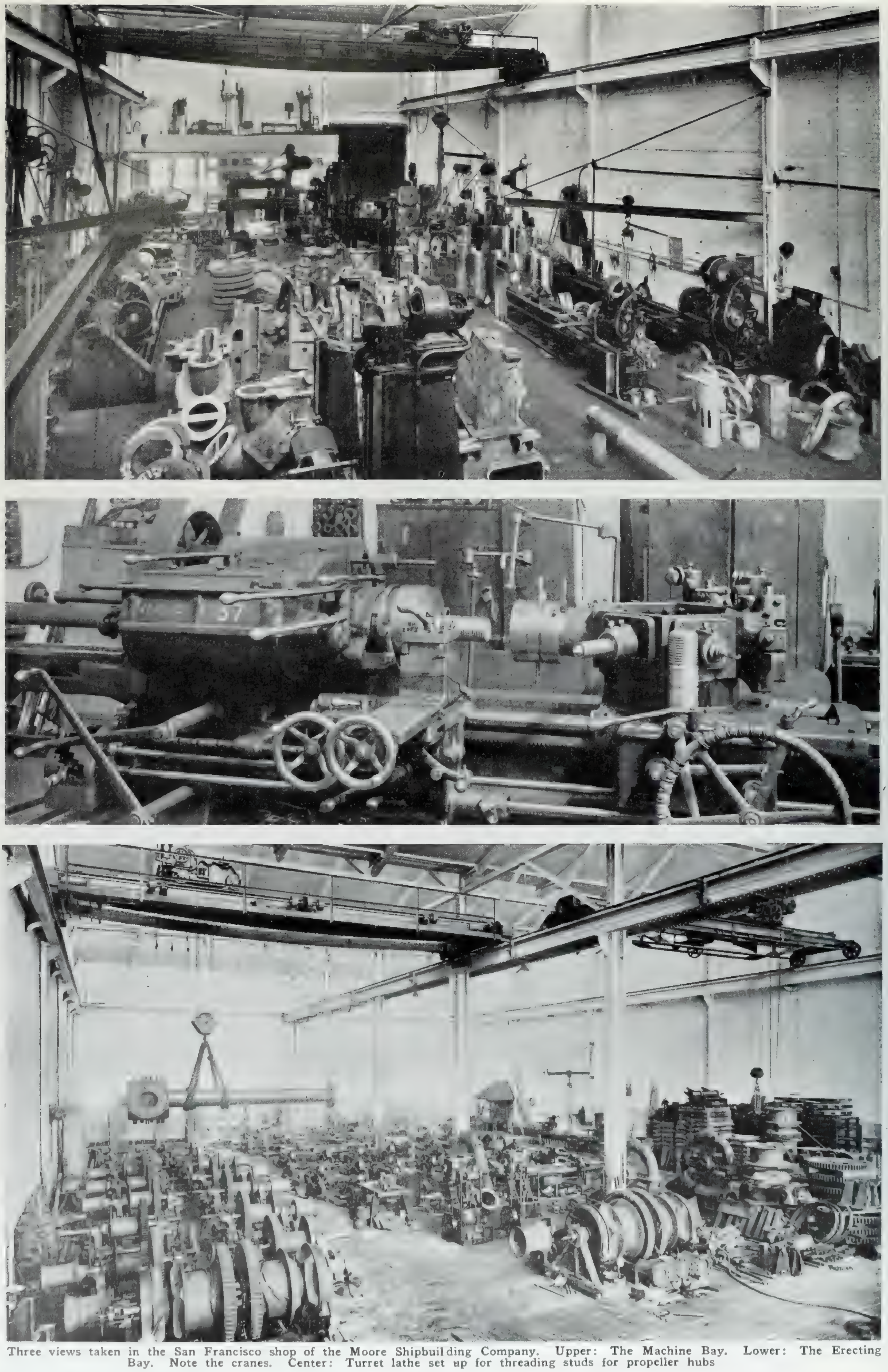
Second-hand Market

Second-hand tools of high grade are still very difficult to obtain and the prices remain at a high level. The majority of the special tools used for ordnance work, which are owned by the manufacturers, are being altered to take care of their normal lines, and very few of them have been placed on the market. In fact, the second-hand dealers complain that it is impossible to secure anything but the most obsolete equipment. In connection with the high second-hand prices it is interesting to note that the cost of materials enters very largely into this factor. The material value in machine tools varies from 20 to 40 per cent of the selling price.

Conclusion

A large industrial organization has been built up on the Pacific Coast, much of it the result of the war emergency. This organization has demonstrated that the Pacific Coast has possibilities along manufacturing lines. If the commercial interests of the communities involved get together on sane lines to foster this great source of wealth, we may confidently expect that there will be a stabilization of the present production, and as new and foreign markets are opened we may reasonably hope that there will be a demand for increased output.

Machine tool manufacturers and their agents and salesmen can all co-operate with the managers of Pacific Coast industries so to readjust their business as to transform these much hoped for ideals from possibilities to actual facts.



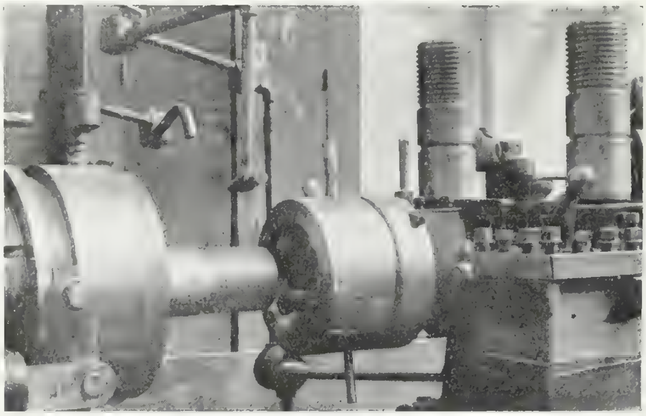
Three views taken in the San Francisco shop of the Moore Shipbuilding Company. Upper: The Machine Bay. Lower: The Erecting Bay. Note the cranes. Center: Turret lathe set up for threading studs for propeller hubs

The San Francisco Shop of The Moore Shipbuilding Company

ON South Second street, close to the waterfront, is located one of the finest machine shops in the bay district. Originally planned to take care of repair work on the San Francisco waterfront, this adjunct of the Moore Shipbuilding Company has been enlarged and equipped to manufacture winches and handle much of the machine work for the freighters that are being turned out so rapidly at the yard on the Oakland estuary.

The shop is one-story, brick construction, with saw tooth roof, and is divided into three bays, two of which are served by Shaw ten-ton overhead electric traveling cranes, and the third by a five-ton overhead electric traveler made at the shop. The walls and ceiling of the entire shop are whitewashed twice a year and everything is kept scrupulously clean. The result is a wonderful lighting effect, very pleasing to the eye. The following list of tools will give some idea of the equipment:

One 60-inch by 30-foot Bement lathe.
One 34-inch by 30-foot American lathe.
One 24-inch by 16-foot American lathe.
One 34-inch by 16-foot Bradford lathe.
One 17-inch by 12-foot Le Blonde lathe.
One 17-inch by 10-foot Le Blonde lathe.
One 16-inch by 12-foot Lodge & Shipley lathe.
One 14-inch by 6-foot Lodge & Shipley lathe.
One 14-inch by 8-foot Hamilton lathe.
One 20-inch by 10-foot Forsaith lathe.
One 60-inch vertical Coburn mill.
One 60-inch vertical Bullard mill.
One Universal horizontal mill.
One No. 35 Landis mill.
One 18-inch Bement slotter.
One 60 by 78 by 14 Gray planer.
One 24-inch Ohio shaper.
One 24-inch Queen City shaper.
One No. 4 B heavy Brown & Sharp milling machine.
One No. 3 A Warner & Swasey turret machine.
One 2-inch by 24-inch Jones & Lamson turret machine.
One No. 3 Foster screw machine.
One 72-inch Dreses radial drill.
One 42-inch Bickford radial drill.



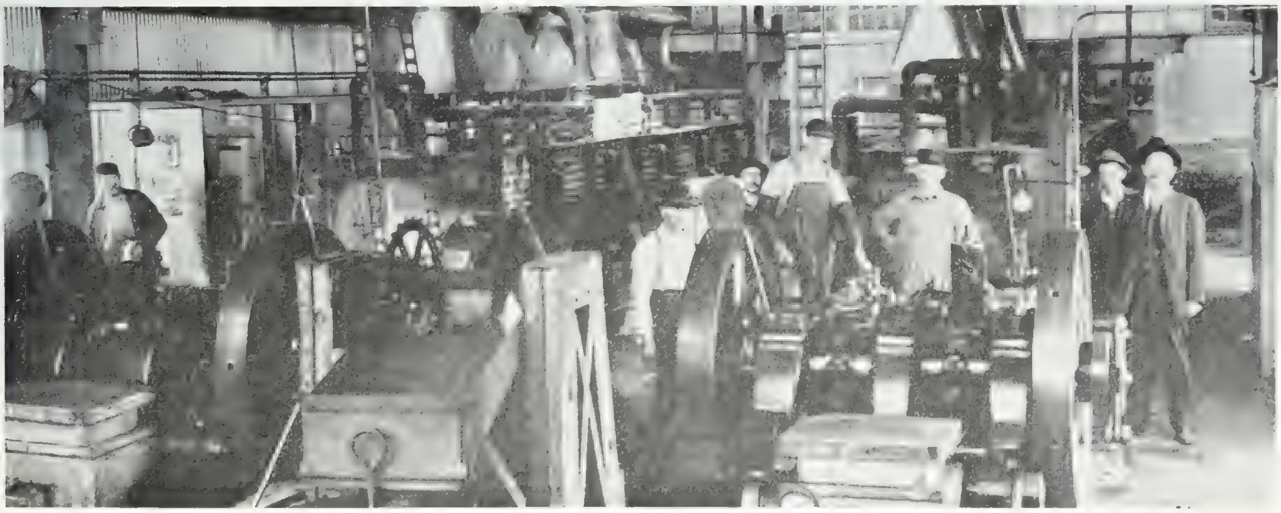
Close up of geometric die used in threading studs for propeller hubs

One 42-inch Fosdick radial drill.
One 42-inch American radial drill.
One 24-inch Aurora drill.
One 20-inch Barnes drill.
One Greenfield Universal grinder.
One No. 2 Pratt & Whitney centering machine.
Two No. 7 Kwick Kut hack saws (Atkins).
One No. 3A Mitts & Merrill key seater.
One 72-inch 200-ton wheel press.
One 10-inch by 18 Simplex air compressor.

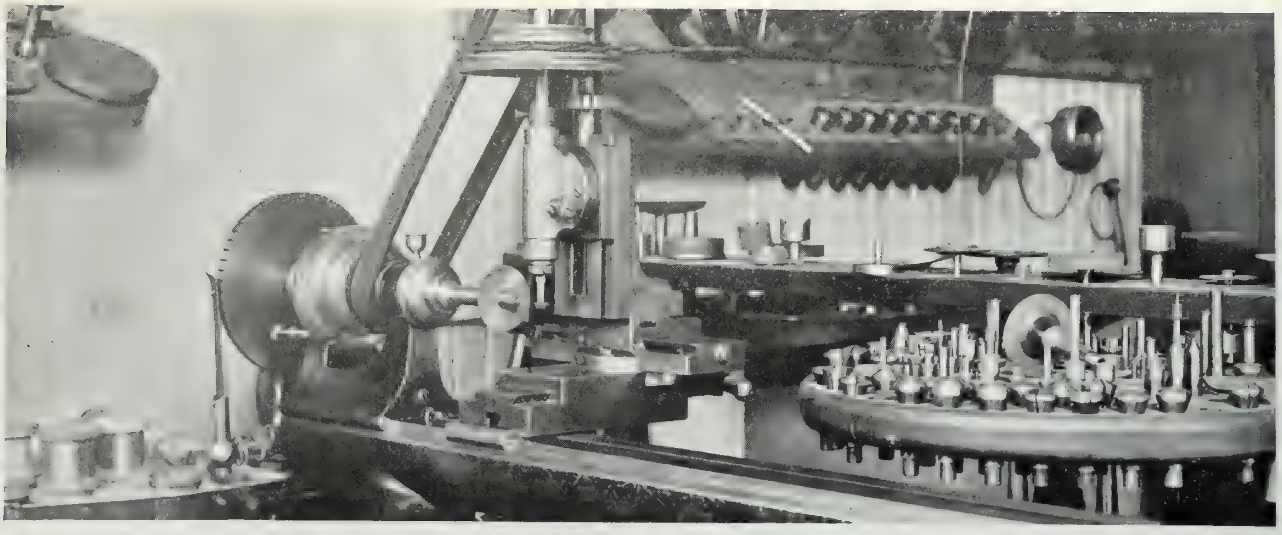
All tools have individual electric drive, direct current, at 230 volts.

Although the shop is located within a few blocks of all the great wholesale tool and machinery houses of San Francisco, it is equipped with a very complete tool room, where many special tools and jigs are manufactured and quite a stock of high-grade tool steel is kept on hand.

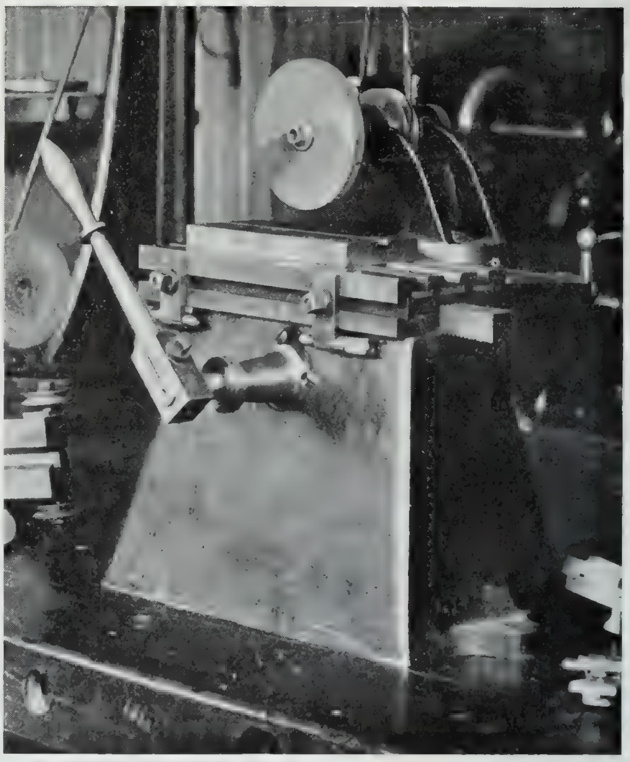
One very remarkable piece of machine tool work has recently been put over by the foreman of this shop. He became convinced that his Warner-Swasey 3-A turret lathe was sturdy enough to take the strain of cutting the threads on 3½-inch propeller hub studs with a die and decided to try it out. The result was a very great saving in time and expense on this operation. The thread shown in the illustration is cut in one minute with the die, to the satisfaction of everybody concerned.



Rivet-making machine at the Moore shipyard

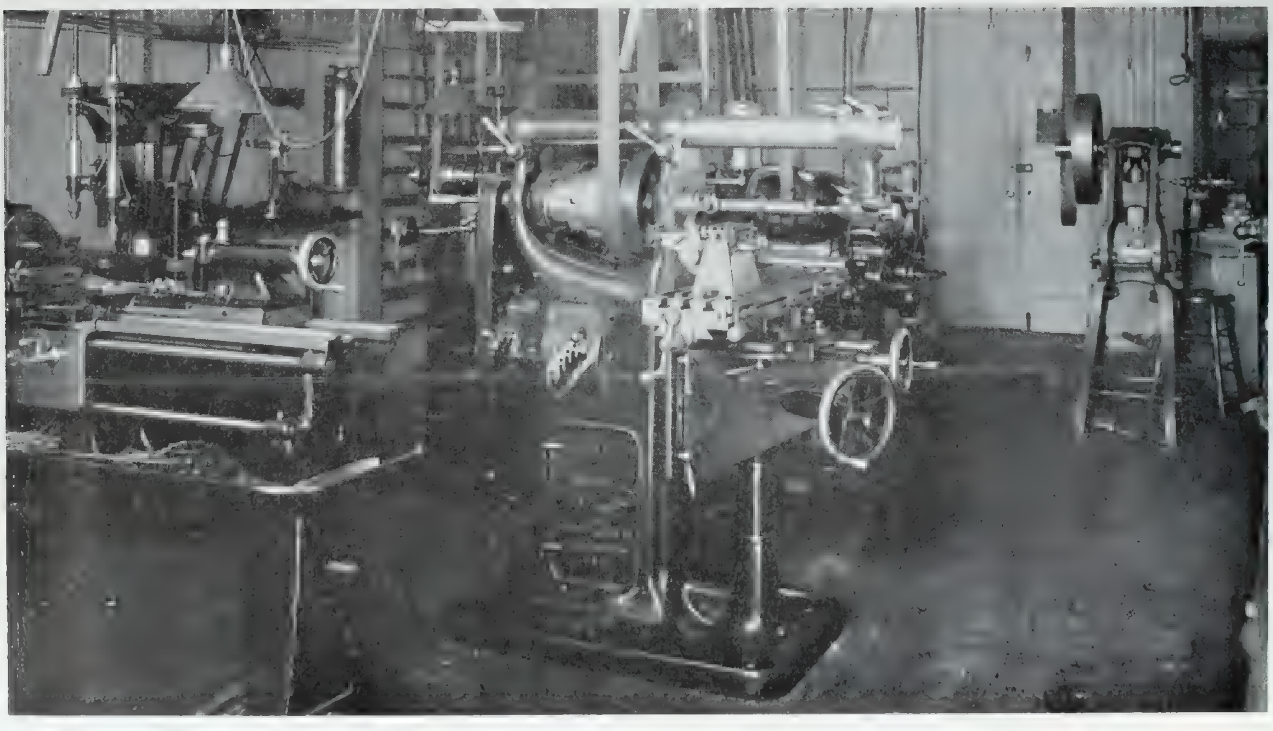


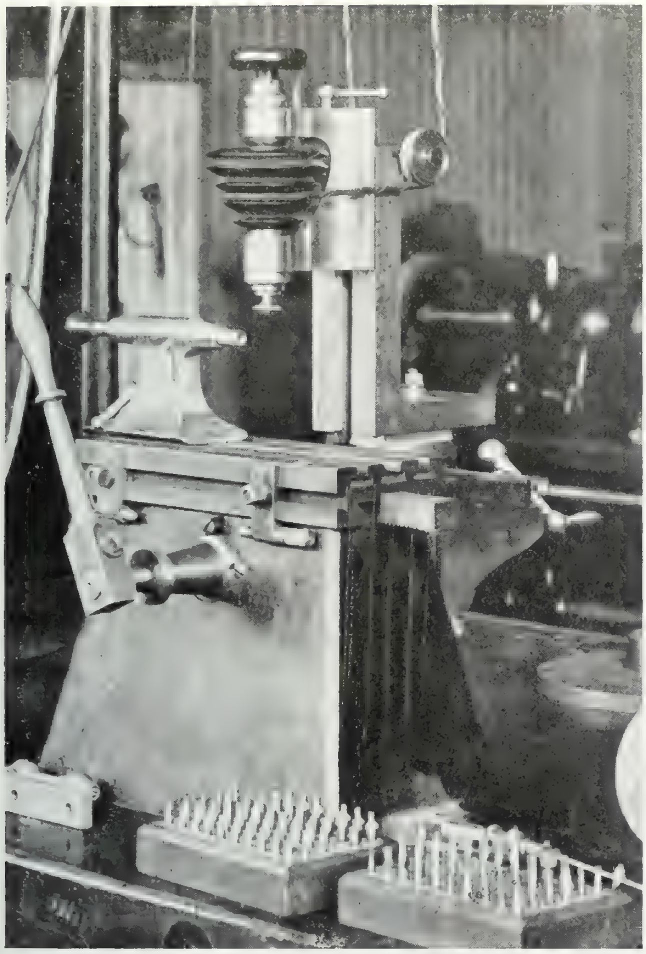
Some Tools of Precision

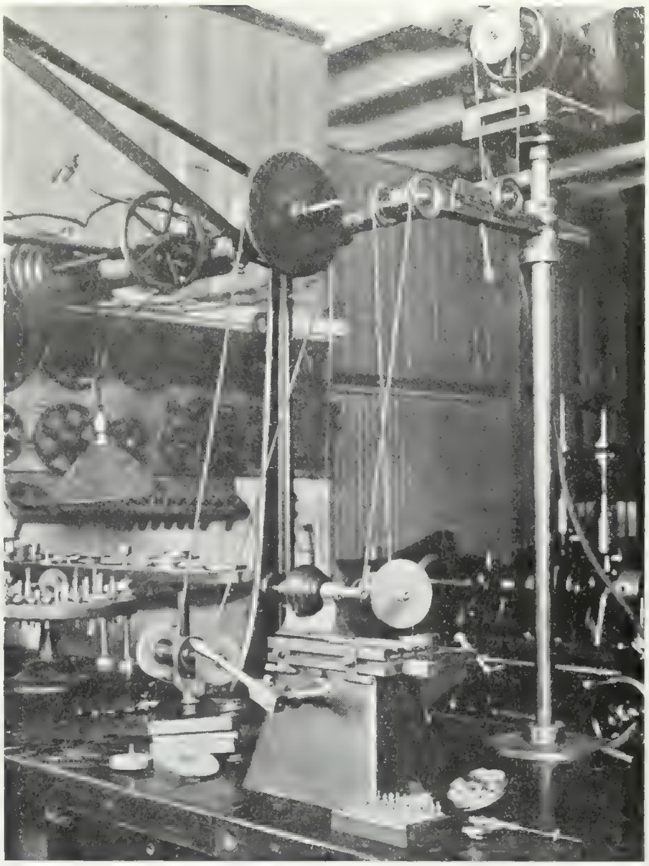


THE illustrations shown on this and the following pages are from photographs taken in the shop of the Moorhead Laboratories in San Francisco. These laboratories were instituted to develop and manufacture a transmitting and receiving valve for wireless telegraphy sets, the invention of Mr. O. B. Moorhead. In the development of this very specialized, scientific apparatus, many jigs of great precision had to be manufactured, and the machine shop in connection with the laboratories is one of the most completely equipped for precision work in the western part of the United States.

The small milling and grinding machine illustrated was made by Mr. Fred Lathe, the foreman of the shop, and has been used in precision work for nearly everp operation within its limits that could be performed on a universal milling machine or on a grinder. This machine can easily be carried in one hand and has been used successfully in producing small milling cutters. Such a machine, however, soon reaches its limit when work of any size is undertaken, and hence we find the Moorhead laboratories investing in a first-class universal milling machine, which is shown in the

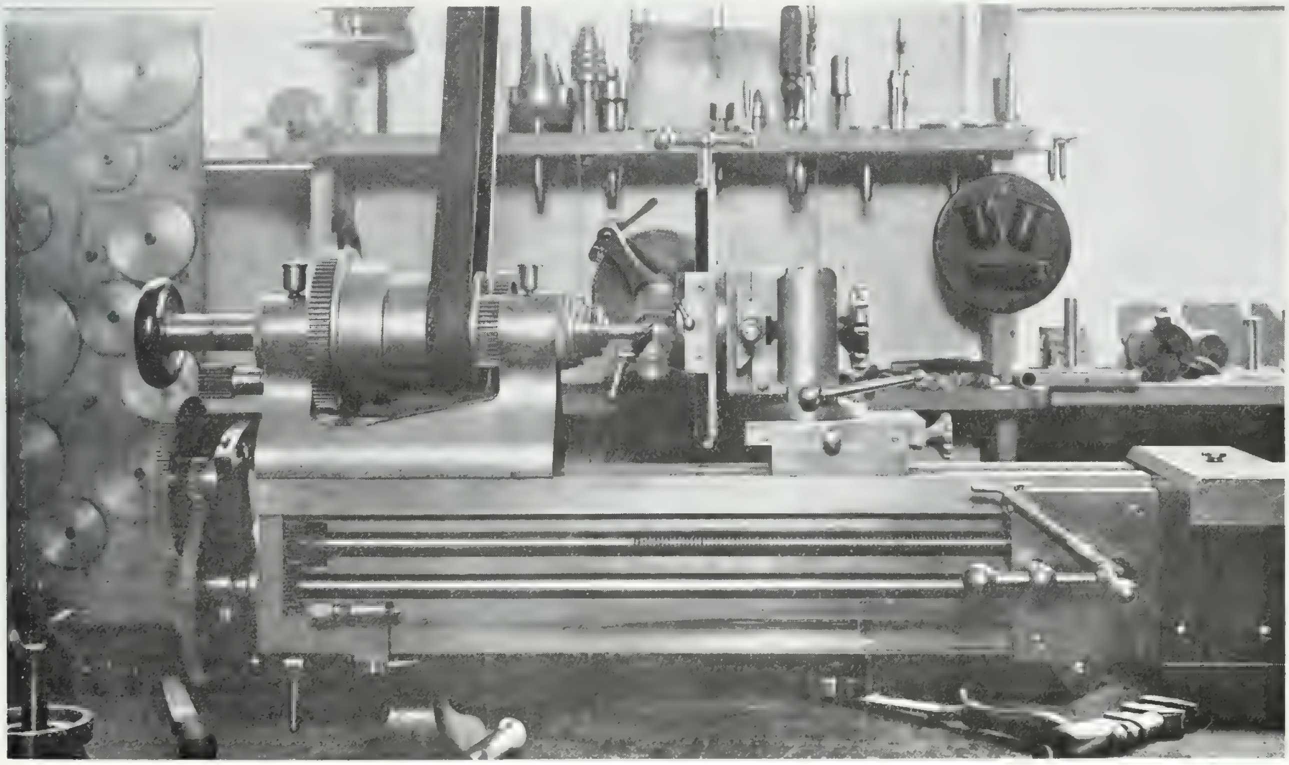


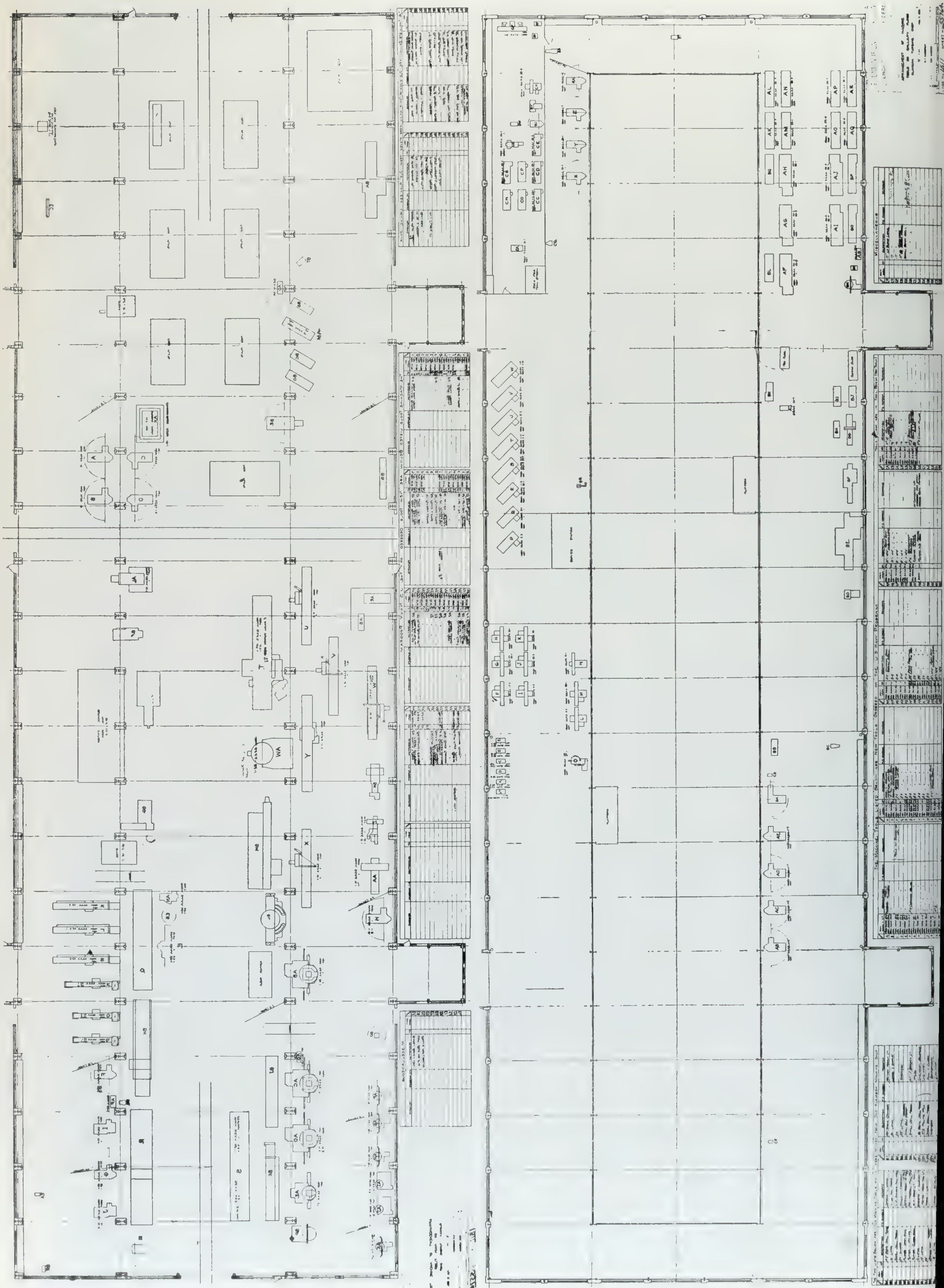




lower view on page 90, with the small machine standing on its table.

There are many very interesting processes involving great delicacy of adjustment, including almost every mechanical operation, carried on in the Moorhead laboratories with a precision and attention to detail which stamp them as manufacturing operators of a very high standard. San Francisco may well be proud that the results of these efforts have made it possible for products of her shops to render vital assistance in the European war, and in the transmission of intelligence from the ships and airplanes of commerce.




MISCELLANEOUS
The Machine Tools Listed Below Are New Tools Ordered on the U. S. Navy Program
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An Ideal Machine Shop

THE machine shop of the Alameda works of the Union plant of the Bethlehem Shipbuilding Corporation is conceded by all who have visited it to be the best arranged and most carefully planned building for the purpose west of Chicago, if not in the whole United States. It was originally designed with the idea of doing the machine work on, and the erection of, marine turbines for the United States Navy Department, and this shop was built and erected to take care of the tremendous amount of machine work that goes into the building of destroyers, submarines and scout cruisers which this company holds contracts for.

The ground on which this building was erected is underlaid with soft mud, and it was necessary in order to secure a proper footing to put the foundations on piles from forty to eighty feet long. Under all of the columns there are groups of these piles, and under the entire floor the piles are spaced on ten-foot centers. The top of each pile is tied to the floor by a concrete pier. The concrete floor itself is made in slab form, which, of course, makes a better concrete job and gives an opportunity to tie up special blocks for machine tool foundations. In driving these piles considerable difficulty was experienced on account of the fact that when the pile had been driven to solid bottom the top had considerable play in a lateral direction owing to the soft, oozy mud, and often piles had to be redriven because they got out of place before they could be tied up with the concrete.

Under all the big machines the concrete is extended down well around groups of piles. On top of this concrete floor a structural steel building was erected 160 feet wide and nearly 600 feet long, with two towers on each side twenty feet by thirty feet, in which elevators for the galleries could run and lavatories and locker rooms for the employes.

"I" beam columns spaced twenty-four feet centers were erected running clear to the roof along both sides of the central bay, seventy feet wide, and swung between these columns and the sides of the building are forty-five-foot galleries on each side, with narrow connecting galleries at each end.

On the main floor of the shop redwood blocks, set with vertical grain, were laid in hot asphalt. These blocks are practically a six-inch cube. They are dipped in hot asphalt and then laid on a sand foundation which has been spread over the concrete. No trouble has been experienced with this floor on account of the extreme care with which the lumber was selected and the careful laying of the blocks. Nothing but clear, dense redwood from old trees was used, and the floor is evidently good for a great many years. The same style of floor is used on the galleries with the exception that there the blocks are three inches deep. These blocks were all sawn true to dimension and were laid close.

The roof construction is flat with large skylights raised and running across the whole building. In the skylights a wired glass is used. The columns of the steel frame in the outside walls are covered on the exterior with brick, and the space between the columns is almost entirely filled with ribbed, moss glass, set in steel sash with numerous ventilating sash inserted. This special glass removes the glare trouble and gives a very delightful, soft, daylight effect in the interior. The percentage of glass in the building is higher than in any other shop of which we have any knowledge.

The excellent crane service in this building is one of its notable features. In the main or central bay there are three cranes, one sixty-ton and two forty-ton capacity. These cranes have a seventy-foot span and a clear lift under the hook of fifty-seven feet. Under the gallery, on the main floor, there are two ten-ton cranes on each side of the building. Above the gallery there are two five-ton cranes on each side of the building. These gallery cranes have floor control: the cranes in the main bay have an operator in a cage on each crane.

One of the unusual features of the building is that every one of these cranes can operate uninterruptedly over the full length of the shop, this feature being due to the unique design of having the elevators, lavatories and locker rooms in exterior towers.

Comparatively little railroad trackage is used on the floor. There is a main track through the width of the building. At each end there is an entering track running just clear of the end gallery so that a car can be loaded by the main bay cranes at each end of the bay.

All doors in the building are of the Kinnear rolling-door pattern, operated by electric motors. All tools have individual electric drive. The arrangement of the tools is shown on the floor plans illustrating this article. See opposite page.

A Remarkable Twist Drill

SOME wonderful endurance and speed records have been made with the "Colton Detroit" twist drill in San Francisco shops. One drill bored 2800 seven-eighth-inch holes seven-eighths inch deep in cast iron on one grinding. Another managed 4500 one-half-inch holes three and one-half inches deep in hot rolled machine steel on a feed of eight-one thousandth inch per revolution. Drill ground nine times. These are records made by stock drills, in ordinary shop practice, and can be duplicated any time. These drills are forged from special steel and heat treated, and they have in great abundance those two most looked for features—speed and endurance.

The Arthur Colton Company of Detroit, Michigan, who manufacture these drills, believe in service. They have recently issued an attractive catalog in which are given interesting illustrations for the care and use of drills, from which we extract the following:

To preserve the efficiency and long life of the drill, too much stress cannot be laid on the importance of correct grinding and sharpening. The cost of a drill depends almost entirely upon the care exercised and the knowledge employed in grinding or sharpening.

A drill properly ground at the point shows the cutting edges of equal length and uniform angle with the longitudinal axis of the drill. Fifty-nine degrees is considered the best angle for general purposes.

Another thing of importance is the lip clearance or backing off of the cutting edge. For regular shop work twelve degrees is the very best angle at the periphery, but as the center of the drill is approached this angle should be increased until the line across the center of the web stands at an angle with the cutting edges of approximately 135 degrees.

For heavier feeds in soft metal the angle of the lip clearance may be increased to fifteen degrees at the periphery, but it is important that the angle at the center be given a like increase.

In drilling extremely hard material where lighter feed is used, the grinding point should be at an angle of sixty-eight degrees and the angle of the lip clearance decreased to nine degrees at the periphery.

Preserve the original form in grinding a drill. It insures rapid and satisfactory work.

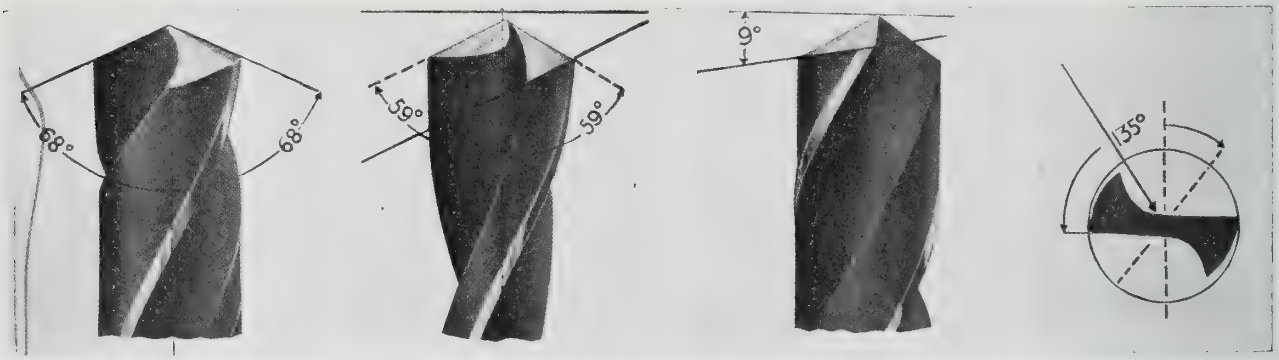
It is strongly recommended that one person in a shop be carefully instructed in the grinding of drills and that he be given the drill grinding to do.

Poor grinding means lack of efficiency, and often causes drills to split in the web.

Because of the keen desire to have their drills do maximum service and render greater efficiency, The Arthur Colton Company will be glad to give full instructions in grinding in their own works to an employe of any large user of drills, or they will send an expert to such user's works to instruct in drill grinding. They feel that correct grinding is of such importance to the life of the drill that they gladly render this service gratis.

The importance of correct grinding cannot be too strongly impressed on the man who has charge of this work.

Please note the illustrations below. These show the angles at which you should grind your drills when drilling material that is exceptionally hard, where lighter feed is used.



A Popular Turret Lathe

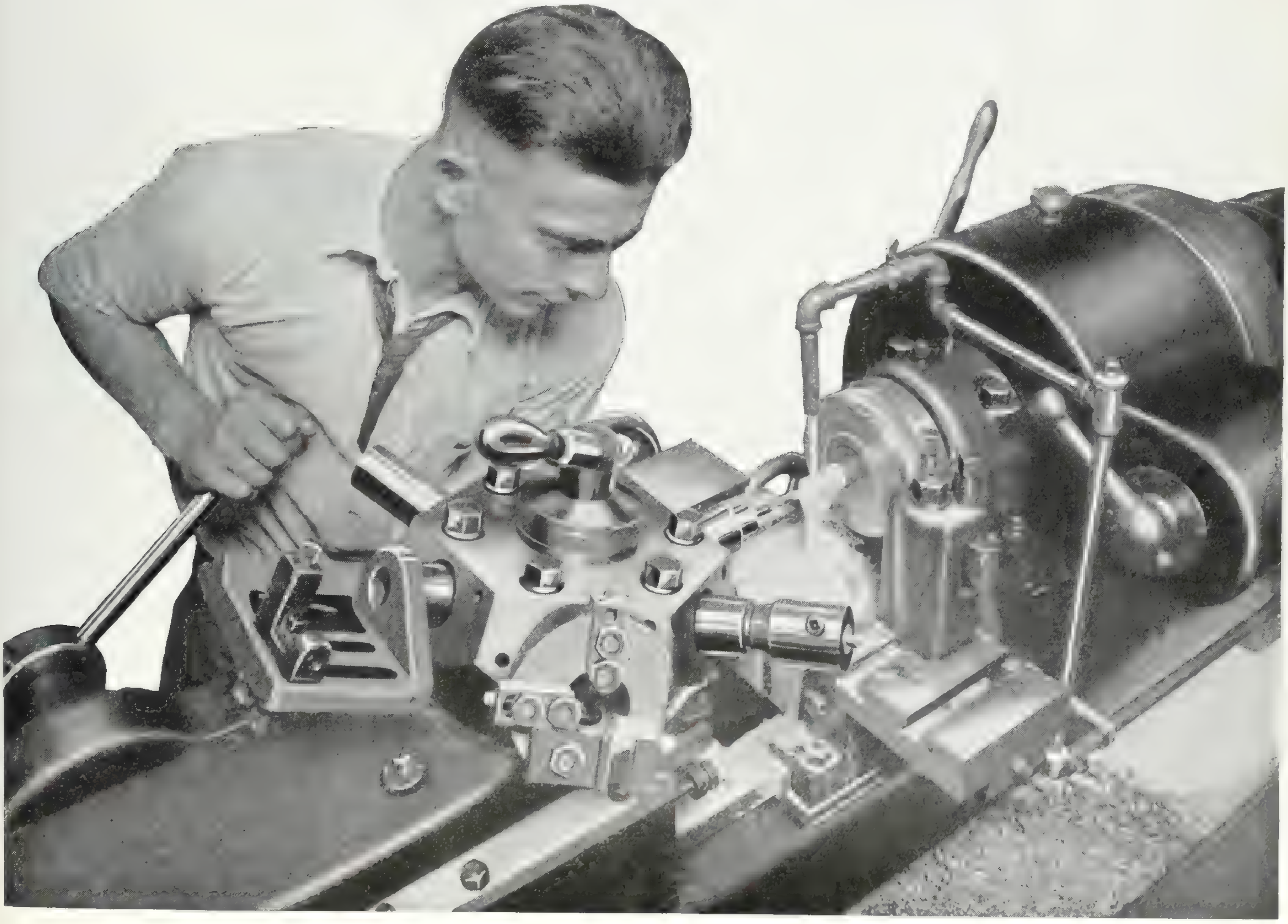
THE clear track feature developed and perfected in the tilted turret lathe and screw machine of the Wood Turret Lathe Company has increased and expedited production in many a plant where efficiency was thought to have reached its apex. Perhaps some of the vital parts in your own automobile traveled the tilted turret route.

One of the illustrations in this article shows this wonderful lathe at work in the shops of the Cleveland Milling Machine Company. The work shown in this cut requires six operations—two drills, one reamer, two box tools, and one cut-off tool are used. The material worked on is Cyclops high-speed steel and facing cutters are being made. The stock used is seven-eighth inch diameter; the finished size of cutter is three-fourths inch at one end, 41/64 inch at the other, and one inch long with a .3085 bore. The daily output is seventy-two finished cutters.

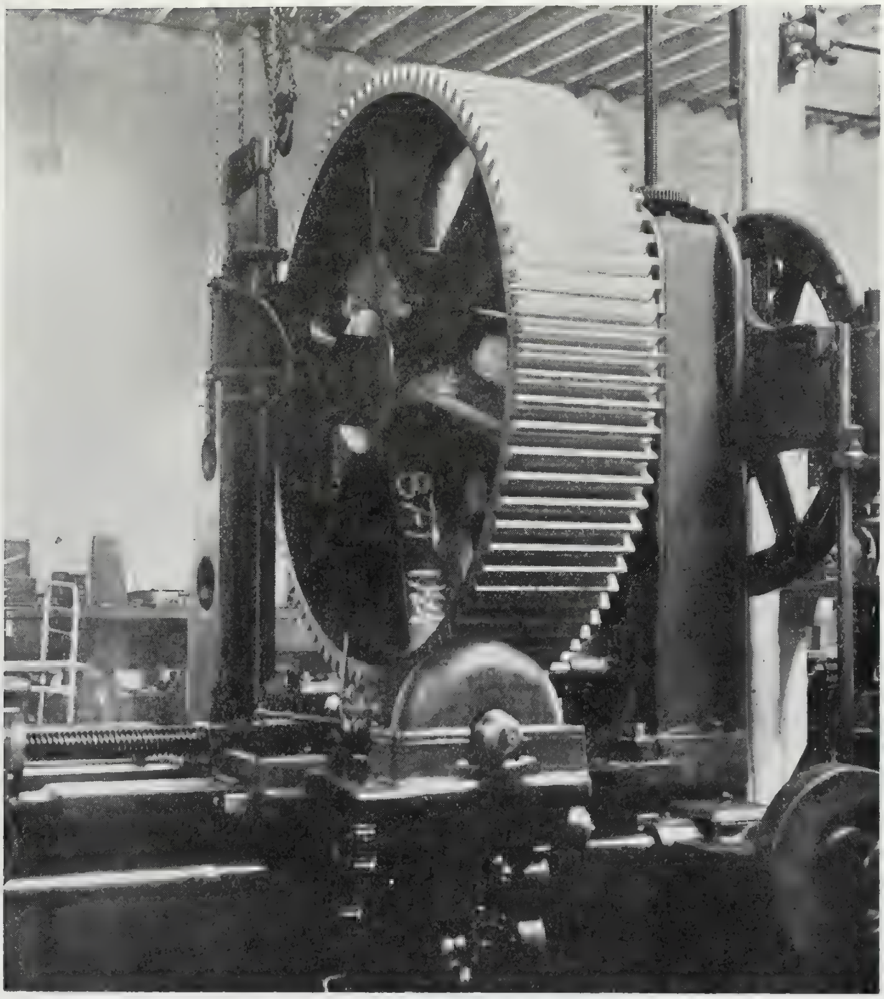
Not only is this machine remarkable for its sturdiness and ability to stand up under high-speed work, but it is extremely easy to operate, and has been successfully operated in many plants by girls with very little previous experience. Note the girls in the illustration, one of whom is machining cast-iron oil pump bodies, requiring the three operations of turning, threading and drilling. The size of thread is 12/20 and the number completed in one hour is twenty-five.

Here is another stunt that is pulled off regularly in a manufacturing plant at Pittsburgh on a machine that has been in use for four years and is known as a "speeder." The one work of this machine is the finishing of cast-iron gear blanks.

This consists of five operations, turning to an exact diameter of 2.22 inches, facing both sides to an exact thickness of five-eighths inch drilling and reaming a one-inch hole. The steady pace is twenty-five finished gear blanks each hour.



Generated Gears



ONE of the fundamental accomplishments of engineering is the transmission of power. Power is applied and results are obtained, the connecting link between the two is power transmission in some form. Without power to supply the initial energy, little engineering development would result, while the proper application and distribution of power forces are essential to obtain the results efficiently.

There is hardly a branch of specific engineering endeavor that has been better served in the strides toward accuracy and dispatch in production than has the gear during these past few years of epochal advance, and indeed the activities of war have accomplished great and almost unbelievable strides toward mechanical perfection. The demand for products of extreme excellence beyond our wildest imaginations has caused the manufacture of equipment for production of these commodities to be stimulated to the extent of rejecting the now antiquated tools and installing those whose principles of operation produce a theoretically correct product. Alloy steels are no longer a luxury and heat treatment devices are now a necessity. The removal of metal by grinding is admittedly superior and the generating processes for cutting the various types of gears is putting the single cutter methods back into oblivion. Single cutter tools have become relics except where large sizes of coarse pitches are as yet beyond the range of generating tool capacity.

Pacific Coast engineers have long been independent of their Eastern brothers in economically performing mechanical operations on raw product, and it has been proved many times that we have at our command a better grade of ingenious assistance to crown our efforts as the most efficient and expert producers per man hour of effort expended.

The accompanying cut shows a gear locally produced for the Goodyear Rubber Company, who have a decidedly active industry in our midst. The gear happens to be one of 87-inch teeth, 1½ diametral pitch, 58-inch pitch diameter, and 10-inch face, and was cut from the solid in cast steel. The photograph was made in the factory of the Johnson Gear Company in San Francisco and gives one the assurance that it is indeed needless for San Franciscans to seek beyond their doors for products of this type. Equipment of a size to meet any local demand and of a quality to satisfy the most particular can be found at this factory. Size is of little moment here, for it is generally accepted that in the production of small, heat-treated, extremely accurate gears for aircraft service, the Johnson Gear Company stands pre-eminent as the pioneer in the development of this product.

The recent strides of internal combustion engines, with particular reference to marine installations, calling for a noiseless type of accurately-cut reverse sets, open a new field of endeavor which the Coast producers of gears stand ready to supply, to the satisfaction and pride of the engine makers.

Cutting Oil System

THE general arrangement of a modern cutting oil circulating and filtering system is shown in Figure I. In its simplest form the operation is as follows:

Clean cutting oil or compound flows from an overhead reservoir by gravity through a system of piping to the various machine tools, affording lubrication not only to the cutting tools themselves, but also to the different bearings on the machine. The oil supplied through a flexible metal hose to each machine is regulated by a valve at the machine. The used oil from the various machines drains by gravity into a filter where it is thoroughly purified, the system of purification used depending to a considerable extent upon the kind of oil used, the material being worked and the general arrangement of the plant.

The use of pure cutting oil surely pays. It was found in one plant that the cutting tools and drills lasted from one-third to two and one-half times as long when lubricated with clean cutting oil as when dirty oil containing metallic dust and scale was used.

In another plant difficulty was experienced because the foreign matter in the oil caused the sides of the drills to wear down, making them tapering and causing them to wedge. This in turn generated more heat, interfered with the accuracy of the operation and consumed more power. By using clean cutting oil this difficulty was eliminated.

In another plant working on cast iron, sand and scale in the oil quickly wore down the sharp cutting edges of the dies and taps, making it necessary to frequently sharpen them. The use of clean filtered oil kept the tools sharp a much longer time and greatly decreased the power consumption of the machine.

Fire hazard is practically eliminated where an automatic circulating system is installed as the oil fed the various machines instantly passes off into the drain pipe. No oil is kept in the base of the machine and the small quantity adhering to the machines and cuttings is not sufficient to support a fire. The oil storage reservoir and filter can if desired be located away from the main building or in a fire-proof compartment.

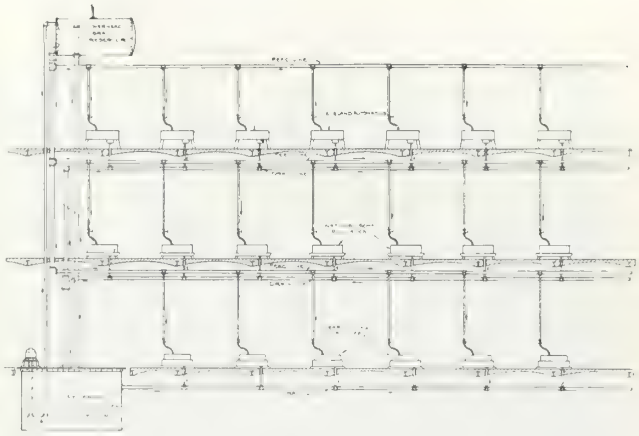


Figure 1

Figure 2 illustrates a Peterson cutting oil filter with magnetic separator especially designed for manufacturing plants where the tools are largely employed on steel and iron. This filter has shown remarkable results in practice, and operates as follows:

Used oil enters the inlets "A," passes down through strainer baskets "B," which remove large cuttings, flows under baffle "C," then up and across the top of the magnetic separator "D," where iron or steel chips are removed. To remove the accumulation of chips, scrapers "E" "E," operated by an endless chain belt, travel across the face of the magnet, scraping the chips off into the chip retainer "F," which is provided with holes in the bottom, covered by screens, to allow the oil to drain out. Referring to section BB, this chip retainer can be slid to the right and lifted out. After passing over the magnet, the oil flows over dam "G" into the filtering compartment, completely surrounding and flowing through the individual filtering units, where the most minute particles of foreign matter are thoroughly removed. The clean oil collects in the clean oil compartment "H."

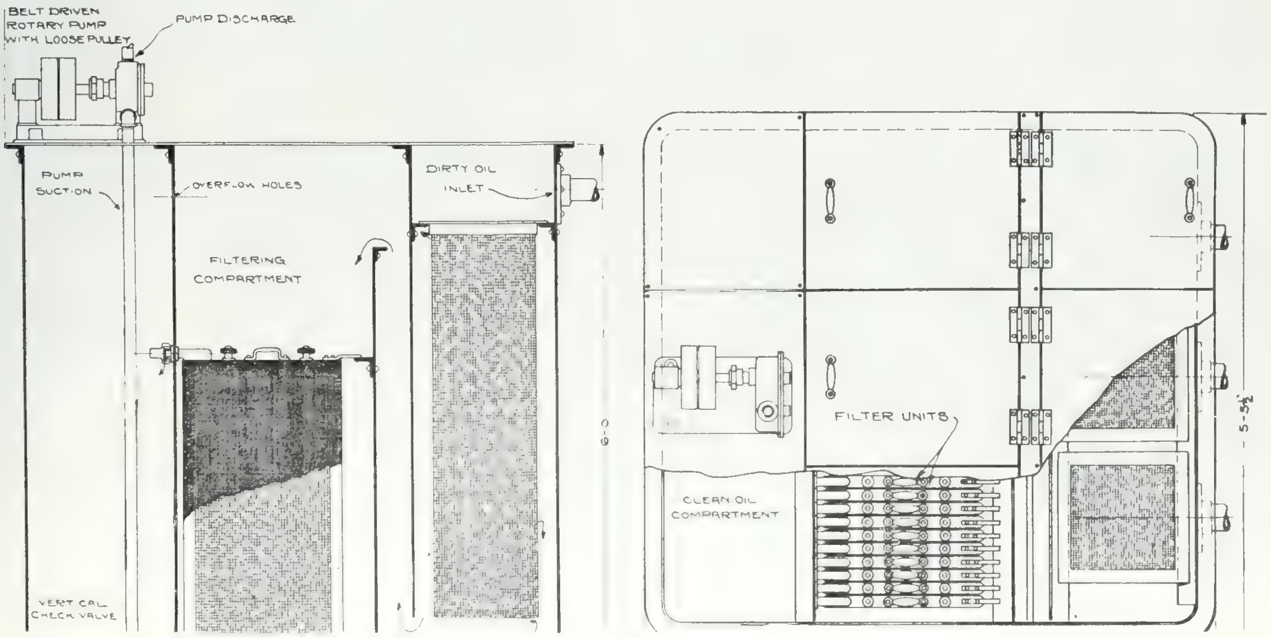
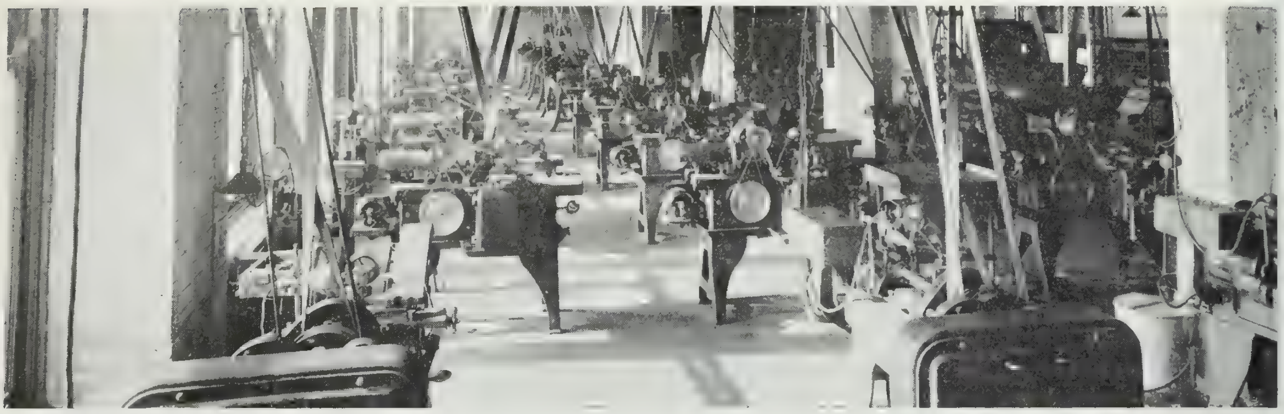


Figure 2

Training Men for High Quality Tools

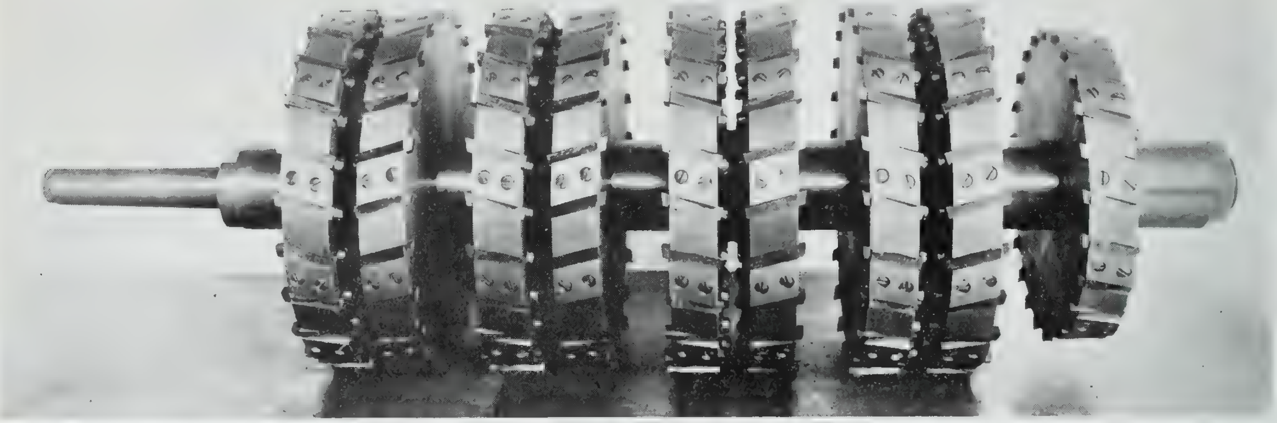
By H. J. Miller

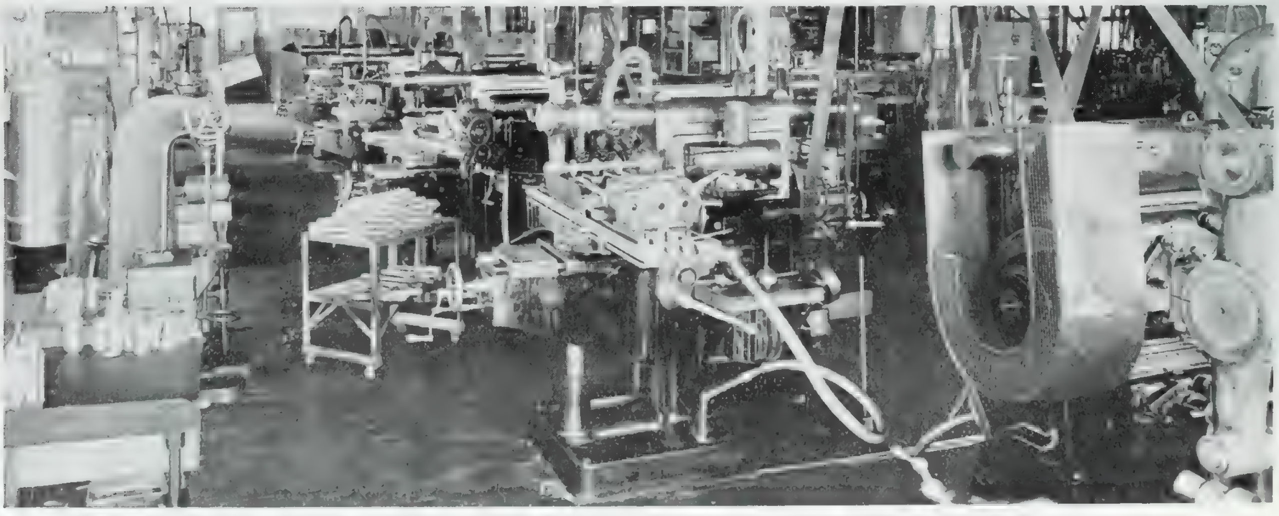
In Charge of Vocational Training Schools



TOOLS of highest quality can be produced only by specially trained workmen. This factor was early realized by the Illinois Tool Works, Chicago, where tools of superior precision and quality are manufactured, and the vocational training school has been of great importance in testing, selecting and training new employes and up-grading old employes. Men who show average aptitude are retained, trained and prepared for specific positions in the shop.

Before the acceptance of an applicant he is given certain tests to determine his adaptability for the various lines of work. Thereafter the applicant is given tests in blue print, micrometer and scale reading, and also shop mathematics. All who grade 60 per cent are given further instruction in addition, subtraction of fractions and decimals, and are also taught to convert decimals to common fractions, and vice versa, as well as freehand sketchtions, and vice versa, as well as freehand sketching from models. They are then instructed in grinding tools, and those selected for milling machine work learn the theory of using cutters, while those for lathe work learn to grind standard lathe tools. All of these instructions are based on the fact that superior work requires superior knowledge.

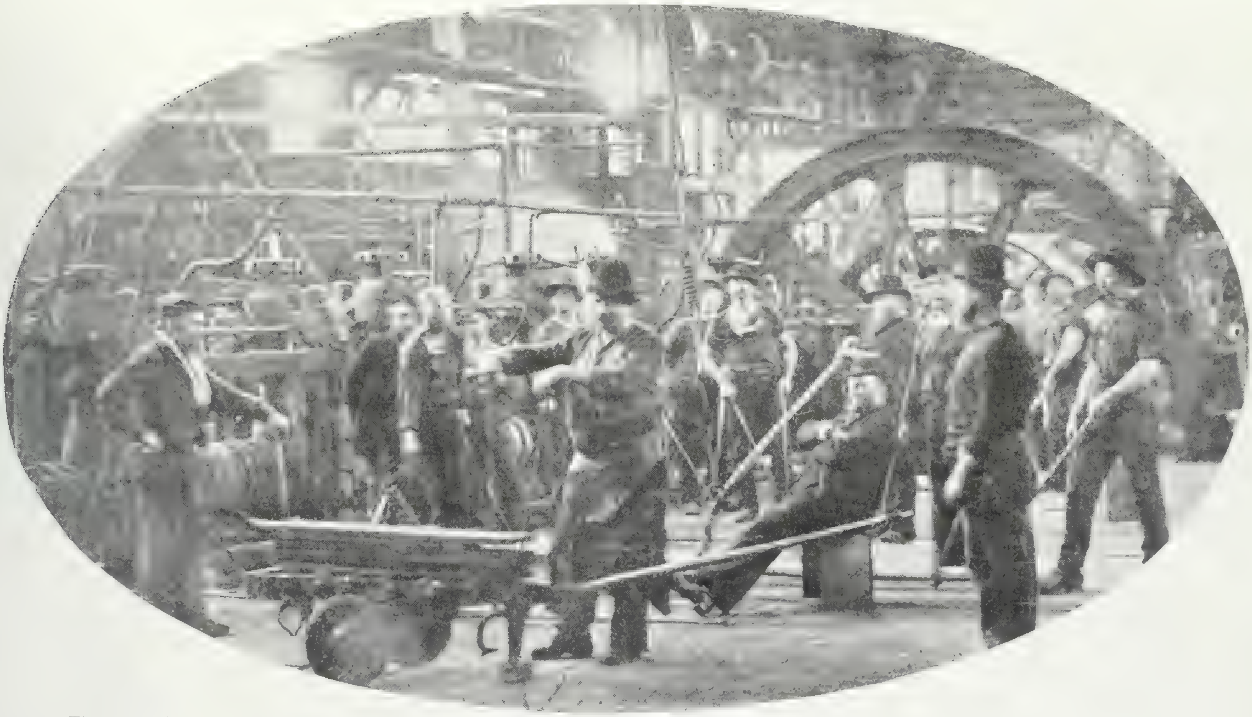




Views in the Illinois Tool Works. Upper: Portion of Hob-grinding Department. Center: Special inserted tooth gang-cutter. Lower: Section of Milling Department

Pacific Coast Rolling Mills

An Historical Sketch by Robert Hatton—Part I.



The 18-inch Bar Mill—Pacific Rolling Mills. Thomas F. Hatton, Superintendent, sitting. Photograph taken in 1878

Robert Hatton, the author of this narrative history of the Rolling Mill industry of the Pacific Coast, is one of the few survivors of the old days when California engineers and mechanics were startling the world with a series of mechanical exploits that were very much in advance of the accepted practice of the time. The tale is flavored with the romance of the bonanza days on the Comstock lode, and of those difficult times in the eighties when the old Union Iron Works succeeded after much trouble in securing contracts for navy construction, and in producing cruisers and battleships which were in their time the pride of the United States navy. Many San Franciscans will be interested in trying to find the faces of old friends in the illustrations.

I WAS almost born in a rolling mill. Perhaps, who knows, I may die in a rolling mill.

To qualify this statement and explain its connection with this story, it will be necessary to ask the reader's indulgence while I pay tribute to the memory of my father and narrate a little personal history.

The son of a Welsh coal mine inspector who was killed in the mine, leaving a large family, my father, the youngest, at the age of eight years started work in the Tredegar Iron Works pulling up doors at 45 cents per week. Obtaining all his education at night schools, he became a leader in rolling mill practice, contemporary with such well known men as David and Daniel Mathias in Wales, the Garretts of Ohio, and old David Gravell. He rolled by hand three-eighths-inch round bars twelve to sixteen feet long. In 1860 on the Dowlais goat mill, he rolled the longest iron rail that was exhibited at the first Crystal Palace Exposition, thereby winning a prize in competition with all the mills of Great Britain. On this occasion Lady Ivor Guest, wife of the owner of the mills, held the tongs on the finishing pass and she was given the credit of rolling the longest rail.

My father as early as 1834 was a prominent all-around roller in the Rhymney Iron Works, the oldest mill in Wales, and a little later accepted a foremanship in the Dowlais Iron Works, then the largest rolling mills in the world. By his associates he was acknowledged to be one of the best rollers and mill managers of his day. In 1847 he went to France and for two years managed a rolling mill there during the exciting events of the revolution of that period. In 1862 he accepted under a three-year contract the management of two rolling mills in St. Petersburg (now Petrograd). In this enterprise he was assisted by forty experienced Welsh rolling mill men, heaters, rollers, etc., accompanied by their families. The writer, then a boy of nine years, remembers very well this Russian experience. The mills under Russian management had been rolling both bars and rails. In one mill they had six furnaces and had worked four piles to the heat and five heats a day with half of the rail output unfit for use.

The British firm which had taken over the mills and employed my father, offered him a premium of 200 roubles silver if he could get 200 good rails out of the mill in any one day of twelve hours.

A day was set and everything was working ahead of schedule when a pinion in the gear train broke and the mill was delayed two hours. One of the Welshmen, however, set the mill clock back two hours and at the appointed time—by the mill clock, the 200 good rails were ready and father was given the premium and was a guest of honor at a splendid banquet which followed. The writer attended this feast and has a very vivid recollec-

Crew of the Mill Department, Pacific Rolling Mills. Photograph taken 1878. Some prominent San Franciscans of today among the boys in this picture

tion of the scenes of conviviality induced by the liberal consumption of "caviar and Russian vodka."

First Eight-hour Day

One notable feature of this experience in the Russian mills was that my father placed these mills on three eight-hour shifts, and by so doing brought the output up to a very respectable figure.

So far as I know, this was the first eight-hour day for iron workers; certainly it was far in advance of anything of the kind in Great Britain. On returning to England the family settled at West Hartlepool on the northeast coast, and there in 1869, at the age of sixteen, I was apprenticed in the trade of roll turner at the enormous wage of four shillings a week of six days from six a. m. to six p. m.

In 1871 I went to Chicago and assisted my brother-in-law to turn the rolls for the first steel rails rolled in the Union Iron Works at Bridgeport. Finally, in 1874, I came to San Francisco and went to work under Mr. Thomas F. Hatton, my oldest brother, then superintendent of the Pacific Rolling Mills.

My first job was helping to roll one-eighth by four-inch band iron to be used in the construction of the original Palace Hotel.

With that start, and working with the Pacific Rolling Mills through all the years of its varying history, I advanced through the different grades of service until, at the time of the final shut down of the plant, I was acting superintendent.

So much introduction seems necessary to show that the writer has probably more than any man living the knowledge necessary for setting forth the history of the rolling mill industry on the Pacific Coast, so let us get on with our story, in which we have no intention to describe the processes which enter into the manufacture of the various forms of iron and steel, but rather to relate the facts of the rise and fall of the various rolling mills which have been established on this coast.

The number of rolling mills that have been erected on the entire Pacific Coast, from Lakeview, Washington, down to Los Angeles, is twelve, of which number five have ceased to exist or be operated.

First Mill

The first attempt to roll iron on the Pacific Coast was in San Francisco in the year 1867. The site was on the old Potrero Point on a small piece of land projecting into the bay. It was reached by a narrow footpath at the foot of Irish Hill. A wagon road was afterwards cut alongside the hill to enable the iron to be hauled over the "long bridge" to the warehouses in town. The site is now occupied by the United States Steel Company. All the hills are leveled flat and the bay filled in.

Origin of the Mill

A gentleman, named Mr. William Hall, who was a pioneer forge hammer man, erected a small trip hammer for the purpose of forging car axles and various shafting. Nothing over six inches diameter was attempted. The hammer was a very old-fashioned affair, consisting of a wooden beam, working in a crocodile manner and operated by a Chinaman armed with a good stout staff for defensive purposes against the attacks of the "Melican hoodlum." It would have made an excellent exhibit in the P. P. I. E., if the Chinaman and surroundings could have accompanied it. His name was Ah Fook, commonly called by all "Charlie." He was the forerunner of a tribe of Ah Fooks and A Sins, who later became a fixture and a nuisance in the vicinity. He kept the stick to protect himself from the attacks of the Melican boys, the writer included. He also sold us "Havana" cigars at a cost of $1.25 for a box of fifty cigars.

The forging proved a great success, as it could not help but be under Mr. Hall's supervision. The Union Pacific Railroad was hardly completed, so that the merchants had to rely upon the ship arriving via the "Horn" for all supplies, and as the mines increased there was a growing demand for all sorts of iron; so some capitalists concluded to erect a mill and roll iron from the local supply of scrap. At that time there was a quantity of excellent scrap scattered up and down the coast as far as South America, and no demand or use for it.

as the freight charges from one place to another were prohibitive in those days.

It was decided to commence at the bottom and work up. An eight-inch train was installed, and one small one-door coal furnace was built, and the rolling of iron was commenced on the Pacific Coast on the old Potrero Point, lying between the old wooden shipways and the gas works. The writer would like to digress here and indulge in a few reminiscences of those past and eventful years of his youth and of the many interesting events that occurred, but he would never be able to end; therefore, it is best not to begin.

The little mill, like the trip hammer, proved a great success and a paying affair. Nothing but the best scrap iron, rattled clean, was used, and a first-class grade of new iron was rolled. There was no steel scrap on the coast; therefore, a man got what he ordered—viz., iron, not dirt. One of the first mill men employed was John Cornwall, an expert roller. The first heater's name was James Burke. Mr. Cornwall was succeeded in August, 1870, by Mr. Thomas F. Hatton, who was undoubtedly one of the best rollers of his day. He learned the trade and served under his father, Mr. Francis Hatton, in the largest rolling mills in the world, viz., the Dowlais Iron Works, Wales; also in France from 1847 to 1850; later in Petrograd, Russia, from 1862 to 1866, coming to Chicago and Joliet before steel rails were rolled there. The first superintendent was Mr. B. P. Brunner, who prior to the Civil War owned and operated a rolling mill in one of the Southern states. He was also the superintendent of the gas works. Mr. Brunner attended to the outside and clerical part of the mills, leaving the supervision of the mills to Mr. T. F. Hatton. No praise is too great for those two men. They spared no effort to make the mills a success, and under their direction the mills grew rapidly in size and number and the production increased.

For some time the output of the eight-inch mill seldom reached 7000 pounds per shift, often less. This was due to the primitive manner of heating and rolling. The furnace was small and heated by coal. No other fuel was available on the coast at that time but coal and charcoal. The coal came from Wales and Australia at a high cost. Naturally, finished bars were also very high. A carload of good assorted iron was thought by many men to be of more consequence than a load of gold quartz, for without the iron they could do no mining. In course of time, the demand for finished rolled iron increased and an addition was made with a two-high eighteen-inch bar mill. Large quantities of flat and round bars were in demand for the mines. Flats ranging from four, five and six inches up to ten by one and one-quarter inches thick, fifty feet long, were rolled under some difficulty. Rolling mill men will know what it means to roll by hand on a two-high mill. Round bars, in sizes up to six inches, requiring a solid box pile eleven by eleven inches, weighing 2200 pounds, were in constant demand, but the furnaces being so small, only three piles could be charged to the heat. Three larger furnaces were built, so that the output was increased until the production of the three furnaces reached twenty-one tons from all three in one turn. A great celebration occurred, much beer was consumed, and it was the general topic of conversation in "some quarters" on Irish Hill. But Mr. Brunner and Mr. T. F. Hatton were not content. They had been accustomed to a larger output. Hitherto the scrap pile went direct to the rolls, and only weighed 130 pounds, and eleven piles per heat. So a good steam hammer was obtained and the furnaces enlarged to two and three doors, the piles built on boards and increased to 200 pounds and later to 250 pounds and sixteen piles per heat, six heats per shift (and they were long shifts). The result was, the tonnage was increased to nine and ten tons per furnace per shift. Great indeed was the cheering when the tonnage was chalked up on the board—"thirty tons of good, clear, finished iron," worth in San Francisco $75 per ton. Good wages were paid and everybody was happy.

The bar mill having proved such a "howling success," it was decided to add a three-high eighteen-inch train to roll iron rails. The Central and Union

Eighteen-inch Rail Mill crew and eight-inch Bar Mill crew, 1878, Pacific Rolling Mill

Pacific Railroads had not long been completed, and steel rails were still in their infancy in the East, so there was a great demand for iron rails. There was no Colorado Fuel & Iron Company then; no mills west of Bridgeport, Chicago, except an iron rail mill built in Laramie, Wyoming. Steel rails commanded $100 per ton and iron about $80 per ton. The general weight of the rails was fifty to sixty pounds per yard, thirty feet long. For many years iron rails, from thirty to sixty pounds per yard, were rolled on the eighteen-inch train. The output averaged nine tons per furnace. Six new furnaces were built with three doors each. If there was excitement when the bar mill was so successful, it was ever so much greater over the results obtained on the rail mill—seventy tons of good iron rails in one shift. It took a lot of men to operate an iron mill in those days. During this period (1873) the following prominent men controlled the mill: D. O. Mills, James Fair, William Alvord and John Parrot—all of them acting as president at various times. The Mills building was erected in later years for D. O. Mills by the Pacific Rolling Mills. Mr. L. B. Benchley was the general manager, Mr. B. P. Brunner vice-manager, and Mr. Thomas F. Hatton the superintendent. Many prominent men and rich estates were represented in the board of directors and shareholders—viz., the Parrots of San Mateo, Mr. Ralston of the Palace Hotel, and the Sharons.

To meet the ever increasing demand for iron, a number of new furnaces were built by that old pioneer furnace builder, Mr. Judge. Sixteen furnaces were by this time in operation, seven of them running on the rail mill, three on the bar mill; but owing to the two mills being so close, they could not be well operated on the same shift. Sometimes three crews were worked by coupling up the boxes, etc., and then it was a hot job—with the fire flying, buggies going up and down, and the cinders from the flues all running inside the mills. It required forty men to work the rail mill alone. Four double puddling and busheling furnaces were built. Another steam hammer was put in and a two-high sixteen-inch train added to supply the finishing mills with stock slabs. There being no spare rolling mill men on the coast in those days, it was necessary to send East for the heaters and head rollers, etc. It was at this time that the writer made his first appearance on the Pacific Coast. In the meantime the plant had been greatly enlarged in other ways. One of the largest machine shops in San Francisco was erected, capable of handling any of the largest forgings or engineering work on the coast. Mr. Gullixon was the master mechanic, and recognized as one of the best of his time, and also was highly respected by everyone. The largest blacksmith shop in San Francisco was installed, equipped with twelve fires and three steam hammers. Mr. Robert Orphant was the foreman, and under him were some mighty men. Amongst those who succeeded Mr. Orphant after his decease were George Wells, John Mahoney, T. O'Leary, Ed Kerr, and the genial and well known Eddie Forrest, all men of great ability and skill. It was a pretty sight to see those men with five and six helpers striking in rotation on the same piece of forging. There was also a large carriage and wagon axle shop, making all sizes up to four-inch axles. This shop was under Mr. Silas Harris, a very clever and ingenious mechanic. In addition there was a large chain shop, making any size required. In this shop was made the chain that was used in binding the first log raft that was floated from Portland, Oregon, to San Francisco, but the raft broke up and the chain of course went to "Davy Jones' locker." New chains were soon made and shipped north, and the next log raft came down successfully. The docks and wharves were enlarged by driving piles and filling in until there was dockage to accommodate six deep-water ships at one time. The largest nut and bolt factory in San Francisco was erected and fully equipped with machines to make any size or shape of bolts, nuts and washers.

In addition to other parts of the plant there were four of the largest steam hammers on the coast, and all the shafts and three throw crankshafts for

Mill crew and time-keepers, Pacific Rolling Mills, 1878. Robert Hatton third, sitting, Thomas F. Hatton, fifth, sitting, second row from bottom, left to right

Executives and office force, Pacific Rolling Mills, taken in 1880. Patrick Noble, manager, sitting in center

the battleships were forged here. For a number of years Mr. Daniel Bingham was the hammer man, succeeded by Mr. Edward Bagot, both men of first-class ability. The writer has a lasting regard for the memory of them both, particularly Mr. Bagot.

In 1878, B. P. Brunner fell ill and resigned. His death occurred shortly after, and he was sincerely mourned by all the employes, and San Francisco in general. He was succeeded by Patrick Noble, who had long been in the service of the Pacific Rolling Mill Company as bookkeeper and assistant superintendent. In fact, he grew up with the mill. From that time on the plant was enlarged greatly and rapidly.

In 1875 a twelve-inch four-stand train was installed. It was the toughest train the writer ever worked—tough in more ways than one. This was followed soon after by a ten-inch train, and a sixteen-inch train for rolling scrap or stock bars.

Gas Furnaces Installed

In the meantime experiments had been made with gas for heating, and two gas furnaces were built, one for the ten-inch mill and one for the eighteen-inch trains, and proved to be a success, largely increasing the output. The tonnage of the ten-inch train increased from 24,000 to 40,000 pounds and 50,000 pounds of one-inch round bars. The tonnage of the eighteen-inch train increased from 27,000 pounds per coal furnace to 60,000 to 110,000 pounds of finished iron by the gas furnace, and 27,000 pounds additional with one coal furnace.

Shortly after this time, coal for heating purposes was abandoned, and to a great extent oil also, as the three big gas furnaces were sufficient for all heating purposes. They were nicknamed, respectively, No. 1, "Little Willie"; No. 2, "Big Bertha," and No. 3, "John L. Sullivan," after local celebrities.

In 1885 Mr. Thomas F. Hatton resigned his position and was succeeded by Mr. L. McMahon, who had been head roller on the eight-inch and ten-inch trains. Mr. Robert Hatton, who for years had been roller of the two eighteen-inch trains, was given charge also of the twelve-inch train, and on the completion of the twenty-eight-inch mill was appointed assistant superintendent of the plant. Mr. Charles McKay became head roller of the eight and ten-inch guide mills.

A large factory was constructed for making nine-sixteenth railroad spikes, equipped with scores of machines; also a horseshoe factory was erected, making all sizes, from pony's up to "Jumbo."

First Steel Foundry

We come now to the most important feature in the career of the Pacific Rolling Mills, viz., the construction of the open-hearth furnaces and the twenty-eight-inch mills, blooming and finishing. For some years the rolling of iron rails had ceased, as steel rails had superseded them. Steel blooms had been brought by the shipload from Germany, Belgium and England, and rolled here into whatever shape was required, and gradually steel was substituted for iron wherever it was available. The size of the ingots was eighteen by eighteen inches, weighing 6000 pounds, and were rolled to billets and blooms from three and one-half by three and one-half inches up to four, five, six, seven and eight inches, and all beam and other shapes for the finishing mills. The eighteen-inch train gas furnace turned out 120,000 pounds of finished steel, supplemented with two coal furnaces with a tonnage of 30,000 pounds each. Every section listed in "Carnegie's" catalogs was now rolled in one or the other of the mills, and many shapes not listed but rolled exclusively by the Pacific Rolling Mills—flats up to twelve by two inches, angles up to six by four inches, squares up to five inches, and rounds as large as six inches, made from a solid box pile eleven by eleven inches, weighing 2200 pounds per pile, when iron was required.

Steel for the Oregon

The first steel maker was Mr. John Galvin, an expert steel man and a most genial fellow. He was succeeded by several incompetents, and later by Mr. James Early, who remained with the mills until they closed. Under John Galvin and Mr. Early was cast the steel used in the construction of the White Navy, then building at the Union Iron Works — the Charleston, the Monterey, the San

Francisco, Olympia, our celebrated Oregon and the Wisconsin. Steel was supplied for the battleships, numbers of gun boats and steamships, large skyscrapers, steel bridges and cable and electric railroads. At this time the mills employed 1200 men. The writer had the honor of either rolling or supervising the rolling of most of the steel for this period. He is especially proud of the Oregon. In 1893 the twenty-eight-inch blooming mill and finishing trains were ready and commenced blooming eighteen-inch ingots, 6000-pound weights, and blooms and shapes and billets were available for any purpose, and independent of foreign imports. The writer has not forgotten the first ingots that were rolled. The general superintendent had been sent East to pick up items, and he was posted. In order to instruct the table men, large timbers were used to practise with. Of course they did not last long, but everything went along smoothly, from the immense furnace to the charging machine, rolls, tables and hydraulic shears; and thus the first blooming mill was started. The open-hearth furnaces had been in operation for many years, but the ingots were all hammered down to eight and six-inch blooms. It was customary to use steam hammers in the early days.

To enumerate all the important work that was accomplished at the Pacific Mills is impossible. The steel was rolled and fabricated for all the cable roads, first to last, from Baker City down to San Diego, and for practically every skyscraper and steel bridge of the period. Among the many buildings were the Mills Building on Montgomery street, the first Call Building, Third and Market streets; also the beams for the City Hall.

The twenty-eight-inch mill train rolls were all cast iron, but very seldom did one break. In fact, there was not a single steel roll in any of the eight mills. There was a set of steel pinions for the eighteen-inch bar train put in in January, 1879, when the two-high mill was changed to a three-high train, and those pinions were in use and in good condition when the mills closed in 1898. No important additions were made after the twenty-eight-inch mill was started. In fact, the mills soon after struck hard times. The mills were run to the full capacity of the furnaces. The twenty-eight-inch mill tonnage on fifteen-inch beams was 150,000 pounds finished beams, the eighteen-inch trains about 300,000 pounds, and the ten-inch trains about 60,000 pounds. In later years orders became scarce and so one crew operated the twelve and eighteen-inch shape mills, eighteen-inch bar mill, and twenty-eight-inch finishing, rolling alternate heats on each mill in succession, beginning with the twenty-eight-inch mill and winding up with the twelve-inch.

We come now to the closing of the mills. Gradually orders got scarce. Carnegie's were shipping steel via the Horn and laying it down in San Francisco for one and one-quarter cents a pound; some qualities for less. During the years of depression—1890 to 1899—trade was vile and competition keen. Some heavy losses had occurred, and to make matters worse, the chief mainstay of the company, Mr. James Fair, died. Soon after, on May 23, 1898, the mills were closed. Mr. Edward Coleman and Mr. John Coleman, who were president and vice-president, respectively, of the Nevada Bank, and also of the Pacific Rolling Mills, told the writer that they knew nothing about rolling mills (which was true), but were mining men, and would not invest any more money in a non-paying industry. It was a common belief that if Mr. James Fair had lived, the Pacific Rolling Mills would be in operation today, for soon after—in fact, on May 25, 1898—the Spanish War was on and common iron rose at one jump to four cents base price a pound, and was in demand at high prices for a number of years. The Pacific Rolling Mills were often idle for weeks, while iron and steel were brought by shiploads from the East via the Horn. The entire plant, site and docks were finally sold to the Risdon Iron Works. Two of the trains were afterwards opened up and operated by them in May, 1899. They were closed finally, in August, and the entire plant, except the large steam hammers and two engines, was dismantled, blown up by dynamite and sent to the scrap pile. The various men, after twenty to twenty-five years' toil, were scattered all over. Many lost their homes, some went to farms, some were employed at various plants, while others were too old and unfit to work. It is a lasting disgrace to San Francisco and to the Pacific Coast in general that the Pacific Rolling Mill was allowed to go under for lack of patronage.

Not a word was ever published in any of the papers concerning the closing of that great and important plant and the sole steel works on the Pacific Coast.

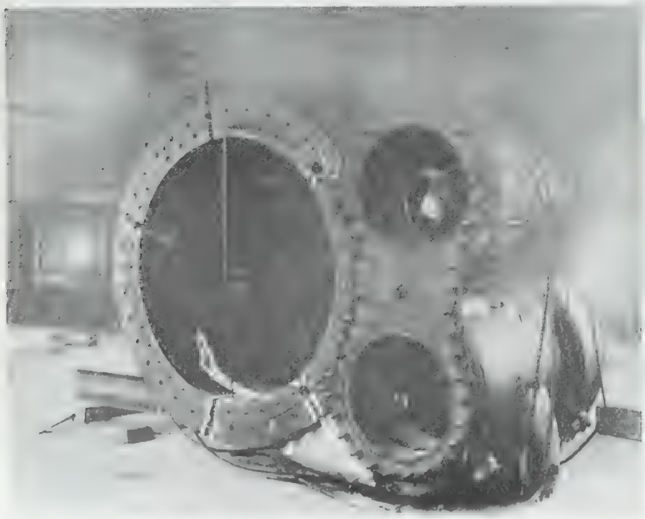


Fig. 1—Wrecked low-pressure cylinder, showing cracks V-grooved by chipping preparatory to Oxwelding

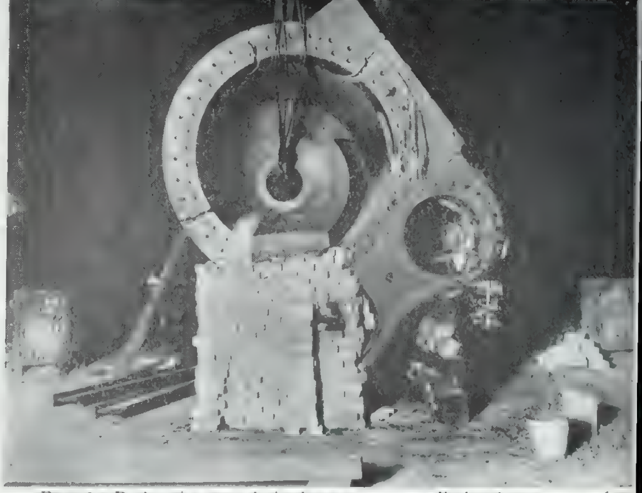


Fig. 2—Preheating crack in low-pressure cylinder by means of charcoal fire. Castings handled by crane

Notable Repairs on Large Cylinder by Oxy-Acetylene Welding

By L. M. Malcher
Superintendent, Welding Shop, Oxweld Acetylene Company.

THE following account should prove of more than usual interest to shipbuilders, for two reasons: First, because much of the machinery found in shipyard shops and on large vessels is of massive construction, like the broken castings referred to below; and second, because the happenings in a steel mill—the shipbuilder's main source of supply—are of vital concern to the shipbuilder.

One of the big steel rolling mill engines at the Farrell works of the Carnegie Steel Company, Farrell, Pennsylvania, that had been doing its full share in helping to win the war, broke down two weeks after the signing of the armistice, having worked constantly up to then on 100 per cent war orders. In the accident, besides other parts, the left-hand low-pressure steam cylinder, seventy inches inside diameter, of an Allis-Chalmers twin tandem compound reversing engine, was badly fractured, as a result of the breaking of a connecting rod at the moment of reversal.

A serious situation confronted the officials of the Carnegie Steel Company, as it would have taken at least three to three and one-half months to obtain a new cylinder, in case the broken one could not be repaired in a shorter time. Three hundred and sixty men were thrown out of employment. The broken cylinder was of such size and the damage done was of such character that a decision whether the cylinder was to be renewed or repaired involved a risk on the part of the management. Although considerations of expense as between the cost of purchasing a new cylinder and repairing the old one were of secondary importance, the cost of repairing was estimated to be about one-third that of a new cylinder.

The officials of the Carnegie Steel Company, after careful investigation, quickly decided in favor of oxy-acetylene welding. They called upon the job welding shop of the Oxweld Acetylene Company, Chicago, Illinois, to meet the emergency. Three expert welders, accompanied by all necessary equipment, went immediately to Farrell and completed the job under the direction of the writer. The total time consumed in repairing the low pressure cylinder, including chipping, pre-heating and welding, was 72 hours. While dismantling the engine a fracture was discovered in the right hand, 42 inches diameter, high pressure cylinder. This fracture also was repaired in about 18 hours. It took just seven days, from the time the order was given to the Oxweld Company to complete the entire job.

The data covering this work are given in detail below:

Low Pressure Steam Cylinder

5000 H. P. Allis-Chalmers Twin Compound Reversing Engine.

The H. P. given is maximum power developed while rolling and running at about 100 to 110 R. P. M.

Cylinder bore	5 ft. 10 in.
Stroke	4 ft. 6 in.
Weight of cylinder	13 tons
Thickness of iron casting	2¾ to 3⅜ in.
Number of cracks	7
Total length of all cracks	22 ft. 2 in.
Preparing and preheating casting	27 hours
Welding casting	45 hours
Linde oxygen consumed	2850 cu. ft.
Prest-O-Lite acetylene consumed	2845 cu. ft.
Oxweld cast iron welding rods	390 lbs.
Oxweld "Ferro" flux	25 lbs.
Number of welders	3
Period of welding shifts	10 to 30 minutes

High Pressure Steam Cylinder

5000 H. P. Allis-Chalmers Twin Compound Reversing Engine.

Cylinder bore	3 ft. 6 in.
Stroke	4 ft. 6 in.
Weight of cylinder	5 tons
Thickness of iron casting	3½ to 6 in.
Total length of weld	4 ft. 6 in.
Preparing and preheating casting	9½ hours
Welding casting	8½ hours
Linde oxygen consumed	650 cu. ft.
Prest-O-Lite acetylene consumed	650 cu. ft.
Oxweld ¼ in. cast iron welding rod	110 lbs.
Oxweld "Ferro" flux	10 lbs.
Number of welders	3
Period of welding shifts	10 to 30 minutes

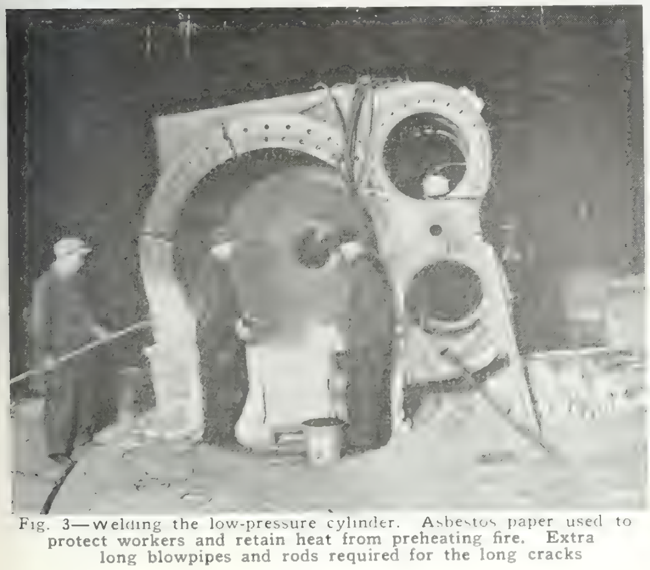


Fig. 3—Welding the low-pressure cylinder. Asbestos paper used to protect workers and retain heat from preheating fire. Extra long blowpipes and rods required for the long cracks

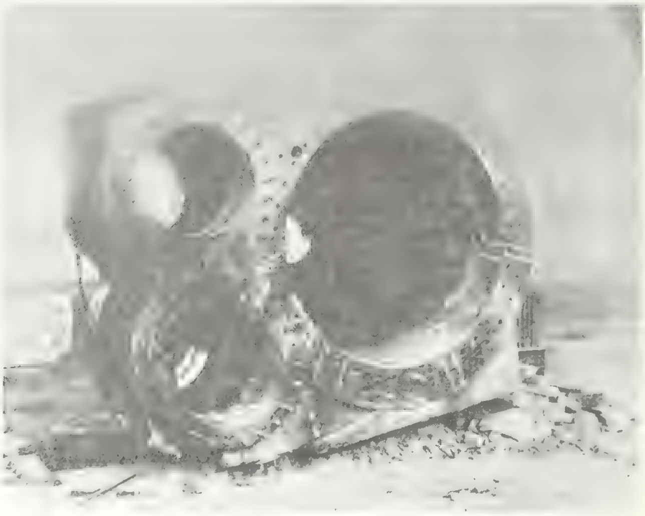


Fig. 4—Welding of low-pressure cylinder completed

European Marine Notes

By Special Correspondent

SHIPOWNERS and shipbuilders alike in the United Kingdom, while looking forward to activity, are not finding things developing as quickly as they would like. With regard to shipping generally, our ports recently have been having quite large numbers of unemployed seamen walking about their streets, although this particular feature has been relieved to a certain extent by the utilization of some of the transferred German merchant vessels. British seamen throughout the war have, it is agreed, been brave and persevering. They have gone to sea in face of grave perils, and there is many a British sailor who has been torpedoed several times, and not once only. It would be a thousand pities, therefore, if with the coming of peace unemployment were to descend upon this very deserving class, and the government is certainly doing all it can to prevent such an untoward thing happening.

Still there are many difficulties in the way of stimulating import and export trade of the country. A great deal of inertia prevails in the ranks of general employers in this country, and there are unemployed workers to the number of more than a million now in receipt of the weekly out-of-work donation pay from the government. This number is being added to every week, and until the tide turns one cannot say that manufacturing industry in Great Britain has commenced to revive; and unless it does so, shipping must correspondingly lag.

One good thing is that shipping is now considerably freed from government control, but that of course is not the only thing requisite for activity. The leading men in the business are meeting together almost without cessation with a view to helping matters along and hastening the trade and shipping revival, but very great difficulties stand in their way. Something like a definite signing of peace in Paris will of course help, and certainly there should be a demand abroad for many classes of British goods to replace the destruction of war.

At the same time it has to be remembered that in certain foreign countries severely hurt by the war, markets for the supply of their necessities are being found nearer at hand than Great Britain, while in other cases clever financial arrangements have sent them even further afield than Great Britain for what they want. The shipper, therefore, perceives freights lessening and the area of trade not expanding as he would like.

One thing that tends to upset many shippers is the persistent talk of the nationalization of shipping. Upon this question shipowners' and shipbuilders' associations have been giving their views of late, and the opinion of Robert J. Dunlop, president of the Glasgow Shipowners' Association, might be quoted as representative. He declared that those people who thought salvation for shipping lay in the nationalization of shipping were being gravely misled. If the government of Great Britain were to enter into trade competition with other countries, would not this nationalization, he asked, sow the seeds of strife and possibly lead to war in the future? Shipping was, in his opinion, the very last thing we should nationalize. In our position as a first-class power, it was necessary to give full scope to individuality. Human nature as it was constituted required that every man should have a goal to attain and a prize for the attainment of that goal. Nationalization meant death to individual effort. It had already been shown to create a lack of responsibility, and a nation's purse to draw upon had been shown to create a carelessness of expenditure.

Mr. Dunlop also referred to another danger of state interference in shipping, and that was the question of political appointments. Shippers knew too well, he said, from experience that politicians were prone to reward their political friends for their services by giving them paid positions with but small regard to their suitability for such positions. Nationalization, he said, also gave to the workmen, through their votes, power to exact terms from their employers which, while constituting a temporary triumph, might ultimately be to their detriment, and the effect might be disastrous to other industries and to the nation.

Slow Progress of British Shipbuilding

Figures to hand giving the output of new ships on the Clyde (Scotland) for the first three months of the current year are not encouraging. It is true the figures for March itself were better than those either for January or February, but in the three months only fifty-four vessels were produced of a total of 77,681 tons. This compares with forty-eight vessels of 95,985 tons in the corresponding three months of 1914, forty-one vessels of 117,858 tons in the first three months of 1913, and fifty-six vessels of 135,340 tons in January to March, 1912, which was the biggest quarter for a great many years past. One has to go back twenty years to find a Clyde average for the three months approximating to the low figures of the first quarter of this year. It is evident, therefore, that work on the river is still far from satisfactory, and that the conditions are not yet favorable to a full resumption of prewar activity. The difficulties of changing over from war to merchant work may be seen in the large proportion of small vessels for the Admiralty which were launched in March, but the position is also explained by the fact that comparatively few of the merchant vessels laid down last year have yet reached the launching stage, so that the hiatus between war and merchant work promises to be worse than was anticipated. At present there is some danger of unemployment, but this is explained largely by the labor troubles of a few months ago, which delayed the laying down of new vessels, and by the uncertainties of the industrial situation generally.

Reduced Shipbuilding Hours and Wage Adjustment

The granting of a forty-seven-hour week in the British shipbuilding and engineering trades has led to a lot of troublesome negotiations of various sorts, but at last the situation is becoming clear and the various controversies are being smoothed out. In connection with the shortening of the hours from fifty-four a week to forty-seven a week, one of the difficulties was the fact that no allowance had been made to piece-workers for an alleged diminution in their opportunities of earning. This particular question has received the consideration of the Court of Arbitration and a decision has been reached.

Amid its complicated details as to piece-workers and men on lieu rates, one principle is clear, that the reduction in hours need not mean reduced earnings for piece-workers. It may be surmised that in arriving at this conclusion, the court had in mind the fact that a considerable amount of time is lost by the piece-workers engaged in shipbuilding. Probably the average working week in such cases is less than forty-seven hours, and so the impression is left that there need be no diminution of earnings if, as is claimed, a reduction in hours is accompanied by better time-keeping and possibly also by better organization. Experience may prove otherwise, and if so, a recommendation is made that piece-work prices should be reconsidered. According to the existing view, the change in conditions should not result in reduced earnings by piece-workers.

One phase of this problem remains to be considered. In shipyards it may happen that certain members of a squad on some system of payment by results have to employ and pay men remunerated by the hour. Time-workers are now to receive an enhanced rate proportionate to the reduction in hours, so that their weekly wages may remain unaltered. Accordingly sub-contractors would require to pay the men employed by them at this increased rate per hour, and to this they objected. Their objection has been sustained, and the difference is to be paid by the firm, so that in accordance with the finding the management will pay such time-workers seven hours and the piece-workers who directly employ them will be responsible for forty-seven hours, both at the old rates. This, however, does not invalidate the general conclusion to be extracted from the terms of the award, that in the shipbuilding trades piece-workers should be able, presumably without extra effort but with better time-keeping, to maintain earnings at the level reached under the previous conditions.

Freights in the North Atlantic

The additional 5 per cent levied on all freight and charges to United States ports, made payable abroad in the United States, by all steamships which sailed from Great Britain on and after February 1, 1916, is no longer to be collected, according to an announcement made by the Atlantic Transport, the Cunard, Furness Withy & Company and Frederick Leyland. Shipping companies have always been disposed to encourage the payment of freight in advance, since it relieves them of the trouble of dealing with certain little matters, and in some trades today there is still an additional charge made for freight payable at destination. As a writer in the Times trade supplement points out, in the case of the North Atlantic trade there were in 1916 special reasons for putting a premium on the payment of freight in this country. There was the important question of exchange, which made it desirable for all payments possible to be made in this country, and there was also the substantial factor of war insurance. When freights were paid in advance, shipping companies had no reason to insure them, for, in the event of the loss of the ship, they still retained them. If, on the other hand, freights were collectable at the port of destination, the shipping lines had to insure them at the comparatively high rates which ruled. As the need for a high premium for war insurance no longer exists, and as exchange between this country and the United States is now being left to take care of itself, there is no longer the same justification for the additional charge. Its removal means a reduction of two shillings and six-pence on a freight of fifty shillings, and so is quite noteworthy.

The Gyroscopic Compass

Although gyroscopic compasses were extensively and successfully used in surface and submarine ships of war both before and during the recent hostilities, few, if any, instruments of the kind found their way into British merchant vessels. Royal naval reserve officers returning to their ordinary employment are, however, saying so many favorable things about the comparatively new compass that shipowners are beginning to be impressed by its possibilities. A Sperry gyro compass is shortly to be installed, I hear, in the White Star liner Ceramic, and if its service is as satisfactory as the Sperry people claim that it must be, its adoption for other vessels of the fleet ought to follow as a matter of course. The Norwegian-American Company's two largest liners have Sperry gyro compasses.

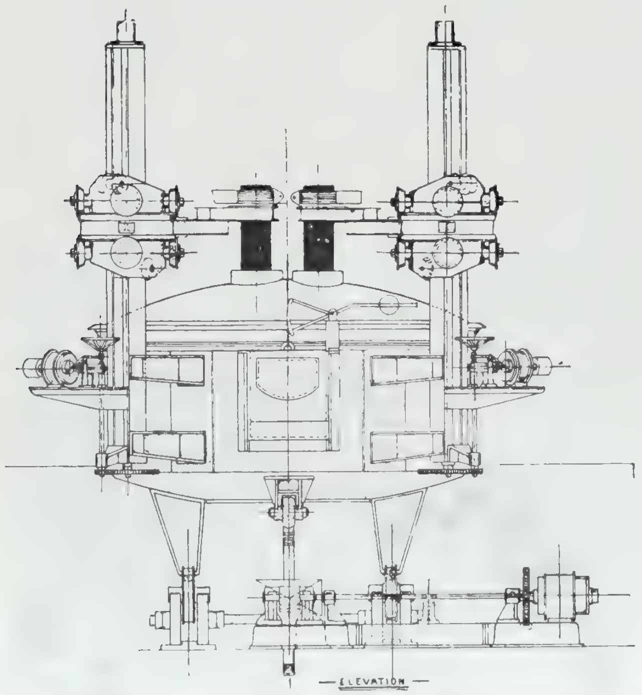
The Electric Furnace Applied to Pacific Coast Iron and Steel Industries

IRON and coal are two great factors which largely determine the power and wealth of nations, and to a smaller extent this axiom may be applied to states and localities. Those who study the trade conditions of the Pacific Coast will readily understand that if the states lying along the sea line had the necessary facilities for producing iron and steel, a time of great prosperity might reasonably be looked for. It may therefore be of some interest to consider the various factors tending to encourage and discourage such an industry.

At the present time steel is being produced in the localities of San Francisco, Los Angeles and Seattle, and is mainly being manufactured into steel castings. Although the foundries doing this work are relatively on a small scale compared to the Eastern steel works, one or two of them are by no means insignificant. The bulk of the steel produced is made from iron and steel scrap, which is being successfully melted in oil-fired, acid and basic-lined furnaces, and also in electric furnaces.

The class of scrap used in the oil-fired furnaces is necessarily of the heavy type and the proportion of turnings is small, whereas in the electric furnaces a charge of all turnings is preferred. The price of heavy scrap is from $30 to $40 per ton, while that of turnings is from $8 to $10, so that on the score of raw material the electric furnace has much to recommend it.

Of the electric furnaces operating, the largest and most recent are two six-ton furnaces of the Greaves, Etchells type—one in the Bremerton navy yard, the other at Mare Island. These furnaces are exceedingly interesting and our representative had the pleasure of seeing one in operation. There are particular features which commend these furnaces to both the steel worker and the electrical engineer. Among these we may mention:



Elevation of 12-ton Greaves-Etchell electrical furnace

1. Ease of practical operation.
2. Uniform heating of the steel.
3. Steady absorption of electrical load and absence of extreme fluctuation and surges on the supply system.
4. Uniform distribution of load on all three supply phases and maintenance of a power factor of .90 to .95.

In this particular furnace, which is of 1300 kilowatt capacity, the main electrical load was maintained at 1300 kilowatts during the melting period, which lasted about four hours, and the maximum fluctuation shown by the recording wattmeter did not reach 1500 kilowatts.

To those electrical engineers who have had experience with electric furnaces of various types, such loading will no doubt appear incredible. The steel produced was killed under a completely deoxidized slag, and poured without any trace of dissolved gases and with perfect fluidity.

The steel produced averages a composition of C .25 S .20 Mu .55 S .010 P .010, and the usual test is:

Elastic limit, 45,000 pounds.
Maximum stress, 80,000 pounds.
Elongation, 30 per cent.
Reduction of area, 45 per cent.

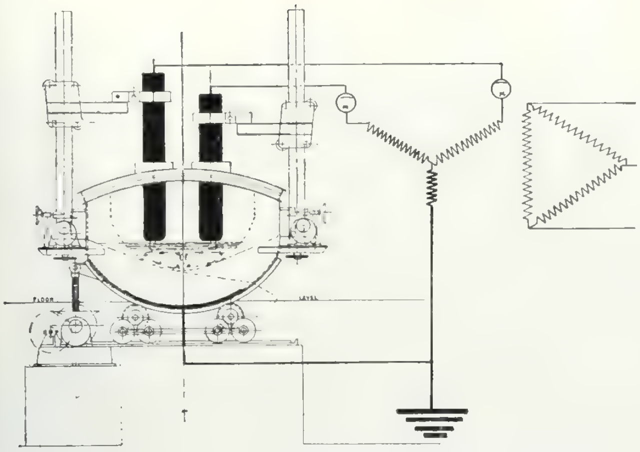
The difference between the physical properties of electric steel made in this way and open-hearth steel is worth noting. An average test for the best open-hearth steel would be:

Elastic limit, 35,000 pounds.
Maximum stress, 70,000 pounds.
Elongation, 15 per cent.
Reduction of area, 50 per cent.

It is not that the tensile strength is higher, but the increased percentage elongation should be carefully noted, as this is a good indication of the toughness of the steel. The reduction of area is no greater than with open-hearth steel even under a greater elongation, which means that the test piece was so uniform that it elongated over its whole length fairly evenly, instead of in just one place. Taken in conjunction with the fact that electric steels of this class give 90 and 100-foot pounds Izod impact test against 12 to 15 pounds for open-hearth steels, it will readily be understood that in dealing with electric steel we have an exceedingly tough and shock-resisting material. We discussed these points with Mr. Etchells, who pointed out that, owing to the purity of electric steel, a metal is produced which is entirely free from incipient cracks and flaws and which has its component crystals very closely knit together.

The true merit of such steel is not realized until it is perceived how resistive it is to vibrating and alternating shocks and stresses, such as are experienced by a propeller shaft, for example. The microscope has often revealed that the existence of slag inclusion or similar flaw started the line of fracture on which a propeller shaft broke. Such a possibility would be absent with properly made basic electric steel.

The fluidity of the metal renders it suitable for pouring into small and intricate shapes, many of which would only be produced in malleable iron



Arrangement of 12-ton Greaves-Etchell furnace showing electrical connection to three-phase power line

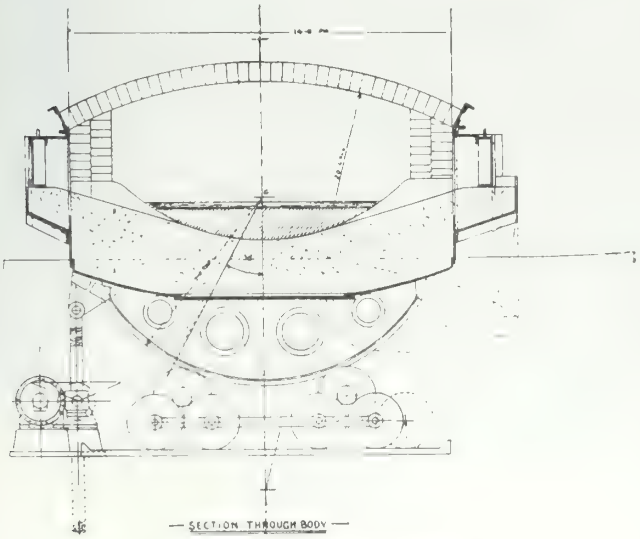
heretofore, while its homogeneous composition and absence of dissolved gases render the use of chills and brackets largely unnecessary in moulding.

Mr. Etchells estimated that the cost of melting would be from $15 to $20 a ton, according to the cost of power in a particular locality, which may vary from six cents a unit to one cent.

The liberal manner in which all the industrial districts on the Pacific Coast are supplied with power should render the choice of location of a furnace fairly simple, providing sufficient raw material is available.

The consideration of raw material raises another issue which cannot be overlooked. In a recent paper before the American Foundrymen's Association, Mr. Fenstermacher of the Columbia Steel Company, Pittsburgh, California, pointed out that the demand for scrap exceeded the production in the latter days of the war period. If the demand for steel for shipment from the Pacific Coast increases — as many authorities think it will — the coastal states must produce and not merely sell Eastern products if they are to take full advantage of such demand.

We are fortunate in having every requisite to this production except cheap fuel and cheap transport. In regard to transport we know that it often costs as much to move local traffic over comparatively short distances as the preferential tariffs charge Eastern producers for sending their products across the continent, and until a fair settlement of this question is arrived at it will be practically impossible to touch our own reserves of iron ore, which are second in quality to none in the world.

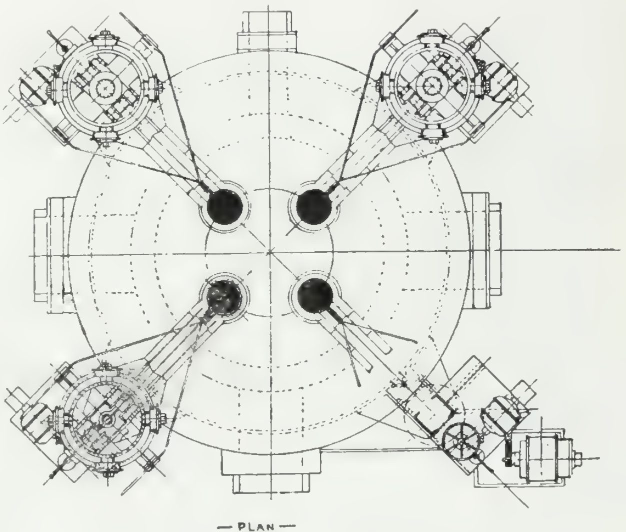


Section through body of furnace

In regard to fuel we have an enormous development of hydro-electric power which could be used to supplant all the fuel required for heating purposes in iron smelting. It is well known, however, that a certain amount of carbonaceous fuel is necessary to effect the chemical reduction of the iron oxide. This would necessitate importing a certain amount, preferably coke, for this purpose. Roughly, the ordinary blast furnace uses one ton of coke for every ton of iron produced. Of this, about two-thirds is burned to provide heat and only one-third is used as a reducing agent.

In discussing this matter with Mr. Etchells, he suggested that the use of charcoal might establish another local industry and provide the necessary fuel. In the districts where iron ore is found there is also a quantity of small wood waste available, and power can readily be brought to the spot.

The adoption of methods by which the carbonaceous fuel used is burned fully to carbon dioxide instead of carbon monoxide in reducing the ore would make possible a consumption of about 350 pounds of carbonaceous solid fuel for every ton of iron and about 1800 kilowatt hours of electrical energy.



Plan of furnace

The utilization of local iron reserves is not a new problem, and it has been tackled in a small way several times. It is one, however, which the whole population of the Pacific Coast should study carefully, as the development of a local steel industry from our own raw materials would benefit the coast-lying states immeasurably and bring stable prosperity into our midst. Obviously the Coast is using much more steel than she produces, or scrap would not be available for all our steel works, but it lies with us to see that with all our wonderful natural resources we take full advantage of the trade which is gradually coming to our shores, and that all the steel that we use is produced on the Coast from our own raw materials.

Electric Tractors Versus Hand Trucks

An interesting article on "Truck Conveyors for Unloading Boats," by Robert Ardell, M. E., was published in March Pacific Marine Review. In this article several general statements were made concerning the unloading of miscellaneous cargo. These statements have brought to this office much interesting comment, and we are glad to publish the following excerpts from a letter written by D. L. Darnell, M. E., of the Baker R. & L. Company:

"We note, on page 123 of your March, 1919, edition, an article by Robert Ardell, M. E., entitled "Truck Conveyors for Unloading Boats," and we take exception most decidedly to Mr. Ardell's preliminary statement—"For handling miscellaneous freight, containing packages of all sizes and shapes, each to be delivered at a different place, there seems to be nothing better than a common, two-wheel truck with a man behind it." The country is dotted with electric industrial truck and tractor installations, and in every instance this mechanical handling of freight has effected a considerable saving.

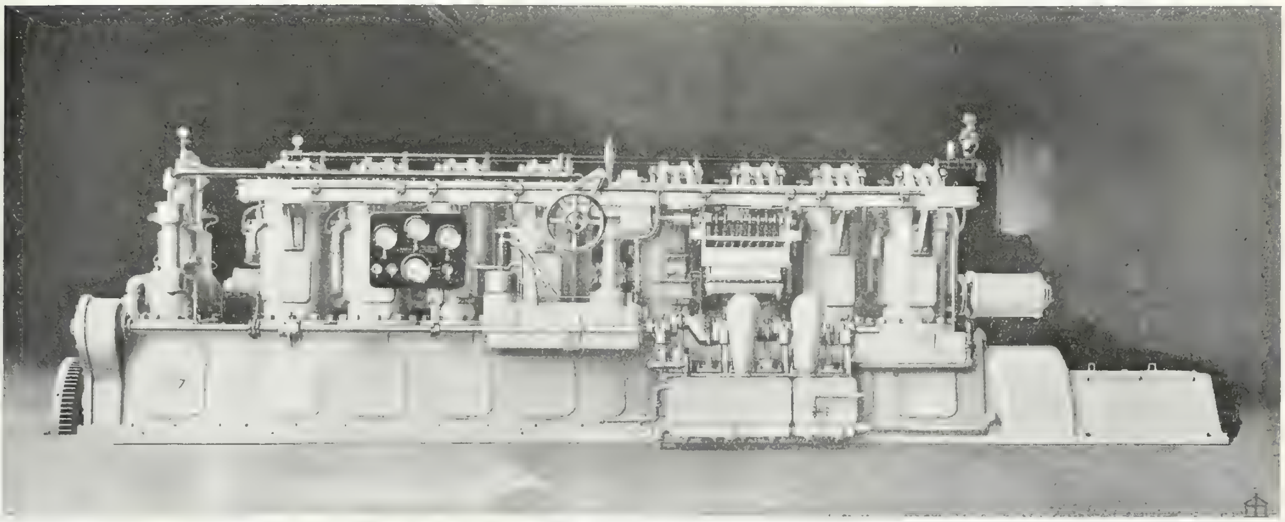
"The reason for this is quite obvious, since under the labor conditions obtaining during the past few years the cost of operating an industrial truck, exclusive of the driver, is practically the same as the wages paid a man. On this basis an electric industrial truck would only have to do the work of two men in order to be even in cost with the man-power system, but the installation is rare where the machines cannot do at least the work of five men, and in many cases they are doing what as many as twenty did previously. Furthermore, the electric truck will run up an incline steeper than the one shown in the illustration on page 124, and needs no auxiliary power to assist it.

"We do not make the foregoing statements unadvisedly, but can readily point to many installations throughout the country equipped with electric trucks manufactured by the Baker R. & L. Company, or any one of several other firms, which will bear us out. The enormous plant of the B. F. Goodrich Company of Akron, Ohio, is a very good example. This plant is nearly four miles around and turns out more rubber goods than any other single factory on earth. In such a plant the question of transportation is a very important one, and after a thorough survey the Goodrich people have adopted a system using both trailer trains hauled by electric tractors and the load-carrying type of elevating trucks. We can also point to the installations at the United States expeditionary quartermaster depot, Pier No. 78, Philadelphia; the ordnance depot at Pig Point, Virginia; the ordnance expeditionary pier at Curtis Bay, Maryland; the fleet supply base at the Brooklyn navy yard, and the army supply depot on the Boston waterfront. In the photograph shown on page 123 three men with hand trucks are plainly visible and another can be detected at the left-hand side of the illustration. With an electric utility truck, one of the most common types, the work of these four men could be accomplished in less than one-half the time and at from one-third to one-fifth the expense.

"In the city of San Francisco we point out particularly the Pacific Steamship Company docks and the Oakland and San Francisco terminals of the Wells Fargo Express Company, where industrial trucks (not of our manufacture) are doing work in a manner which never could be attempted with hand trucks."

Typical uses of electrical truck and tractor in industrial plants

An All-American Diesel



Operating side of 8-cylinder Winton Diesel oil engine, bore 12-15 16 inch, stroke 18 inches

THERE is naturally at this time widespread public interest in the development of shipping to sail under the American flag. There is not, however, equally widespread knowledge of the economies to be effected by the use of the heavy oil Diesel engine in place of the orthodox steam plant. These economies are two-fold: First, largely increased carrying capacity of a given sized ship, due to the much smaller space requirements of the power plant; and second, the greatly decreased operating cost.

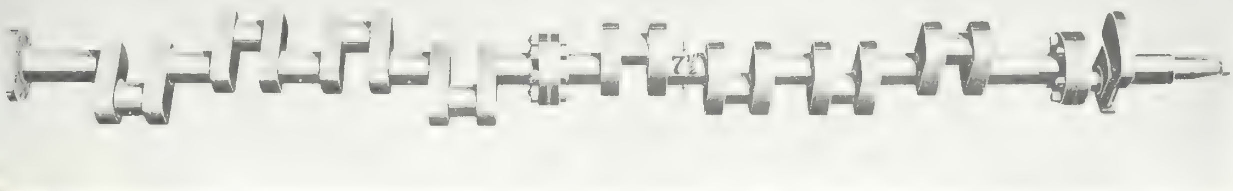
Space saving is effected in several ways. The engine room proper is about the same size in either case, but with the Diesel engine the boiler room is entirely eliminated, as are also the coal bunkers, the oil fuel being stored between the inner and outer skins of the ship, or in tanks occupying much less space than the bunkers. The crew's quarters are also much smaller, as there is, of course, no boiler room force, and the engine room force is considerably reduced. The net carrying capacity of a 3300-ton ship, 250 to 260 feet long, powered with two of these Diesels, is increased 15 per cent over that of a ship with steam as motive power. But a few moments' consideration is required to realize the vast advantage given by this increased capacity, even if the operating costs were not reduced. Particularly is this true in view of the recent reductions in rates for ocean cargoes.

Reduced operating costs result from three sources, viz., economy in fuel, smaller operating force, and less time required for a given voyage. The total cost of fuel oil is only about one-third that of coal. The saving of man power, and consequently of living expenses during the voyage, is due to the elimination of the stokers and a reduction of perhaps one-third in the engine room force. In one case recently reported by Edward N. Hurley, chairman of the United States Shipping Board, the reduction was from thirty-three men on a steamer to twenty-three men on a motorship of the same size.

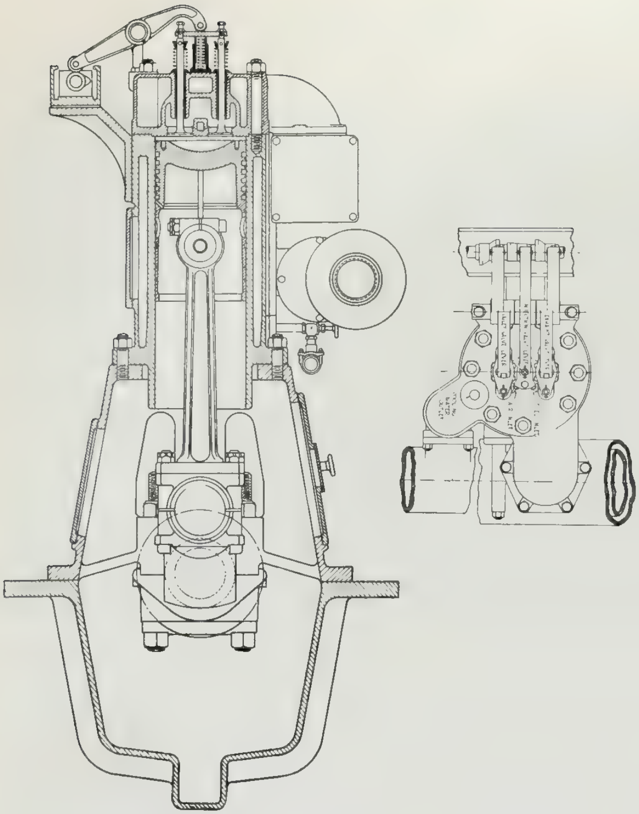
The saving in time results from the much smaller number of stops required for bunkering, and also because of the shorter time needed to pump the oil aboard, as compared to that for loading an equal weight of coal. The figures as given by Chairman Hurley in the case mentioned above are as follows: The steamer stopped fourteen times for coal in a voyage lasting 300 days. The motorship stopped twice in the same distance for oil, completing the voyage in 236 days, besides using some of her tank capacity for carrying a cargo of oil from one port to another.

The figures given above are by no means exceptional, as many records of even greater performances are on file. In addition to the above, there are many other advantages of the motorship over the steamer, which make certain its ultimate adoption in place of the steamer for all except perhaps the largest ships.

The majority of the Diesel engines built in the past for motorships have either been constructed abroad, or built in this country under foreign patents. These have usually been of the open crank case, crosshead type, following accepted marine practice in the case of steam engines. Among the few strictly all-American designs, the Winton engine stands out because of its departures from the conventional accepted forms. That these departures have been in no way detrimental is proved by the successful records established during the past two years on many ships; on the contrary,



Crankshaft of 8-cylinder, showing three-piece construction. Note the holes drilled through shaft for pressure oiling system



Section through cylinder and detail of fuel injection

they have permitted the construction of very light, compact units, running at higher speeds than have yet been generally accepted, and with sufficient reserve power for all emergencies.

Winton engines have been produced in large numbers in the following three sizes:

Six-cylinder, 11 by 14 inches, known as Model W 35.
Six-cylinder, 13 by 18 inches, known as Model W 24 A.
Eight-cylinder, 13 by 18 inches, known as Model W 40.

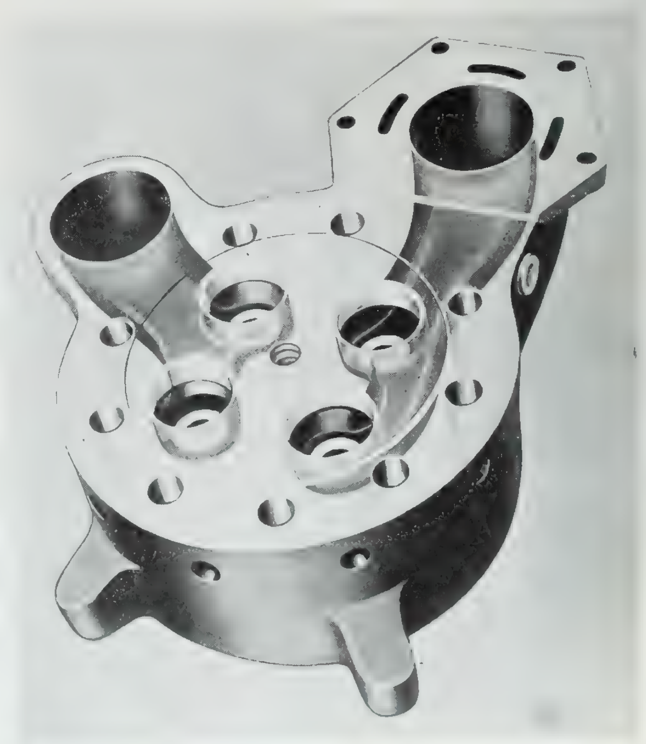
Ordinary practice in the past in producing moderate powered Diesel engines has been to copy the designs used in marine steam engines which the Diesel engines are to replace. This has resulted in very clumsy designs; the extraordinary features being adopted with the idea of overcoming the expected prejudice of the engineer accustomed only to steam engines.

In designing his engines, Mr. Winton departed greatly from this practice, and applied the proved principles of standard practice wherever they logically could be used. The outstanding features of his engine are: The use of an enclosed crank case, trunk pistons instead of the usual cross head arrangement, and crankshaft bolted up to its bearings which are mounted in the upper half of the crank case.

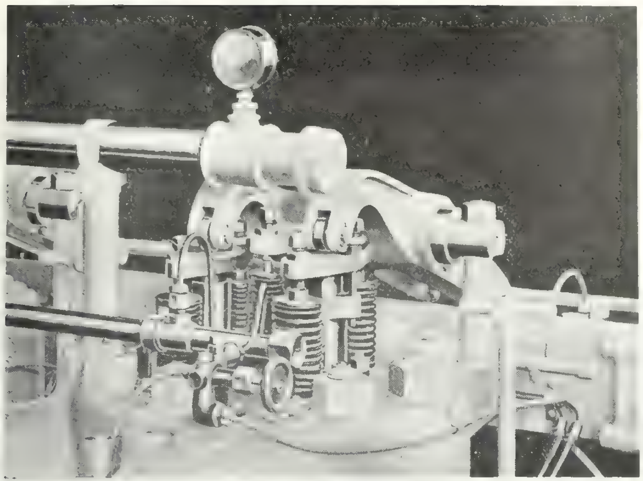
This method of mounting the crankshaft, which is practically universal practice in gasoline engine design, has two very important advantages. It is well understood that practically all the wear which takes place in main bearings is in the lower halves, as the thrust is in this direction in the power strokes. As wear takes place, the crankshaft drops slightly from its original position. If the wear is unequal in the various parts, the result is that the shaft is sprung more or less out of line, straining the shaft and reducing the effective output of the engine. Where the lower halves of the bearings are fixed and the upper halves are bolted down to them, it is very easy in taking up loose bearings to spring the shaft seriously out of line. It is almost out of the question to lift the heavy shaft off its bearings to get at the lower halves; and, further, it is very difficult to determine when the bearings are exactly in line. On the other hand, if looseness develops where the shaft is bolted up to the fixed upper halves of its bearings, taking up the looseness simply restores the shaft to its original alignment. The second real advantage of this mounting is that taking up wear in the bearings brings the pistons up to their original position again so that the compression remains unchanged.

In Diesel engines there is no explosion in the power cylinders, as there is in the ordinary small internal combustion engine, but the fuel is really burned, giving very high, steady pressure. The fuel is forced into the cylinder, against the compression, by air at 850 to 950 pounds pressure. This not only carries the fuel into the cylinder, but breaks it up into very fine particles, so that the combustion is complete and consequently smokeless. The high-pressure air for this purpose is obtained from the air compressor, a three-stage type of very interesting design located at the forward end of the engine. The piston is of the trunk type and is operated by a connecting rod, which is a duplicate of the connecting rods in the power cylinders, and a single throw counter-weighted crankshaft which is bolted to the front end of the main crankshaft. The throw of this single crank is somewhat less than that of the power shaft. Following each stage of the compression the air is water cooled, so that on delivery it is at normal temperature.

From the compressor air is delivered into two sets of air bottles, one carrying air at about 600 pounds pressure a square inch, which is admitted to the cylinders in turn to force the piston down and thus start the engine rotating. The second set of air bottles carries air at 1000 pounds pressure



Phantom view of cylinder head. Note careful design of ports



Assembled cylinder head showing valve operation and fuel injection pipes

a square inch, which is used to inject the fuel into the cylinders, thus starting the engine running under its own power.

No ignition apparatus is required in these engines, as the compression pressure of about 550 pounds raises the temperature of the air to the point at which fuel ignites spontaneously; consequently the fuel starts to burn as soon as it is forced into the cylinders by means of the high-pressure air.

The following detailed description of the Winton engines will be found interesting:

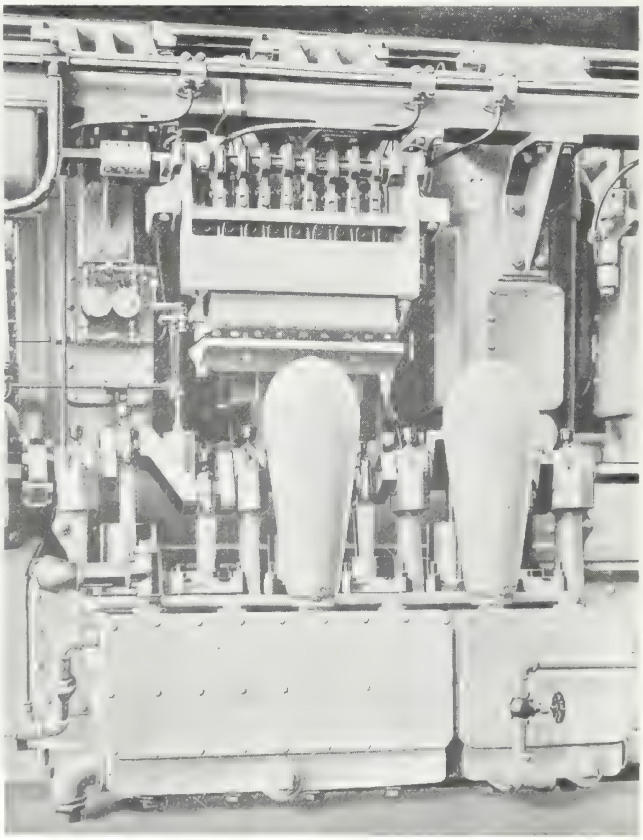
The crank case is of gray iron, and cast in one piece, of skeleton construction—that is, the sides have large openings opposite each throw of the crankshaft, each of which is provided with a cover plate, affording easy access to all parts of the interior. A main bearing for the crankshaft is provided on each side of each throw of the crankshaft, each bearing being supported by heavy ribs, so that the crank case is extremely rigid. The lower part of the crank case is enclosed by a trough-shaped casting which extends from the timing gear in the front to the rear of the thrust bearing at the back end of the engine. The crankshaft and connecting rods are thus fully enclosed, so that there is no possibility of oil being splashed outside of the engine. The bearing caps are each bolted up to the crank case by four large studs and nuts. The bearings themselves are heavy shells, lined with high-quality babbitt metal. Each bearing has an individual oil lead from a header running the full length of the crank case. This header is connected to a two-cylinder reciprocating oil pump which maintains constant oil pressure on the bearings. Further details of this pump will be given later.

The crankshaft, because of the considerable weights and sizes of the forgings involved, is made in three pieces—two sections each having three or four throws for the power cylinders, and a single throw section for the air compressor. These sections are flanged and bolted solidly together before being assembled into the crank case.

From each main bearing of the shaft a hole is drilled through the adjacent web to the crank pin. These holes register with grooves in the main and connecting rod bearings, so that the connecting rod lower bearings are also lubricated under pressure directly from the pump.

The connecting rods are I-section forgings, split at the upper end and clamped around the piston pins, and formed into a T-head at the lower end, to which two half boxes and a supporting cap are bolted. Each rod has an oil-tube connecting with the groove in the upper half box and leading upward to the piston pin. The piston pin itself is hollow with its ends plugged, and is drilled near each end so that oil is fed directly to the bushings in the piston. The tube and piston pin are thus filled with oil under pressure from the pump, and adequate lubrication of the piston pin insured. The piston pin is case-hardened and ground, and bears on bronze bushings pressed into the bosses of the pistons. These piston pin bushings are grooved so that the oil will reach all the pin-bearing surfaces. The surplus oil escapes onto the cylinder wall, providing ample lubrication for the pistons. Any excess oil works down and collects in the crank case. It is thus seen that all bearing surfaces are assured of positive lubrication.

The trunk pistons are about 75 per cent greater in length than in diameter. The piston pin bosses are located about one-third of the distance up from the bottom of the piston, which brings them to about the center of the effective bearing surface. The length of the bosses is such that the bronze bushings can be inserted from the inside. As each bushing is flanged, it is effectively locked against endwise motion when the connecting rod is in place. The piston has the usual saucer-shaped top to give the necessary compression space, there being heavy ribs from its top to the side walls and the bosses. The piston is also strengthened by a rib around the inside, just above the bosses. To prevent oil from splashing up under the lower side of the head where it would be burned, the hole through this rib is closed by a light sheet metal plate. This simple feature has great influence in



Oil and fuel pumps of the Winton Diesel

maintaining the quality of the lubricating oil, which would otherwise rapidly become very dirty. The usual piston rings are carried at the upper end of the piston. To prevent oil working up past the piston rings, a groove is turned immediately below the lowest ring and from this groove a number of holes lead back into the inside of the piston.

To permit the handling of the bolt which clamps the upper end of the connecting rod around the piston pin, each piston has a hole through each side midway between the pin bosses and slightly above them.

The cylinders are cast individually with integral water jackets, there being large cover plates so that the jackets can be readily cleaned out if necessary. The cylinders are bored and then ground to very close limits, assuring an excellent fit of the piston and rings.

The cylinder heads are attached to the cylinders by studs and nuts so arranged that the pressure is uniformly distributed. Each head carries five valves, two for the incoming air, two for the exhaust, and one for the injection of the fuel. Each pair of inlet and exhaust valves is operated from the camshaft by a single rocker arm, the valves being connected by a T-head guide on which the end of the rocker rests. The guide is carried in contact with the rocker at all times by a coil spring in the center of its hollow stem. Each end of the guide carries an adjusting screw and lock nut, by which the clearance between the ends of the valve stem and slide can be adjusted. This clearance should be about .015 inch from both main inlet and exhaust valves. These pairs of valves are used instead of single large valves, as the small valves are much less apt to warp under the high temperatures to which they are exposed.

The fuel injection valve is located in the center of the head, and is also operated by a rocker from the camshaft. The adjusting screw for this valve is set to leave .025 inch clearance when the valve is closed. All these clearances are those for a cold engine, and will be somewhat less as the engine warms up.

High-pressure injection air flows during all the time the injection valve is open. Fuel is injected, however, during part or all of this period, depending on the amount of power required from the engine. The amount of fuel is controlled by a centrifugal governor, which limits the duration of the fuel pump suction as may be required to maintain the engine speed.

The fuel pump is of the plunger type, with one plunger for each power cylinder. It delivers the fuel to the fuel injection valve under a pressure of 850 to 950 pounds, depending upon the pressure of the fuel injection air. The stroke of the fuel pump is constant, the amount of fuel delivered being controlled by the governor, by the early or late closing of the pump inlet valve, as noted above.

The fuel oil is lifted to the fuel pump from the tanks by air at ten to fifteen pounds pressure, insuring plenty of fuel at the pump inlet valve.

The engine cylinders and air compressor are provided with circulating water by a four-cylinder plunger pump, operating from the same crankshaft which handles the oil circulating pump.

The oil circulating pump, which provides lubrication for all the main bearings of the engine, really consists of two single-cylinder pumps. The one driven from the end throw of the crankshaft operating the circulating water and lubricating oil pumps draws the oil from the pump in the lower half of the crank case and forces it through a cooler and a strainer to a storage tank. The other single-cylinder pump draws the oil from this storage tank and forces it into the header, from which it is piped to the bearings, as described above. The discharge side of the pump is provided with an air chamber to insure constant pressure being carried on these bearings. The circulating water pump is of the four-cylinder type, and also has an air chamber on the discharge side to insure steady circulation of the water. The cylinders, pistons and stuffing box glands are made of non-corrosive bronze to prevent injury by the water.

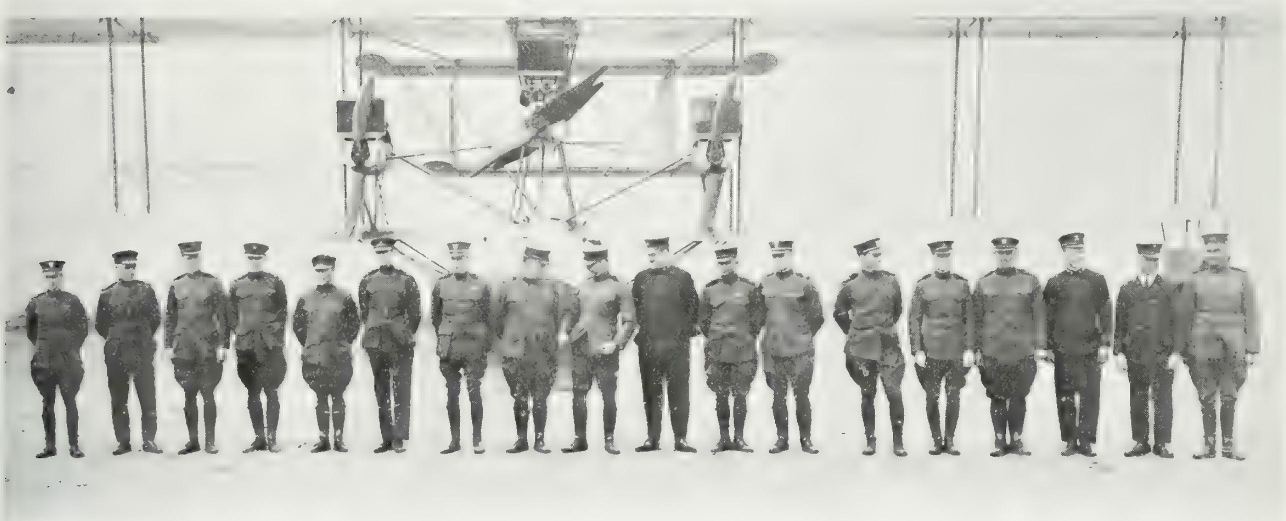
The camshaft is supported in a long box-shaped casting open at the top, which is in turn supported on brackets from the cylinders. This trough is partly filled with oil, insuring ample lubrication to the cams; the camshaft bearings are lubricated under pressure from the pump, as are its driving gears.

The camshaft is provided with two complete sets of cams, for forward and reverse motion, respectively. Shifting the shaft endways by means of a hand wheel and suitable mechanism brings either set of cams into operation. The shift from full speed ahead to full speed astern is guaranteed in six seconds, and is frequently accomplished in five seconds. Considering the weight of the parts which must be brought to rest and started in motion again in the opposite direction, this is a wonderful performance.

Motorship James Timpson

Elements of Piston Design and Their Particular Application to Airplane Engines

By Richard Vosbrink
Chief Engineer, Hall-Scott Motorcar Company



United States Naval Aviators ready for trans-Atlantic flight. Naval seaplane NC-3 in the background

IN a general way it may be stated that gasoline engines as applied to automotive equipment, such as automobiles, trucks, etc., have been so thoroughly developed that at the present time there are very few radical departures from what may be considered accepted and conventional design, most efforts for improvement being restricted to the refinement of elemental features and structural details.

The European war was responsible for giving an added impetus on a concentrated and intensive scale to engine design, especially for airplanes, which in normal times would have extended over a much longer period.

Radical departures from existing standards and formulae became the common practice, as no available textbooks or existing compilation of data were sufficiently comprehensive to meet the extraordinary conditions as they occurred.

Necessity, competition and emulation produced some notable achievements which for the general public will not be available for a considerable period of time.

Requirements and developments in airplane engineering indicated that efforts would have to be concentrated to secure the accomplishment of extremes for every important factor in engine design. The occasion required that engines have the maximum power, reliability, ruggedness, strength and simplicity, combined with a minimum of weight, manufacturing difficulty, fuel and oil economy, etc. By those intimately connected with the engine industry a great deal of this was accomplished by analyzing the constructional elements for the purpose of refinement in detail.

The fundamental principles and characteristics involved in any gas engine design, however, offer certain restrictions and difficulties in development even to the best informed engineers. Eliminating the more simple problems, there still remain several co-related factors which to a great extent restrict the size, speed and power of gas engines. There are physical limitations to securing the maximum volumetric and thermal efficiency, mean effective pressures, inertia forces of reciprocating parts, and lubrication.

In a gasoline engine power is obtained by the utilization of heat in generation as the motive force, using as a medium a combustible liquid with a fixed number of British thermal units per pound. This means the induction into a cylinder of a maximum number of cubic feet of a vaporized mixture and the release of the heat contents of that mixture in the shortest interval of time. Consequently an engine should have a large bore and a comparatively long stroke, combined with high speed to obtain the desired maximum efficiency. If the pistons and connecting rods are made larger in diameter and longer, we have the problem of reducing the inertia forces generated in the reciprocating parts. Assuming that the inertia forces increase as the square of the engine speed and that the tensile strength of the material from which the piston is made varies directly as the area, we soon arrive at a point where the physical limitations will not permit an increase in these factors. A consideration of the laws of inertia, mass, force, acceleration, velocity, etc., indicates that the piston, being the major portion of the reciprocating masses demands our attention first. The piston must be of light weight and yet have sufficient structural strength to leave a reasonable element of safety in the design.

Cast iron pistons are almost universally standard in gas engines, as their wearing qualities, strength, co-efficient of expansion, etc., lend themselves readily to design. There are, however, certain restrictions to the use of this material, which for our consideration are quite serious. As it is required that the piston be reasonably strong with a limitation of weight, it is necessary to secure the proper strength, that the pistons have ribs cast under the head and to the sides as a reinforcement for the thin sections. Now ribs cast in the piston,

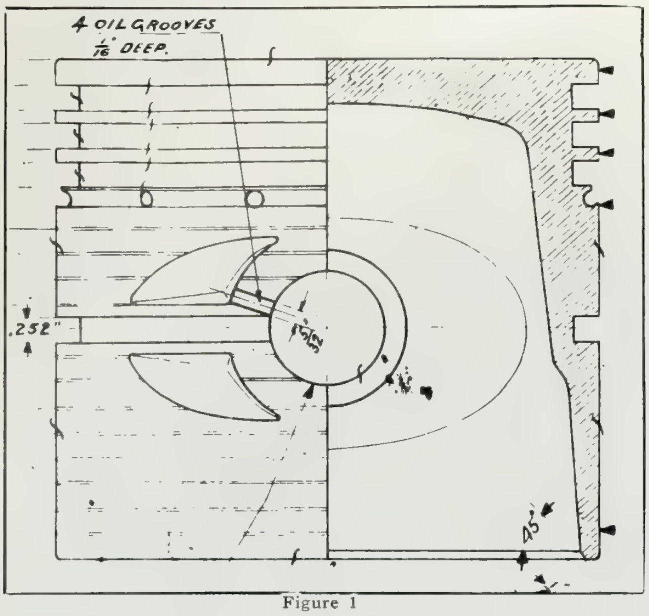


Figure 1

whether cast iron or of other material, are useless in tension and offer great difficulties in manufacture due to shrinkage stresses.

This problem occupied the attention of automotive engineers for years and many methods have been used to accomplish the desired result. Many designers have experimented with aluminum and with pistons, using steel heads and iron barrels with various sections, methods of ribbing, etc. In most cases these experiments have not proved satisfactory and engine builders have reverted to the cast iron pistons again.

Lieutenant-Colonel E. J. Hall, of the Hall-Scott Motor Car Company, made an extensive investigation of this subject to determine the reason for the apparent lack of success of the other engineers. The reason can be understood if a complete analysis of all the conditions are made and the investigations are extensive enough.

As before stated, cast iron pistons have certain inherent advantages. Engine cylinders are generally made of cast iron also. Therefore the ratio of expansion between the cylinder of cast iron and the piston of the same material is reasonably constant, thus permitting various engine speeds at different temperatures, maintaining a uniform compression. However, if we raise the compression pressures to any considerable extent, the temperature would become so great that we would get into difficulties for the following reason: If excessive heat is applied to metal surfaces, the metal will oxidize. The strength of the material is lessened and deformation, temporary and permanent, takes place, due to expansion and internal structural changes.

To obtain the maximum thermal efficiency it is necessary that we utilize as much heat in effective work as possible. This means that we must maintain the heat in the cylinders so that it can be converted into work. If we radiate too much heat away from the cylinders through the cooling water, our efficiency decreases. High compression pressures and explosion temperatures react directly against the piston head. With iron pistons it is not possible to maintain as high a temperature in the cylinder as desirable, as the radiation and heat conductive qualities in cast iron are not sufficient.

The hottest part in the engine, apart from the exhaust valve, is the piston head. As previously stated, the restrictions imposed by weight and velocity as generated into inertia stresses do not permit the iron pistons to be so designed that certain primary facts of radiation and heat conductivity can be taken advantage of. Now before analyzing this further, it is well to consider certain problems involved in successful lubrication. The proper lubrication of the cylinders depends a great deal upon the temperature of the metal surfaces, such as the exterior of the piston and the interior of the cylinder walls. To be thermally efficient, an oil film must be maintained between the piston and cylinder walls through which the heat can be conducted to the cooling water. As previously stated, there is a certain amount of non-conductivity of heat in iron which causes a localization of heat on the piston head. This temperature if too high will subject the oil to carbonization and distillation; its lubricating qualities will be considerably lessened by a reducton of its viscosity. There will also be an abnormal expansion and deformity of the piston, necessitating additional clearance, which if excessive will permit leakage past the piston, resulting in loss of compression and crank case dilution.

The subject of lubrication in general requires particularly an intensive study of oils, an explanation of which for the purpose of this subject would be too extended. For our consideration, however, we will assume that the oil to be used possesses to some degree the following characteristics:

Maximum reduction of friction.

Minimum amount of wear of rubbing surfaces.

Maximum length of time that oil can be used in service.

Minimum rate and minimum amount of decrease in lubricating efficiency.

Minimum carbonization in combustion chamber and the greatest security against seizure consistent with maximum lubricating efficiency.

These characteristics can be affected by factors inherent in the oil itself, or may be affected by mechanical factors in the engine. To determine this as nearly as possible is the problem of the experimental engineer. For instance, if there is a reduction of lubricating efficiency, is it due to a

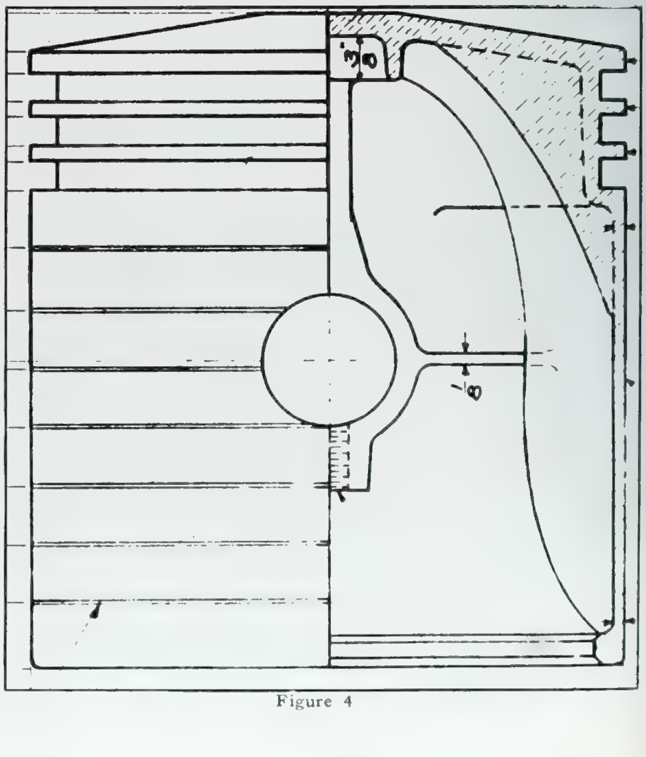


Figure 4

reduction of viscosity, as previously noted, due to piston design, or is it due to products of decomposition in the oil itself? To acquire sufficient knowledge of these various conditions, all the peculiarities in the mechanical features must be examined and recorded; such as bearing clearances, specific bearing pressures, compression ratio, types of pistons and piston rings, and piston clearances, as well as the characteristics of the oil, such as specific heat, adhesion, thermal conductivity, body, flash, fire and boiling point ranges, oxidization and volatility.

Having satisfied ourselves regarding these various details, we now are in a position to make some determination regarding the piston we wish to design. To take advantage of the thermal conductivity of the oil, to maintain its viscosity and to overcome the disastrous distillation and carbonization due to excessive heat, to maintain reasonable clearances, to obtain high compression pressures and to reduce the inertia stresses and to secure a uniform and satisfactory manufactured product, are the things to be accomplished. We must use in our piston material with the greatest heat conductivity, which will permit us to design the piston so that we can conduct the heat radially across the piston head and thence down the piston wall and out through the cylinder walls to the cooling water. To do this efficiently requires that the heat carrying capacity be proportional to the receiving surface on the top of the head. This means the disposition of material or sectional area to be so designed that the thickness of the head will increase approximately as the square of the radius which will allow us to accomplish the desired result. This cannot be done with iron pistons, as they are too heavy, and it has not been accomplished by other designers who have used aluminum in their pistons, because all of these factors have not been taken into consideration. Consequently the only result they accomplished was to get a light piston, resulting in a reduction of inertia stresses, but maintaining the other difficulties of the iron piston, plus the undesirable feature of excessive expansion.

Ignoring the operating stresses for the time being, and considering the problem as regards thermal conductivity, we will analyze the action that takes place in the cylinder. It is understood that with a high compression ratio the explosion pressure will be proportional. Investigation indicates that the explosion pressure is approximately four times the absolute compression pressure. Knowing the area of the piston head, the length of the stroke and the revolutions per minute, we determine the piston speed and the volume of fuel. Using commercial gasoline containing about 19,000 b. t. u. per pound, we determine the cubic contents of air and the gasoline from which we can calculate the number of heat units generated per minute in the engine. Assuming that we have secured the highest volumetric efficiency possible and have determined the generated heat, we now have some idea of the thermal conditions in the engine. Now, as previously stated, the piston head receives the major portion of this heat. The heat units received within a circle drawn concentrically on the piston head must pass radially through a cylindrical surface equal to the circumference of the circle multiplied by the head thickness at that point. To maintain our temperature at a normal degree, the head thickness must increase progressively from the center out so that the metal conducting area bears a consistent ratio to the area of the heat receiving surfaces, so as to control the temperature gradient from the center to the edge. The specific gravity of iron will not permit such a construction on account of the operating stresses that would be developed.

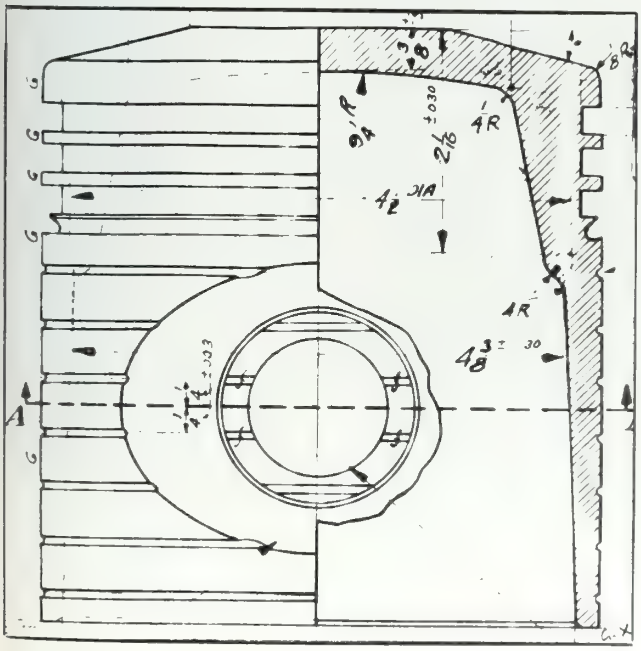


Figure 2

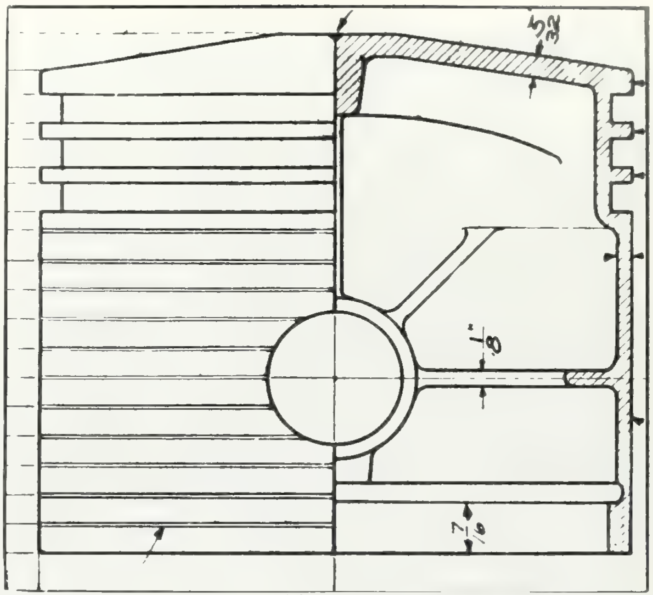
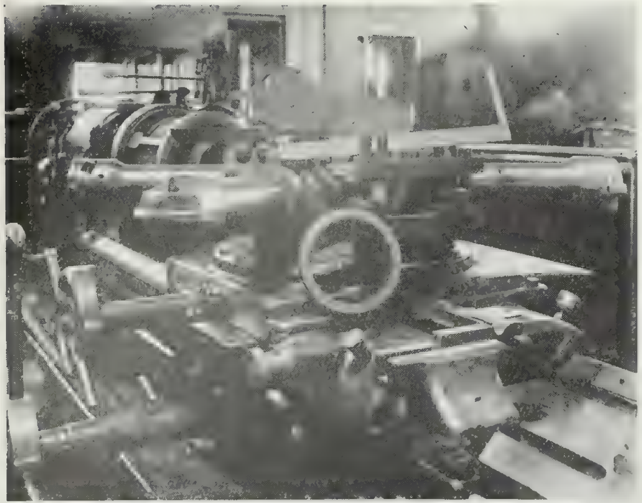


Figure 3

Aluminum, however, is ideal for the purpose, its specific gravity being about 2.59 as compared with 7.21 for cast iron. This characteristic of the metal permits us to make a piston with a thick head and walls and yet relatively much lighter than the best designed iron piston. Our main difficulty with aluminum arises from the fact that its coefficient of expansion is 0.000022 per degree centigrade, while that of iron is 0.0000119 per degree centigrade; therefore the ratio of expansion in aluminum is about 50 per cent greater than that of cast iron. Some of the peculiar physical properties of aluminum are that the thermal conductivity increases with the temperature, and that the metal is extremely malleable and ductile. The tensile strength of pure aluminum is about 15,000 pounds to the square inch, but when properly alloyed this

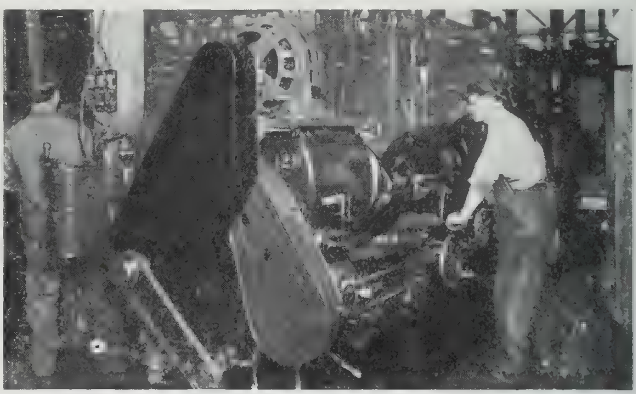


Heavy-duty turret lathe, Hall-Scott plant

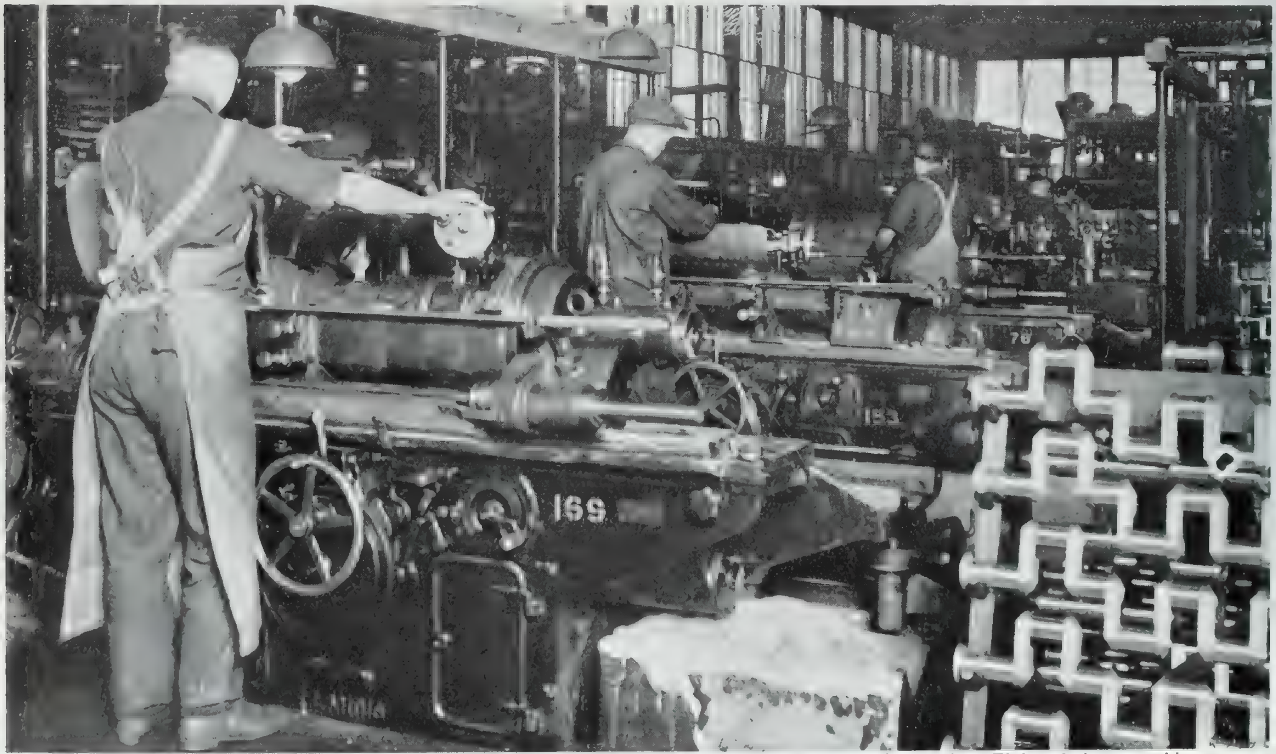
can be increased to as high as 28,000 pounds per square inch. Pure aluminum cannot be used for pistons, as it lacks rigidity. Most alloys for pistons contain about 10 per cent of copper, while some have a certain percentage of zinc. There are some special alloys the ingredients of which have not been made public. The pistons used by the Hall-Scott Motor Car Company are made from an aluminum alloy manufactured by the Aluminum Castings Company of America.

A complete investigation and analysis of all the conditions enumerated was instituted by Colonel Hall, and his thorough understanding of combustion engine design and experiments resulted in the design of piston which is now used as a standard by the Hall-Scott Motor Car Company. This design is illustrated by Figure 1. It was so successful that it was adopted in the now well known standardized government aviation engine, popularly called the "Liberty Twelve." The similarity between the two pistons can be readily seen by referring to the design as illustrated in Figure 2, which is the Liberty piston. Figure 3 is a fairly successful design of iron piston. However, the thin sections and ribbing are an objectionable feature. Figure 4 is an aluminum piston design, following somewhat that of the iron piston. It is entirely unsuccessful. Most designers of aluminum pistons have followed somewhat the design as indicated by Figures 3 and 4. While there have been some very successful and satisfactory aluminum pistons made with ribbing, they are difficult to manufacture, as in most cases they are sand cast. Sand castings are quite porous and the expansion ratio is almost the same as per pure aluminum. The experiments conducted by Colonel Hall for the purpose of reducing the expansion ratio indicated that die cast pistons were much more satisfactory than the sand cast, as the chilling effect resulted in a closer and more tenacious grain, reducing the expansion ratio.

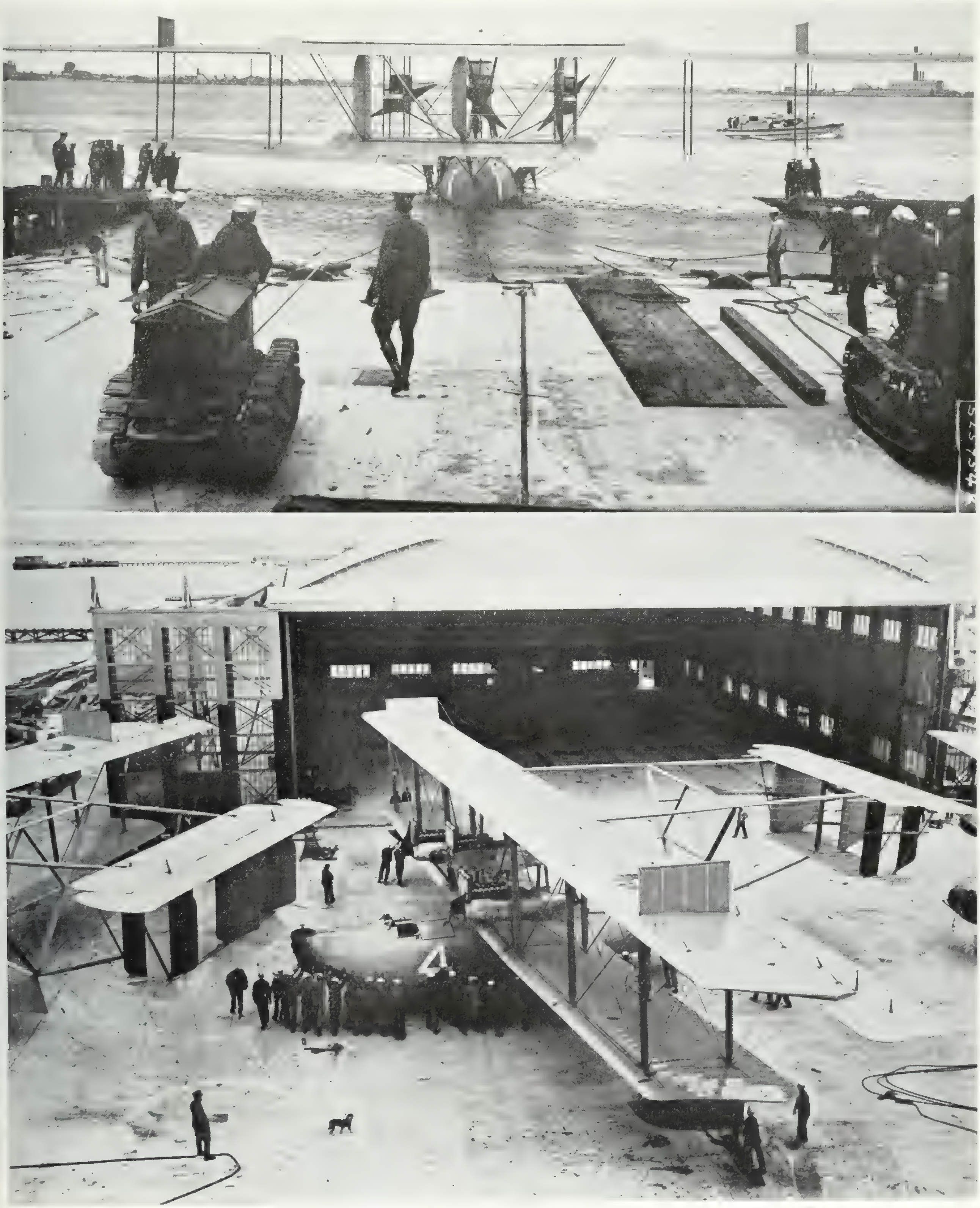
Empirical tests determined the necessary clearances. These tests were comparatively simple and consisted of taking various types of aluminum pistons, those with thin sections and those with heavy sections; those that were cast in green sand molds and those that were cast in hard sand



Heavy precision lathe used in turning crankshafts. Hall-Scott Motorcar Works. This lathe is precise enough to finish to limits of .00027 inch



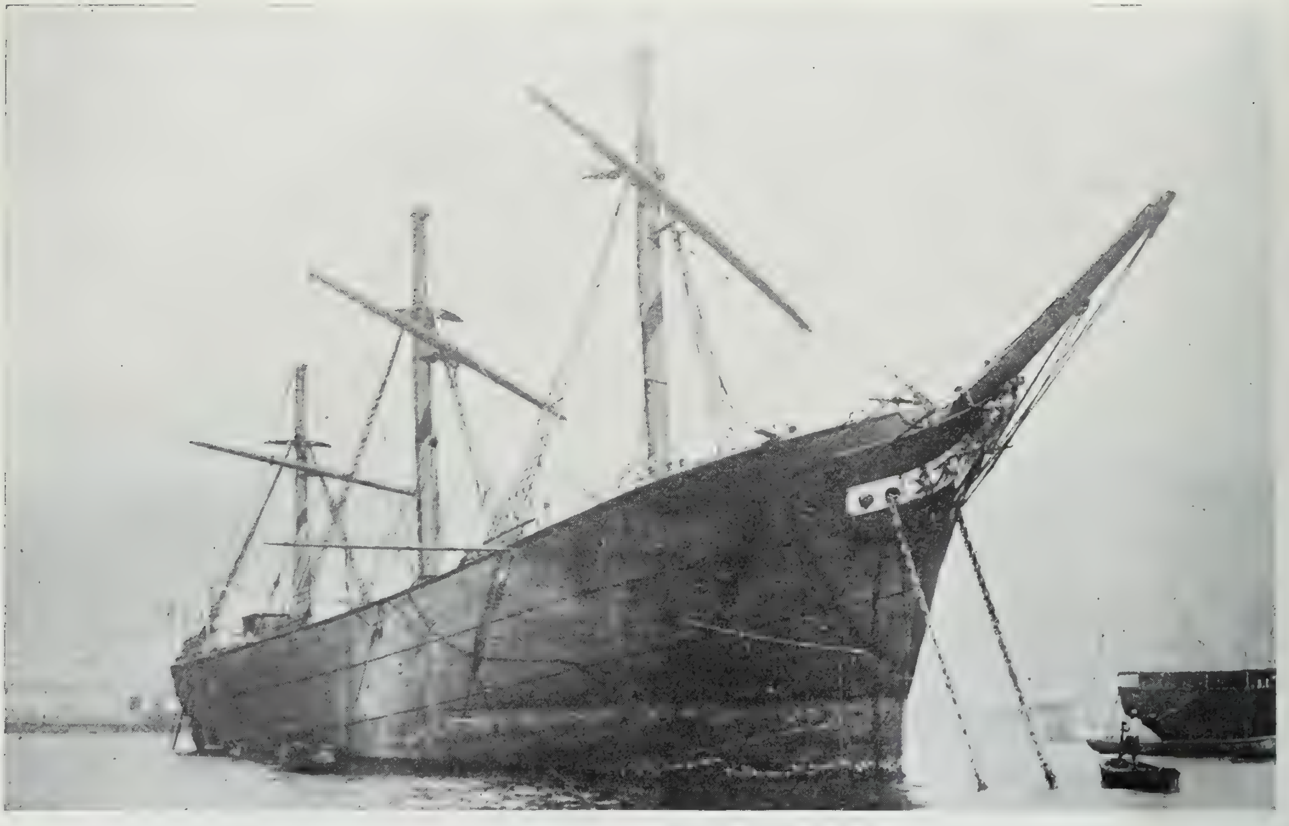
Battery of Landis grinding machines at the Hall-Scott Motorcar Works, West Berkeley, California. Eight of these machines are in use at this plant molds, also some that were cast partially with hard sand cores and externally die cast, as well as some completely die cast. Special micrometers were used to measure the diameters of the piston at different points, such as the first, second and third lands, as well as the barrel of the piston. These measurements were taken at different temperatures, from 70 degrees Fahr. to 700 degrees Fahr. The proper clearances were determined by bearing in mind the necessity of making them as small as was consistent with a reasonable assurance that they would result neither in piston seizure nor that if too large that they would result in piston slap and oil pumping.



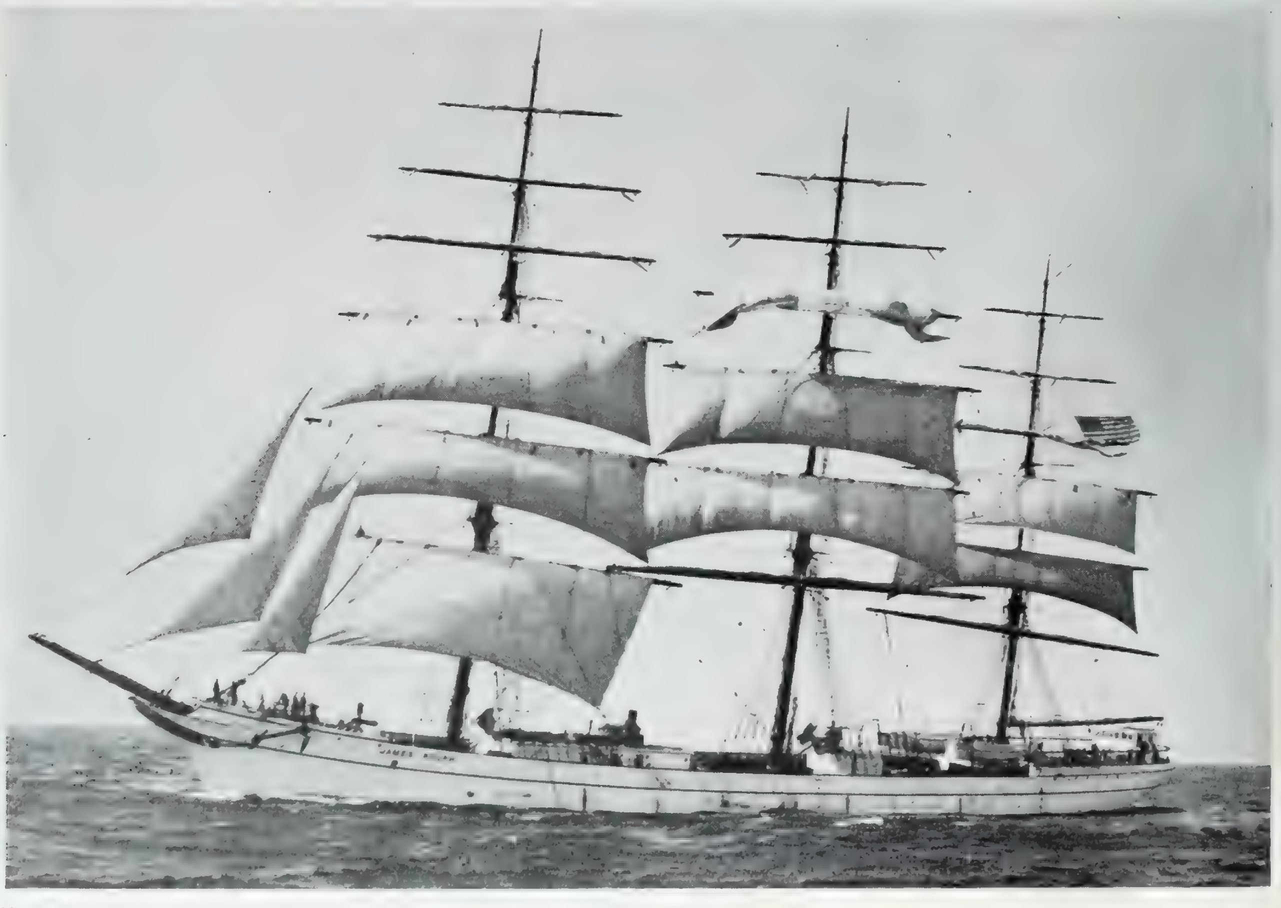
GIANT NAVAL SEAPLANES START ON TRANS-ATLANTIC FLIGHT

Our pictures show the NC-1 and the NC-4 taken the day before the start. The NC-1 is shown being pulled out of the water on her skids by two tractors just after landing from a trial flight. The NC-4, all groomed and ready, is being pushed into her hangar for a final night's rest. It is a matter of pride with Californians that the Liberty-Twelve motors used in these planes are very largely the design of a California engineer. It is also noteworthy that much of the detail designing which made possible communication from these planes on sea service is due to the work of California engineers and electricians. Pacific Marine Review in its next issue hopes to give in full, details of this work.

A Remarkable Transformation



Some years ago James Rolph purchased the hull of the old British sailing vessel Celtic Monarch, then lying in a Chilean harbor, and brought it to San Francisco for use as a coal barge. Recently, realizing the possibilities when it was found that the hull was perfectly sound, Mr. Rolph had it completely overhauled and rigged as a three-masted full skysail yard ship and it will be seen below that while still burdened with a masculine name she is a creature of great beauty carrying with her all the romance of an old China clipper.



The Carburetion of Low-Grade Distillates

By H. O. Ensign, M. E. and E. E.

THE present distillates of petroleum that may at present be used as fuel for internal combustion engines through the medium of carburetors range in boiling points all the way from 125 degrees F. to 600 degrees F., the first being the initial point of gasoline and the latter the end point of kerosene. On the Pacific Coast there are produced a number of fuels that embody fractions of the initial and end points ranging between these two extremes. California engine distillate may be taken as the most prominent one, with an initial of from 200 to 275 and an end point from 425 to 500, and it is rumored that the higher values may soon prevail.

Successful carburetion embodies three important functions: First, the metering of fuel so that the mixture of fuel and air will be in such proportions that under the varying compressions involved at different speeds and throttle positions, perfect combustion will result. Second, the breaking up of the fuel by atomizing, aerating or vaporizing and mixing evenly with the air. Third, transporting it to the engine cylinders without disturbing the condition of the mixture as delivered by the two previous operations.

The correct metering of the liquid fuel to the air stream in proportions to produce the proper explosive mixture is one of the most complex problems involved in engineering operations.

As all fluids, whether gases or liquids, follow the same general law for the relation between pressure and velocity, it would, on first approach, seem that all that is necessary would be to introduce the fuel, by means of an adjusting nozzle, to a high velocity air stream, and the variation in pressure drop, due to changes in air velocity brought about by change in load, would draw in the correct amount of fuel for each different air velocity and corresponding change in quantity of air per unit of time. But when this is attempted in its simplest form it is found that as the air velocity or load increases, the amount of fuel in proportion to air becomes greater for each increment of added air velocity and some sort of compensating device, such as air valves, cam operation of needle valves, or use of manifold vacuum, or other devices, must be used in order to approximate a correct mixture.

One of the causes of this phenomenon is the complex nature of the fuel. At the lighter loads and slower air velocity very little vaporization takes place at the tip of the fuel nozzle and that only from the lightest fractions of the fuel, but the pressure drop increases as the square of the velocity, and it is therefore readily seen that some heavier fractions of the fuel will vaporize under the higher velocities, such action tending to disturb the metering. In fact, the lighter fractions, either in solution in the heavier fractions or mechanically mixed with them, when reaching the low pressure region in the air stream at the tip of the nozzle, in the form of spray or extremely fine particles, will cause these particles or heavier fractions to burst, and thus, by the sudden expansion of the fuel in the throat of this air passage, tend to exclude some air. In other words, the metering characteristics of any form of high velocity choke, such as the venturi, become upset as soon as another medium is injected, in any considerable quantity into this throat, and where this medium is a liquid with a wide range of boiling points, the degree of such distortion of metering is an unknown factor on account of the different amounts of vapor, almost in the form of a gas, released at the point where the supposed metering is to take place. It may be seen, therefore, how difficult it is to compensate for this erratic action, which follows no definite law and varies with each change in the grouping of the fractions of the fuel. In fact, as observed above, it can only be approximated.

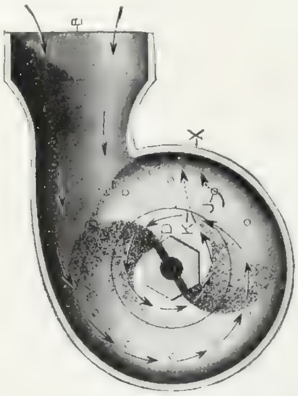


Figure 1

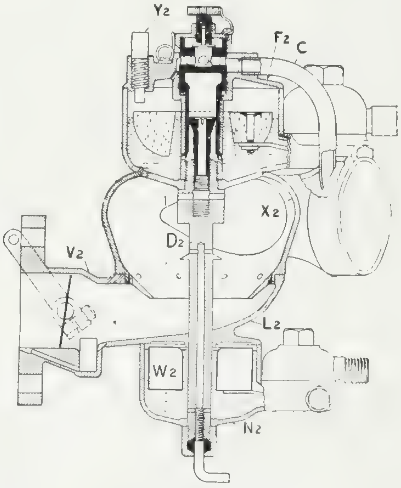
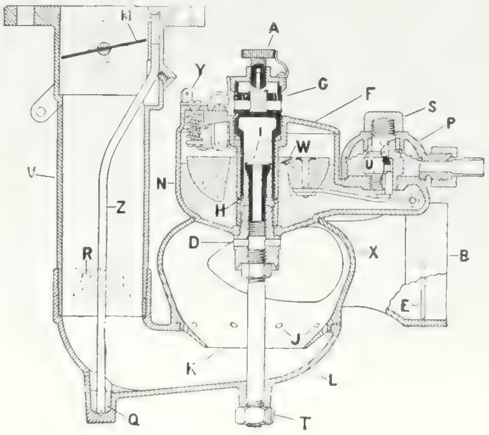


Figure 2

There has been developed and manufactured on the Pacific Coast, during the past five years, a carburetor that has avoided this difficulty. This has



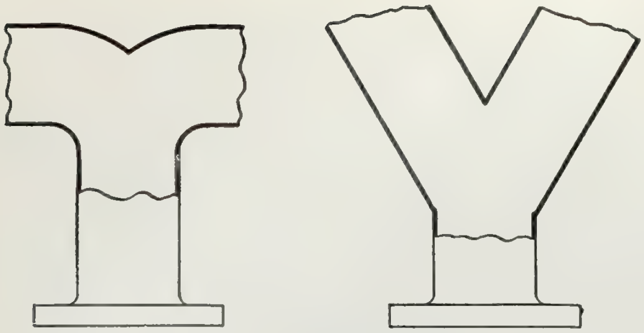


FIG. 3

been brought about by a novel application of natural law. Figure 1 shows a horizontal cross-section of the metering element of this carburetor, and Figure 2 a cross-section of the basic type of the carburetor, around which various modifications are assembled. The principal distinguishing factors of this device, from those of all other devices, are: First, that the maximum air velocity equals and is in no case greater than that of the engine manifold; and second, the fuel is delivered to the center of this metering chamber at a point where the velocity is practically zero. This results in decidedly satisfactory metering characteristics and operates as follows:

The air entering the metering chamber tangentially follows a helical, downward path, creating a drop of pressure at the center. In fact, the metering chamber becomes for all purposes a centrifugal pump with an air impeller operating under suction lift only, against a restricted orifice. With air only, the pressure drop at the center is exactly proportional to the square of the inlet velocity delivered tangentially to this mixing chamber and such pressure drop at the center is equal to five and one-half times the velocity head drop, produced in the smallest diameter of the entrance air horn at any air velocity, but when fuel is supplied at the center the pressure drop, acting upon such fuel, diminishes with reference to air horn pressure drop as the air velocity increases. In other words, the pressure drop at the center, which draws the fuel into the air stream, does not follow the square of the inlet velocity, but follows a gradient of lowering ratio.

To explain this phenomenon, the whirling body of air in this mixing chamber has practically the same weight under all conditions of operation and must be considered as rotating freely, propelled by the tangentially supplied air, but the fuel entering at the center is drawn out into and across this whirling mass of air by centrifugal force, being thoroughly mixed with the air, and in this operation finally attains the velocity of the air at the outer diameter. The energy imparted to the fuel at any instant of time to bring it up to the air velocity must be taken from this freely rotating mass of air, and as this air is flexibly propelled by the force of the incoming air, increasing the amount of fuel, as the load goes on, tends to slow down the body of air in its revolutions about the center, this slowing down reacting to diminish the pressure drop at the center, and hence less fuel is delivered in proportion to the air as the load increases. This results in a gradual thinning of the mixture with increasing load. There is also a thinning effect of the mixture with increasing load, due to the character of the fuel supplied. When kerosene is supplied at ordinary atmospheric temperatures, there is practically no vaporization taking place in the mixing chamber. The fuel may be violently broken up, but none of it takes on the form of a gas. When gasoline is supplied the lighter fractions will become vaporized to a practical gaseous condition, on account of the partial vacuum appearing at the center of this vortex of whirling air. The effect of this vaporization will be to further diminish the pressure drop caused by the whirling mass of air, and this effect will increase with increasing air velocity; the reason being that at lighter loads a small amount of the lighter fractions will be vaporized and satisfy a portion of the partial vacuum. As the load goes on and the pressure drop increases below that of the atmosphere, some of the heavier fractions will be vaporized and still further satisfy this partial vacuum, thus causing a gradual thinning of the mixture. Hence, there are two inherent causes which effect the delivery of fuel to this mixing chamber, both of them tending to thin the mixture instead of enriching it, as all metering devices do where the fuel is delivered in a choked passage. This property has been so worked out by means of the development of the shapes of this mixing chamber that it tends to furnish a mixture that suits the demands of the motor—namely, the motor working at partial load and partly closed throttle will require a richer mixture, on account of the lower compression, in order to operate smoothly and in order to burn the fuel more efficiently; while a motor operating with wide-open throttle or higher speed can handle a very much thinner mixture. This metering system always brings about this desired result. The change in mixture ratio from no load to full load varies with the different characters of fuel; for instance, with good gasoline it may be adjusted to sixteen to one at no load and it will develop seventeen to one at full load, the increased ratio referring to the relative weights of the air and the fuel.

This property tends to also correct for varia-

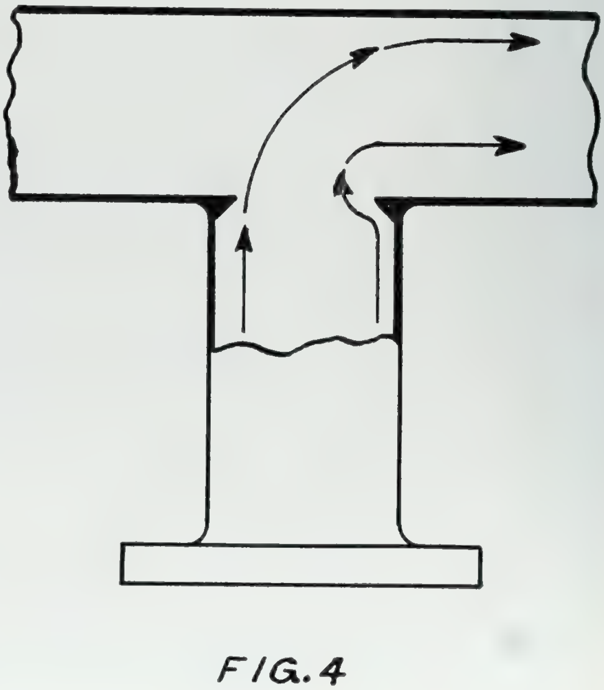


FIG. 4

tions in fuel fractions and temperatures, within certain limits, for in hot weather more vaporization will occur at the center of the mixing chamber and thus cut down the amount of fuel. Under these conditions, less fuel is needed because, if better vaporized, the motor uses it more economically. In cold weather, there being a greater suction throughout the whole range on the fuel for the same carburetor setting, a slightly increased amount of fuel will be furnished to suit the conditions.

Following this up a little further, it is easily seen how the application of hot air to the heavy distillates tends to higher economy and consistent motor performance. When the mixture is heated by the in-flowing hot air, the fuel vaporizes more readily and the suction on it is reduced in proportion. This carburetor then has an interesting characteristic, in that if the mixture is adjusted for operation when cold, by applying hot air it will economically and automatically thin down without any further attention on the part of the operator.

Referring to the second function above mentioned, as necessary for good carburetion, this device accomplishes it in a most effective manner. The rate of revolutions of this air body about its center reaches from twelve to fifteen thousand a minute at full load, and this high rate of rotation throws the fuel, by centrifugal force, from the center across the stream of air, and as the mixture, passing downward toward the outlet of the mixing chamber, makes from seven to twelve revolutions before leaving it, it is constantly being met by fresh incoming air, broken up and thoroughly aerated so that it becomes a mist in its finest form, and in this way greater vaporization, of such fractions that will tend to vaporize, is brought about, than by any other process used in carburetion, while the heavier fractions are finely broken up. These two functions of metering and mixing, operating together when properly applied, give the maximum of economy, flexibility and power and make possible the use of low-grade fuels in an efficient manner.

One of the most difficult operations in connection with carburetion is the third and last one mentioned. That is, to transport the mixture safely without change into the engine cylinders, distributing it evenly and homogeneously to all cylinders.

To illustrate how difficult this is, anyone can perform this simple experiment. Take an atomizer of any handy type, with good gasoline and available air pressure, produce an atomized spray in the air so fine that in a room at 70 degrees F. it will not be visible; direct it horizontally into an elbow sweeping downward 90 degrees and a stream of liquid gasoline will be seen to flow off the far side of the lower elbow opening. By applying heat to the elbow on the outer curvature, you will find that you must raise the temperature to 200 degrees F. before you will materially check the flow of liquid from the elbow. Nevertheless, it is not difficult to find several elbows in many engine manifolds and everyone of them becomes a separator.

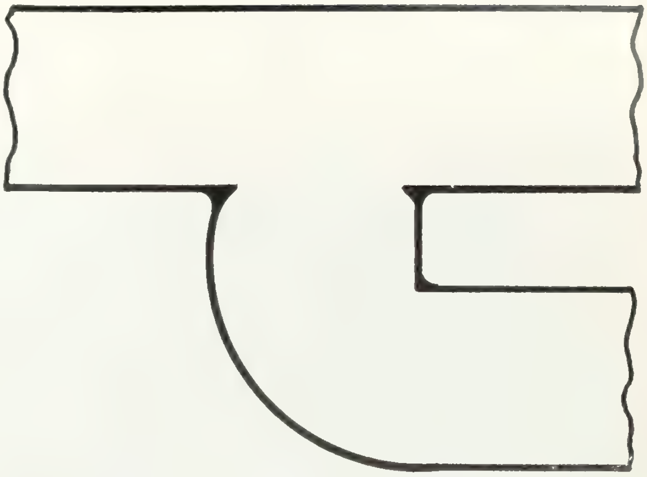


FIG. 5

In an engine where it is necessary to use a manifold, the greatest care and thought must be given to this phase of the engine design, and it must be faced as by far the most difficult problem the designer has before him. The general practice has been to use graceful "Y" branches, short sweeping curves, multiple paths and rams-horn effects. These did very well with gasoline, as it was ten years ago, having a gravity not lower than 72 degrees, but with the present fuels it is practically disastrous if one wishes to attain anything near the possibilities of economy with internal combustion engines. What should be kept in mind is that the shortest possible path for the mixture should be taken, with straight lines, excessive turbulence or disturbance at every branch, and a relatively high velocity throughout the whole manifold. Poor distribution with poor mixing causes greater loss of power than air or mixture friction losses. To illustrate, "Y" branches such as shown in Figure 3 are decidedly wrong. Assume the mixture approaching such a "Y" with the fuel uniformly distributed throughout the stream of air, the impulse is only in one direction at a time and the fuel being heavier than the air, goes straight on, and part of it that should have gone to the right, say, falls dead in the quiet air to the left, being deflected by the splitter, and is picked up from there by the next impulse to the left with a corresponding puff of black smoke when it reaches the cylinder, and in order to be sure that all cylinders get sufficient fuel with each explosive impulse, the mixture must be made richer because a portion of it has by this means been separated out into relatively large drops or bodies and is not in a form to be available as explosive fuel. The proper construction for a branch is shown in Figure 4. The arrows show how the fuel follows the air to either side. The fuel in the air stream nearest to the side calling for it is thrown into the center of the stream, and that from the opposite side is deflected in the

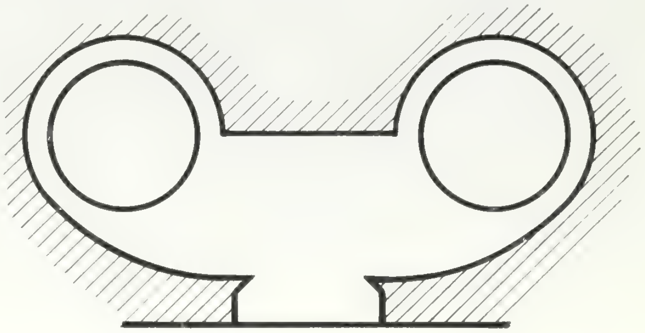


FIG. 6.

right direction. There is excessive turbulence at such a branch and remixing occurs. We cannot hope, without a great reduction in horsepower, to vaporize the fuel by heat sufficiently to have a dry mixture; hence, there is always on the walls more or less of the heavier bodies in liquid form and in this construction they are thrown out into the air stream again and remixed. Figure 5 illustrates the construction which should be followed in passing an elbow. As shown above, the mixture in passing around an elbow is separated more or less from the air stream. Immediately thereafter should be another sharp edge choke that will tend to throw this fuel back into the air stream. By following this method of construction, the writer has changed a number of manifolds and in every case there has been a decided increase in power and economy of fuel; in some cases both have been raised as much as 25 per cent. Figure 6 represents the ideal construction for cast-in connection to valve pockets where one manifold leads to two cylinders cast enbloc. Here again we have a branch involved, but by setting the wall opposite the entrance so that it is about on the center line with the two intake valves, an increase in flexibility, power and economy is brought about as compared with any other method, for in this case right down to the final movement of the fuel before entering the cylinder, it is distributed properly and again broken up, and is delivered into the cylinder in the form in which it will develop the maximum of mean effective pressure. There is a great variety of design of manifolds in use for connecting up three or six cylinders. Figure 7 constructed in detail as suggested above will give by far the best results and is the simplest form possible.

Where the engines are large enough that the manifolds become of considerable length, the question of distance the fuel travels alone becomes serious and a consideration must be given to furnishing a carburetor to each cylinder or to two cylinders cast enbloc. In such a case, a side outlet carburetor, Figure 8, where the fuel leaves the mixing chamber by the shortest possible path to the engine cylinders, is the most effective, and where it is desired to couple up with two cylinders cast separately by a short manifold, it should be so constructed for the low-grade fuels that the mixture path is all downward. By this method the most efficient results have been obtained both in maximum of power and maximum of economy. The best results are with the valve in the head motors, but very remarkable results have been obtained with L head or T head motors, in which case the carburetor has to be of the normal updraft type. The main thing is to bring the carburetor for the large cylinder as close to the cylinder as possible.

There will no doubt be some criticism of this on account of the necessity of adding devices to the power plant for lifting the fuel to the carburetor in certain cases. While we are speaking of large cylinders, there is not a particle of doubt but what this is well worth while, because of the saving in fuel, increase in flexibility and reliability of the plant, as well as the reduction of repairs on the engine which makes the change very profitable.

Where large cylinders are used on these low-grade fuels, it becomes necessary to prevent "pre-ignition," so called. The causes of pre-ignition are not fully understood, but this much is known to be true, namely, that certain combinations of fractions mostly found in the fuels with higher boiling points will not burn with a smooth, continuous flame propagation; that after ignition there will be a rapid rise of pressure to a certain point when the new temperature, due first to inflammation of part of the fuel in the cylinder; second, to the expansion from such inflammation increasing the pressure on the remainder that has not yet become inflamed, causing that remainder to detonate or explode in a manner similar to many nitrogen compounds. This explosion is extremely violent and produces a sharp point on an indicator card, sometimes as high as 75 per cent above the normal explosion in the same engine with gasoline. In the larger cylinders, where the ratio of cooling surface of the walls to the mass of the mixture in the cylinder is very much less than it is in the smaller cylinders, this phenomenon is very much exaggerated with all kinds of fuel. Hence, it is important to avoid hot spots, providing means for rapidly carrying away the heat from the head of the piston, and in addition to accomplishing this, as far as possible, something must be done to alter the rate of flame propagation, or pre-ignition will continue to occur. Some day we hope to have a synthetic fuel embodying fractions that will prevent this. It has been accomplished in a laboratory way and it may be possible to do it in a manufacturing way, but it will be necessary to use the present fuel in existing plants with cylinders having bores ranging from eight inches up and water injection with the fuel will remedy this trouble. This must not be in the form of steam, which has a low specific heat, but as water spray so that advantage can be taken of the absorption of heat as the water is converted into steam upon compression of the charge and thus lowering the rate of flame propagation by this checking of too rapid a rise of temperature. This is provided for with the above-mentioned carburetor by placing a water bowl below so that the water must be lifted to the center of the mixing chamber through several inches of head. It does not, therefore, flow into the mixture when the engine is throttled or running under part load conditions, but only becomes available and is used at the heavier loads being operated upon in the same manner as the fuel under the same varying pressures and delivered in the same proportion as the fuel thoroughly mixed with the same. The consistent application of the apparatus and design principles described herein will result in the very best all-around operating results.

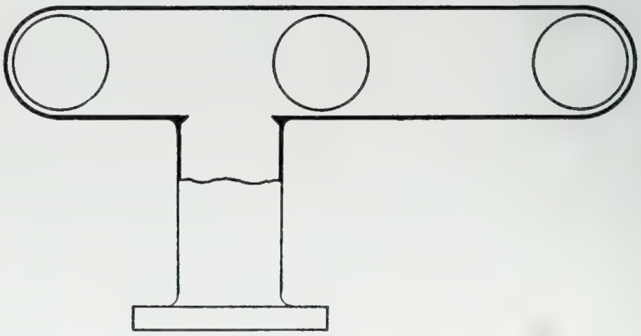


FIG. 7

D. V. Stratton, Industrial Engineer

Mr. D. V. Stratton has made an important contribution to shipbuilding practice in the United States by the development of an original, simple and practical method of planning control. The introduction of this system for the Emergency Fleet Corporation in connection with the standardization of mechanical methods and the reduction of non-productive time has performed a very definite service in speeding work for the war emergency. This system has also been introduced in several large shipyards under private control with Mr. Stratton acting in a consulting capacity, and one of the chief reasons for the success of the work is the hearty co-operation which Mr. Stratton's method inspires among the employes.

Ship Minded

By R. E. Cropley

PART II.

THE operation of the La Follette Act in "unionizing" the crews of merchant ships threatened the safety of our ships in the war zone and impaired the service rendered by those ships to the nation in its hour of need. The Navy Department, if it but would, could express itself vehemently on this section of the La Follette Act. It was because of this that the navy finally succeeded in putting naval crews on our merchant shipping, with the result that the ships, because of discipline, were able to operate more readily.

Yet, before the La Follette Act was law, our maritime rules and regulations made it impossible for us to develop our overseas tonnage. For instance, under the American flag a merchant ship has a higher net tonnage than under foreign registration. Now harbor dues and tolls are figured on this net tonnage. It is actually a fact that a steamer flying the American flag, when transferred to British registry and sailing under the Union Jack, has a lower net tonnage and pays lower harbor dues, although not a single change of any description has been made in her. There is the case of the steamship Charlton Hall. Under British registry she had a net tonnage of 2999 tons. Transferred to the American flag her net tonnage became 4168 tons—a difference of 1169. Of course the increased tonnage was purely theoretical. Yet, as an American ship, she paid about $1402.80 more toll passing through the Suez Canal than she did as a British ship. This is not because American ships are charged a higher rate of toll. It is only because our antiquated and absurd maritime rules and regulations require the net tonnage to be estimated as no other nation does.

As we insist upon better living conditions and wages for American crews, expenses of operation must be reduced in other respects somewhere, somehow. The use of oil for fuel at once lends itself favorably for this readjustment. For it is not alone the difference in price of oil and coal, but it is the increase of cargo space by the elimination of coal bunkers and a reduction in the size of the crews, as well as improving the conditions under which the men labor at sea. By the use of fuel oil, at one stroke the earning capacity is increased and the expense decreased.

Oil For Fuel

I understand all the steel ships built by the Shipping Board are constructed in such a way that they may use oil for fuel. It is calculated roughly that by using the coal bunker space for additional cargo the ordinary vessel's freight capacity will be increased 10 per cent. The ship's wages will be cut down at least 5 per cent and perhaps 10 per cent, because the use of oil does away with the need of stokers and other types of engine-room employes. The result will be that the rest of the crew will receive as good, if not better, wages than formerly. Furthermore, the cleanly engine-room work on an oil-burning vessel will appeal to the American youth we want to get to sea, whereas stoke-hold work with all its dirt only appeals to foreigners who pass as Americans.

In addition, there are other favorable circumstances which the use of oil brings, notably, that it is possible on some trade routes to get more mileage out of a dollar through the use of oil than by the use of coal. And still another saving is a marked reduction in the cost of up-keep of boilers, cost of painting the ship, etc.—items which every ship operator knows are important.

Plans are already on foot for the establishment of oil stations in all American ports to facilitate the refueling of American vessels. The lower cost of fuel oil delivered on a ship, as compared with coal, will serve to give American shipping an economic advantage over foreign ships, as half the world's supply of oil is within the borders of the United States, with vast producing fields across the line in Mexico. If our foreign competitors should adopt oil as fuel they will have to transport it to their shores at a great expense. This use of oil therefore not only gives American crews a better life on shipboard, but it will hold capital to the sea by offsetting the higher wages and construction costs prevailing in the United States.

To remove one more serious obstacle to the economical operation of American ships, we should demand the immediate removal of government regulation of shipyard wages and insist upon a minimum of government interference in shipbuilding. It is not necessary to "strain the Constitution of the United States to put American ships back on the seas." This in itself has been one reason why our Victory ships have cost so much.

There certainly is a crying need for the revision of our laws dealing with the sea, and such revision should surely be done with care and with the advice of those who know maritime operation. If the American people will be but "ship-minded" Congress will prove sensible to its obligations to the merchant marine in reference to its vital relation to the industrial development of the country.

Boy Sailors

As things are at present, the American boy is not attracted to a sea-faring career proportionately as he should be. For the wages are not attractive enough to entice him to give up the pleasures of life ashore. In all the discussions we are having regarding our so-called "Victory" ships, proper attention, I consider, is not being given to forming plans as to how to man them and keep the boys at sea, once they have broken away from the land life. This is as vital an item as any in the whole shipping problem.

One way to interest our boys in a sea-faring career, and at the same time not increase the expense of the ship operator in the matter of wages, is for the government of the United States to enroll merchant ship men in the naval reserve and make them allowances over and above the pay merchant ship men ordinarily receive. As England has proved to herself during the war, merchant ship men came the nearest to being the sole bulwark on which she stood, for without them she would have starved. Now a naval seaman cannot be made efficient in less than six months of intensive training. A deep-sea officer, as this war has shown to us, cannot be made without years of instruction, supplemented by actual experience in the science of navigation and in the command of men. War's wastage cannot well be made up from raw recruits. It must be made up from the practical officers and crews of the merchant marine.

Competent wages and a naval reserve status would be a tremendous asset to a merchant marine, for to the sea it would attract a finer grade of men to whom would be opened up careers of a most promising character and yield them greater compensation. Great Britain has always realized the dual possibilities of such a system. She has set an example for us to follow in the perfection of her Royal Naval Reserve. During the war we have used some of our merchant ship officers in a form of naval reserve, but their return to inactive naval status does not carry the compensation it should and therefore does not entice other merchant ship officers to join up except when forced to by an emergency.

Seamen Ashore

Another point we have lost sight of is that the welfare of the seaman when in port is just as important as his welfare afloat. For hell, I recommend anybody to live on a ship alongside a dock while discharging her cargo and loading another.

We hope to have a tremendous mercantile marine, which we hope to man with several hundred thousand Americans. We somehow forget that these thousands will be similarly fixed in the matter of home associations as the boys in the navy are today. We have had during the war, War Camp Community Club houses in every port which the sailor boy could use as his home when adrift from his ship. As a vital economic fact for our national prosperity we must have these club houses for times of peace, so that our naval boys when discharged will be attracted to switch to merchant ship service, thereby possibly being the means of saving our "Victory" ships from being compelled to hang around an anchor because they lack American crews to man them.

I spend many a night on a liner in port along the New York City waterfront, and I know how lonely officers and men get, and having no club to go to the temptation is great to drown one's sorrow at the corner saloon and seek the companionship of the women of the streets, because there's nothing else to do. The Seamen's Church Institute is serving well to supply this lack of a club—of a sort of home association—but even large as the Institute is, unfortunately it is not large enough to cope with the merchant shipping welfare of the moment.

The following conversation with a young American sailor, studying to be a merchant ship officer, is illuminative:

> "Some folks have the wrong idea about what a sailor really wants. Lots of people think a chap who's been cooped up for a month on a ship wants to dash ashore and go to some goody-goody place and write letters as soon as he gets shore leave. They have the wrong idea. What we sailors want is something different than we've been having. When we get liberty we want to do the things we used to do every night at home. We want to see a girl and we'd rather she were a decent girl, or shoot a game of billiards or do anything else that a regular fellow wants to do. Just because we are sailors is no reason why we want to be like a lot of girls just out of boarding school.
>
> "This place here," and he waved his hand to indicate the Harvard Unit of the War Camp Community Service, where the conversation took place—"this place here is what we want. The only objection is that a sailor can't come in here unless he's in uniform. We can go to the Seamen's Church Institute, but that large place is so overcrowded now, with New York becoming the large port it is, we men of the Shipping Board wear our uniforms ashore in order to get in here. God help us when the war is over, unless they keep these War Camp Community places agoing!"

And talking to an old quartermaster who stuck his head into an officer's cabin on the big Tuscania, where I was sitting on the couch, I had this idea further dilated on. The quartermaster I've known for years and been a passenger on many a ship he's steered:

> "What I say, Mister Cropley, is what all we sailors need is coffee rooms, places where we could get together and play checkers and dominoes, and talk. All I go to a grog-shop for is a little conversation. If we had a place where we could meet and drink coffee and talk things over, it would be all we would ever want, any of us."
>
> "Coffee!" I exclaimed. "Talk! Why, Martin, you never have anything to say until your tongue is a bit loosened by a glass of spirits!"
>
> "Make fun of me," he answered, a martyred look spreading over his broad, red, weather-beaten face, "but I have the idea all the same. Coffee houses wherever there is a saloon in New York and there'd be lots of jollity and some of the things that is worrying seamen would be talked over and decided."

What both men said—one representing young America and the other old England—contains much commonsense which is well worth heeding. The War Camp Community Service has realized this during the war, and the Seamen's Church Institute ever since its inception.

Seamen's Church Institute

The work of the Seamen's Church Institute here in New York City is magnificent. Recent figures covering a year are startling and distinctly dramatic in the matter of lodgings alone. For with beds accommodating but 518 men there were 206,576 lodgings registered during the year, an average of over 593 men sleeping in the Institute's big thirteen-story building every night. It further means that over 50,000 seamen who applied could not be cared for. This certainly is proof that seamen appreciate the Institute's advantages. And what is more, they are not afraid to say so, which in itself is remarkable, because the average man of the sea usually is much too shy to be articulate, no matter what he feels.

At the lunch counter and in the officers' dining room, during one year 446,852 meals were served. As for the mail department, 51,567 letters were received. Letters play an important part in a merchant sailor's life, as we found was the case with our soldier boys in France. For letters are the slender ties which connect one with home, with one's boyhood and youth. In my Red Cross hospital work among the naval sailors and wounded marines, I have found that the most important item is writing paper and the securing of mail from the ship or camp where a patient was stationed before he came to the hospital. I know of one case where a life was saved by a letter. You can imagine then what letters must mean to the men of the sea—what it means to have a place like the Seamen's Institute, where they can receive their mail and sit down in comfort and write an answer.

Another great source of anxiety to the seaman is his baggage, once he is paid off from a ship and awaits to sign on with another. During the year the Seamen's Church Institute's baggage room checked 47,916 pieces. If it wasn't for this baggage room the sailor would be sadly out of luck and lose many of his belongings.

The Institute also maintains a steam tender, which daily visits vessels anchored in the harbor, bringing relief and comfort. Scores of well and sick men are transferred by it, thousands of seabags are found and delivered to men who have become separated from their gear and could not hunt it up themselves, thousands of bundles of magazines and other reading matter are distributed for the men to while away their off-duty hours on a tedious voyage of long duration.

In one month — June, 1918 — the Institute fed, lodged and clothed most of the crews of twelve big ships which had been either torpedoed, bombed or wrecked off the port of New York. In the social department, eighty-seven entertainments were given during the year, the attendance at which was 22,598 merchant sailors. Yet, as I have already said, the Institute is not large enough. Even with the War Camp Community houses which existed during the war to care for American Shipping Board men, the Seamen's Church Institute could use another building containing 500 beds and fill them each night. Heaven only knows what will happen when the present war relief organizations are wound up and Yankee sailors are set to walking the streets at night because of the lack of places to go when their ships are in port and they have liberty.

Touching Incident

Another incident which shows how vital it is for us to care for the welfare of our American boys who will make the sea their profession, I ran across during my military relief work in hospitals for the American Red Cross. It is a situation which could readily arise in times of peace. Although I was supposed to attend only to the American and our Allies' naval and military patients, I looked after the merchant sailors as well, for I appreciated that without their work—without their courage and determination in the face of frightful atrocities on the high seas—the war would have been won by Germany through starvation. I say this without reservation, for the reason that Germany acted so like a pirate toward merchant ship men was because she realized it was they who were transporting the soldiers and feeding them.

The case in question involved three boys—youngsters of seventeen—and cadets on a British merchant ship while learning to be officers. They were well born, and whereas an American boy of the same age and station in life would be in high school preparing for college, these lads, like many other English boys, were getting their high school education in the hard school of the sea.

Just by luck the lads went to the Seamen's Church Institute in New York and adopted it as their clubhouse whenever they got shore leave. One day they all fell sick and were taken away to a contagious hospital. "Spanish influenza," the doctors termed it. Lying in their little white cots side by side, three thousand miles away from home, they must have longed for their mothers. The Seamen's Church Institute's visitor and the Red Cross man were poor substitutes, yet they were better than nobody at all, and if it had been the piping times of peace the Red Cross man would have been missing. And to each of these lads death came one day, as it came to many during the recent epidemic—an epidemic which might just as readily have come in times of peace.

It was the Seamen's Church Institute which took charge of the funerals and saw that the bodies were placed in graves which would not be neglected as the years rolled by. Such things the Institute here in New York has been doing for years, thus saving many a body from a pauper's grave and many a mother and wife untold agony of mind, body and soul.

Call of the Sea

We must sound a call that will draw Americans back to the sea. If they know that the welfare of the seaman is to be as well cared for in peace as it has been during the war by the War Community services, many of the four thousand men who regularly are discharged from the navy each year will be enticed into the merchant marine. In the past we have blandly let them throw away their training, which in itself is so necessary to the naval reserve, and which from any angle, as England has so concisely proved to herself for generations, is worth every dollar it may cost and a great deal more. Furthermore, with the sailor's welfare when on liberty from his ship, assured, instead of our country boys going to the already overcrowded cities, many will be inclined to seek careers in the merchant marine, with the chance to see the world.

That we got our so-called "war Victory ships" at all, we should be thankful for. The cost has been excessive, because during the stress of an emergency ships cannot be built economically or well. Before we have finished with our vessels, docks and port improvements, we will have invested $6,000,000,000 of the taxpayers' money, or more than twice the value of the merchant marine of the entire world before the war, and ten times more than the cost of the Panama Canal. If this great tangible asset is not properly managed, the cost will have been wasted and thrown away.

Ship-Minded

What we need is experienced business men with no political attachments, to take statistics and facts and get down to brass tacks—to apply their practical commonsense business experience—and then let Congress know their conclusions. Our voters must be taught persistently, systematically and intelligently to be "ship-minded," for a nation always legislates in tune with its pocketbook when it knows. So long as a voter believes that a courthouse in Squeedunk is more important than a merchant ship to the interest of the community, he is going to fight for one against the other.

The vital bearing that ships will have upon business after the war has not been driven home. The Kansas farmer knows little about ships and cares less. So is it also with the average man in the street. He knows that ships are made to sail the sea; that they are hollow and, when torpedoed, sink. He does not know that the United States is said to be producing in four months enough to support the nation for a year; that unless our surplus can reach and supply the need of foreign peoples our factories will be idle, labor without employment, and the United States no happy place to live in. He does not know that if we do not find a way to keep our new-born merchant fleet, that again we shall become dependent upon foreign competitors for access to the world's markets for our products, and the profits of American enterprise will depend upon the prices fixed by foreigners.

It is simply a question of self-preservation for the American people to become "ship-minded," for we cannot any longer afford to remain blind to the international shipping problem forced upon us and hope to survive as the world power we like to imagine ourselves to be. We must operate our merchant marine—our "Victory" ships—on a paying basis in peace times or we shall not have them for naval purposes, and again stand to shed either our blood or that of our children in paying the penalty for our blindness by having our shores devastated by the horrors of war. If we do not become "ship-minded" and, instead, wait for politicians and demagogues to look out for our business interests, then we may expect the consideration we merit.

Strong Merchant Marine Necessary

By Wesley L. Jones

United States Senator from Washington, Chairman of Senate Committee on Commerce

AN adequate merchant marine is an imperative need of the United States, not only as a part of our commerce and transportation systems, but also as a part of our national preparedness. No more pressing question is before us than the adoption of suitable legislation to secure such a merchant marine.

The farmers, workers and business men of the interior of the country are in greater need of shipping than those on the seashore. Their products largely make up the surplus that must find a market abroad. If there are no American ships to carry this surplus, it must await the pleasure of foreigners and may be wasted or the price of such products greatly depressed all over the country. Our people must awake to these facts and instead of opposing steps—radical or unusual, if need be—to promote the development and operation of an American marine, they should insist upon the necessary things being done at once.

We should never again be so utterly lacking in the essentials to our national safety as we were at the outbreak of this war. Our armies and supplies had to be taken across the sea in foreign ships. Our boys must be brought home in foreign ships. Our commerce must be carried by our competitors or not handled at all. These are facts that should be burned into the minds of our people until they demand prompt and effective action.

When this war began we had but few ships. Two principal reasons for this were given—our higher cost of production and higher cost of operation. Experienced men estimated that, by the expenditure of five or six hundred millions of dollars over a period of ten years, we could get a fleet of about six million tons, which would be ample to carry 60 per cent of our overseas commerce. No plan had been devised, however, to induce private capital to make this investment.

The war came to us. Ships must be had at any cost. The government took over all private ships, all ships under contract in American yards, and established yards and began to build ships itself. If the program entered upon is carried out, we will have by January 1, 1920, over ten million tons of American-built ships and several splendidly equipped yards, with about three billions of dollars of the people's money invested.

The problem of getting the ships is solved for the time being. How can they be operated so as to return to the people the greatest part of the money they have invested and at the same time keep ship construction and efficient service up with the demands and needs of a growing commerce? This is the problem to be met now. Party platform platitudes won't do it. Maneuvering for party advantage in the next campaign will not do it. Let us forget our party and try to meet this question in a practical and patriotic way.

Some will at once say, "Let the government run its own ships." Against this it will be urged that government operation will be far more expensive and much less efficient than private operation. This I believe to be true. "But," it will be said, "they cannot be operated privately on the basis of their cost, because they have been wastefully and extravagantly built." This is also doubtless true. These ships belong to the people. If they are to lose money on them, they will, in my judgment, prefer to lose it in operating the ships themselves rather than to sell them at a loss and see private capital enrich itself by their operation.

Why cannot private operation and government ownership go hand in hand, at least for a time, to the advantage of private interests and the welfare of the people, unless these ships can be sold at a price fair to the public? Ships that must be used and are desired to "fill in" and supplement the needs of already established lines could be offered for sale at not less than cost to the highest bidder, on long time, the rate of interest offered to determine the purchaser, other things being equal. Bids on the same terms for ships to be used as tramps or to establish new lines to already developed markets could be called for.

It will be said that no sales could be made on such terms because of the high cost of building. That may be true. I know that our ships have cost more than in normal times, and it may be that they have cost more than they should have cost even under war conditions. The demand for ships, however, will be abnormal for some time to come.

The world's shortage now is over sixteen million tons. Water transportation demands will be greater than ever before. If not burdened by too many restrictions, those needing ships and desiring to operate them can afford to pay and will pay more than normal prices for them or for their use. If the cost is spread over twenty-five or thirty years, not only may they be able to pay the cost of the ships in full, but also a greater or less rate of interest thereon.

There will be little complaint, however, by the people if they get their money back, even without interest. The government has built irrigation works, the cost to be repaid without interest. Why not do the same thing with ships, if necessary, to induce private capital to acquire and operate them?

Ships that cannot be sold in this way may be offered for lease or charter upon such terms and conditions as may be deemed wise by the Shipping Board. It has been suggested by an experienced shipping man that government-owned ships might be put in private hands under a "government-form time charter," under which the government would furnish the ship at the "going" charter rates and along with the ship the government would furnish, pay and feed the crew.

In this way, it is suggested, the government would also secure first-hand information as to the disadvantages under which American ships labor in competition with foreign ships; it could keep constantly and thoroughly posted as to the foreign cost of building ships of the size, type, speed, and so forth, we build, so that comparisons as to cost would be exact, or as nearly so as possible. The government should constantly keep acquiring facts as to the pay of masters, officers and crews of ships under different foreign flags so as to be able to make fair comparisons as to similar costs on our ships, and it should also get information as to the number of men employed on our ships as compared with the number employed on foreign ships.

In this way the government would need no information from private and selfish sources as to these differences—it would have them at first hand; and this should go a long way toward putting an end to the unjust aspersions cast upon private owners.

Ships not sold or chartered should be used by the government in establishing new lines and developing new markets. There are many virgin fields that can be opened up only by government or government-aided ships. If regular and frequent sailings are assured, business will come, financial arrangements will be made, business credit will be established and business agencies to meet the market needs will be created. The government can well afford to do this, even if it is done for a time at a loss.

With markets developed, the ships can be sold at a good price to the people and operated by private enterprise. The German trade in South America was large. We ought to be able to get most of it. We can do so if we will make sure ample transportation facilities, and this should be done without delay.

Our great transcontinental rail lines gather our products at terminal points to be shipped to all parts of the world. They should be made to connect directly with American shipping lines, and could well be supplemented by ships bought or leased by them, and this should be encouraged.

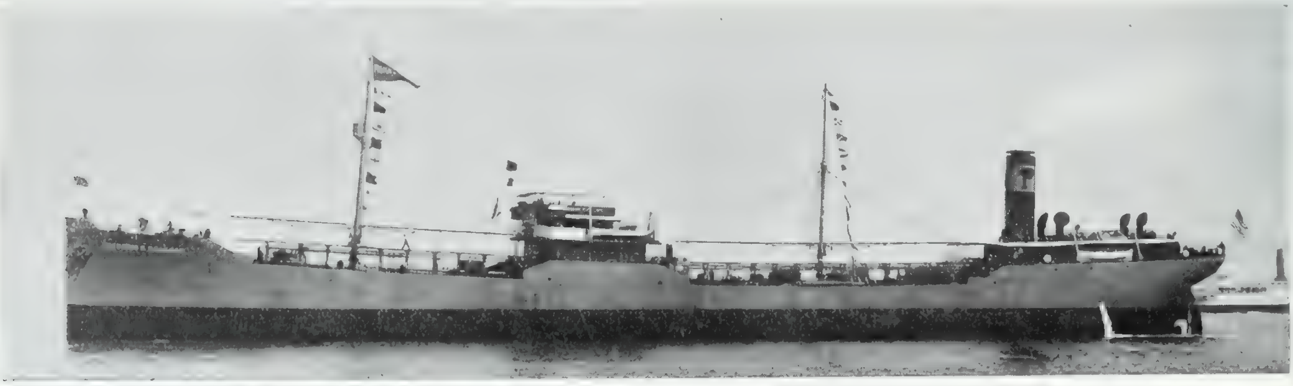
The officers and crews of American ships should be created into a naval reserve, so that, if the ships are ever taken over by the government, their efficient operation will be uninterrupted. This will require extra pay, but it is only a part of the necessary preparedness that we must make.

As a part of a permanent shipping policy, I firmly believe in the system of discriminating duties under which imports in foreign-built ships should pay a higher duty than those carried in American-built ships. Imports otherwise coming in free should pay a small duty if carried in foreign-built ships. This would add to the revenue, insure return cargoes to our ships, and, with proper port privileges, would build up and maintain an American merchant marine under private management and ultimately under private ownership.

This policy has had the indorsement in effect of both political parties. The Republicans declared specifically for it in their platform of 1896. It was unanimously indorsed by the merchant marine committee of the Democratic House of Representatives and was adopted in principle in the Underwood-Simmons tariff act. Immediately upon the convening of Congress I shall introduce a bill to abrogate all the treaties that may be in the way of adopting such a policy in the manner provided by such treaties.

No more important questions confront Congress than working out permanent policies toward the merchant marine and the railroads. The sooner these policies are determined the better.

As soon as Congress meets, the Senate Committee on Commerce should get the opinions of representatives of the shipping interests, representatives of labor, representatives of farmers, representatives of business and the views of government experts as to what steps should be taken to solve this question, and when this is done the committee should determine upon the policy it deems wise, and present a bill to carry it out and ask for its immediate consideration.



American Maritime Policy

By James A. Farrell

President, United States Steel Corporation; Chairman of National Foreign Trade Council

This speech, delivered by James A. Farrell before the National Foreign Trade Council, reviews in a masterly way the progess of America's merchant marine through its great rise in the first half of the last century; its decline subsequent to the Civil War, and its remarkable increase in the last five years. The conclusions drawn by Mr. Farrell from his observations of foreign trade and marine affairs should be carefully studied by shipping men. The union of a broad, open vision and a striking ability for expression, together with the wide experience that has been his as president of the United States Steel Corporation, combine to make this utterance one of authority.

"POLICY" is perhaps a misleading word to use in connection with the development of American shipping. From first to last the impelling force of that process has been the dictates of necessity. That is to say, anything which could properly be called policy that has guided the process has been the product of a felt want, and to that extent at least has lacked the element of deliberate choice. To the trade of the new-born Republic, but few of the world's markets were open. The British navigation acts closed the ports of Great Britain and of all her colonies to the ships of the United States; the East India Company, already the supreme power of Hindustan, grasped at the commercial empire of all Asia. But the American new-comers in a field in which Dutch, Portuguese, French and Spanish had made but a feeble show of competing with the English, had some important advantages in their favor. For one thing they could build ships of the highest class of live oak and cedar at a price per ton 50 per cent lower than any similar vessel could be turned out in the cheapest shipbuilding ports of England, Holland or France. Their still virgin forests gave them an important advantage, even though they had to import hemp for rope from Russia and iron for bolts from England. Then there was the keen business capacity of the merchants of Salem, Boston, New York and Philadelphia, which had been developed under the discipline of adversity in Colonial times, and had as yet but few domestic enterprises to engage its attention. Supplementing and sustaining these advantages was the skill and boldness of the American sailors. It is a striking, but by no means unique, example of these qualities that the ship Alliance made the voyage to Canton in 1788 with no charts and with only a map of the then known world on Mercator's projection, and never dropped anchor from the time she left Philadelphia.

The British navigation laws remained in force for more than fifty years after the Declaration of Independence, but they had some results quite different from those which their authors had intended. Under their system British shipowners became so unenterprising that they permitted Americans to capture the trans-Atlantic carrying trade. This trade grew with remarkable rapidity after the colonies became independent, and by 1795 the Napoleonic wars brought a golden opportunity for the ships of the only maritime nation that was neutral in the struggle. By and by, under the normal stimulus of competition, there emerged the Baltimore clippers— the type of vessel that was found most suitable and remunerative in the Atlantic trade. From these there were evolved in due time the American liners that carried the Stars and Stripes around the world. It was the discovery of gold in California in 1849 that first brought the new type of ship into demand, the full-rigged ship or three-skysail yarder of the type of the Dreadnaught with its record of nine days and fourteen hours from Sandy Hook to Queenstown. For the long voyage from the Atlantic ports round Cape Horn to San Francisco there was needed a ship whose type should be a combination of the British East Indianman and the Baltimore Clipper. As there was no return cargo to be had from California, these ships had to traverse the Pacific in ballast to China, and there load tea for London or New York. Compared with the freight rates of the last four years and even the present United States Shipping Board rates, the returns to the shipowner of these palmy days seem slender. But $25 a ton from New York to California, and $50 a ton back from China to New York for a 16,510-mile voyage, represented very comfortable earnings.

Golden Age American Shipping

What is known as the Golden Age of American shipping covered rather more than the first half of the last century. In 1815, at the close of the Napoleonic wars, the United States had not more than half the tonnage of Great Britain, but in 1850 the United States had 3,535,454 tons compared with the British 4,232,960 tons. The difference went on closing for the next ten years, until by 1861 the United States had only 400,000 tons less than Great Britain—the exact figures being 5,482,127 tons on our side to 5,895,365 tons on theirs. The ravages of Confederate cruisers during the Civil War had, of course, their share in driving American ships from the sea. But the ultimate cause of our maritime decline was the change that had supervened in the materials of shipbuilding. In the judgment of competent British authorities, it was only the evolution of the iron ship that saved their shipping industry from extinction. In the fifties we could build cheaper than the British because of the still available supplies of live oak and other seasoned timber handy to the shipyards of our eastern coast line; in the sixties, the advantages shifted to the other side. The first steamship to cross the Atlantic—the Savannah—had been built of American oak in a New York shipyard, and made the voyage from New York to Liverpool in thirty-one days, winning renown and laurels too; that was twenty years before the famous voyages of the Sirius and Great Western, which have been ac-

Typical freight steamer

counted the pioneers of ocean steam navigation. While we may only surmise what would have happened had wood construction held its own, it is certain that the decline of our merchant marine was due to no falling off in the skill of American mechanics. It was they who made the essential improvements in Watt's engine; who introduced the long-stroke and invented the accepted type of paddle wheels, besides showing how speed could be increased by substituting for the bluff, heavy type of steamship a more graceful contour.

Iron Steamer

With the appearance of the new iron screw-steamer, the maritime supremacy, which seemed almost within our grasp, slipped away, as it appeared, forever. And so began the long and disheartening process of the vanishing of the American flag on the high seas. That was a process which a broad and enlightened maritime policy might surely have arrested, but here, for the first time in our history, the simple dictates of necessity had no place in shaping the future of American shipping. I am not going to try to apportion the blame for the extinction of the American merchant marine engaged in foreign trade, but I may point out that within twenty years from the time when American ships not only carried 75 per cent of our own sea-borne trade, but also carried a large portion of the trade between Liverpool and London, and China and Australia, the foreigner was carrying 74 per cent of the exports and imports of the United States, and the share left for American ships was only 24 per cent. In the course of another twenty years—by 1895—that share had dropped to 11.7 per cent. In the next twenty years there were but few signs of improvement, and in the fiscal year ending with June 30, 1914, there was only 9.7 per cent of the foreign trade of the United States carried in American bottoms.

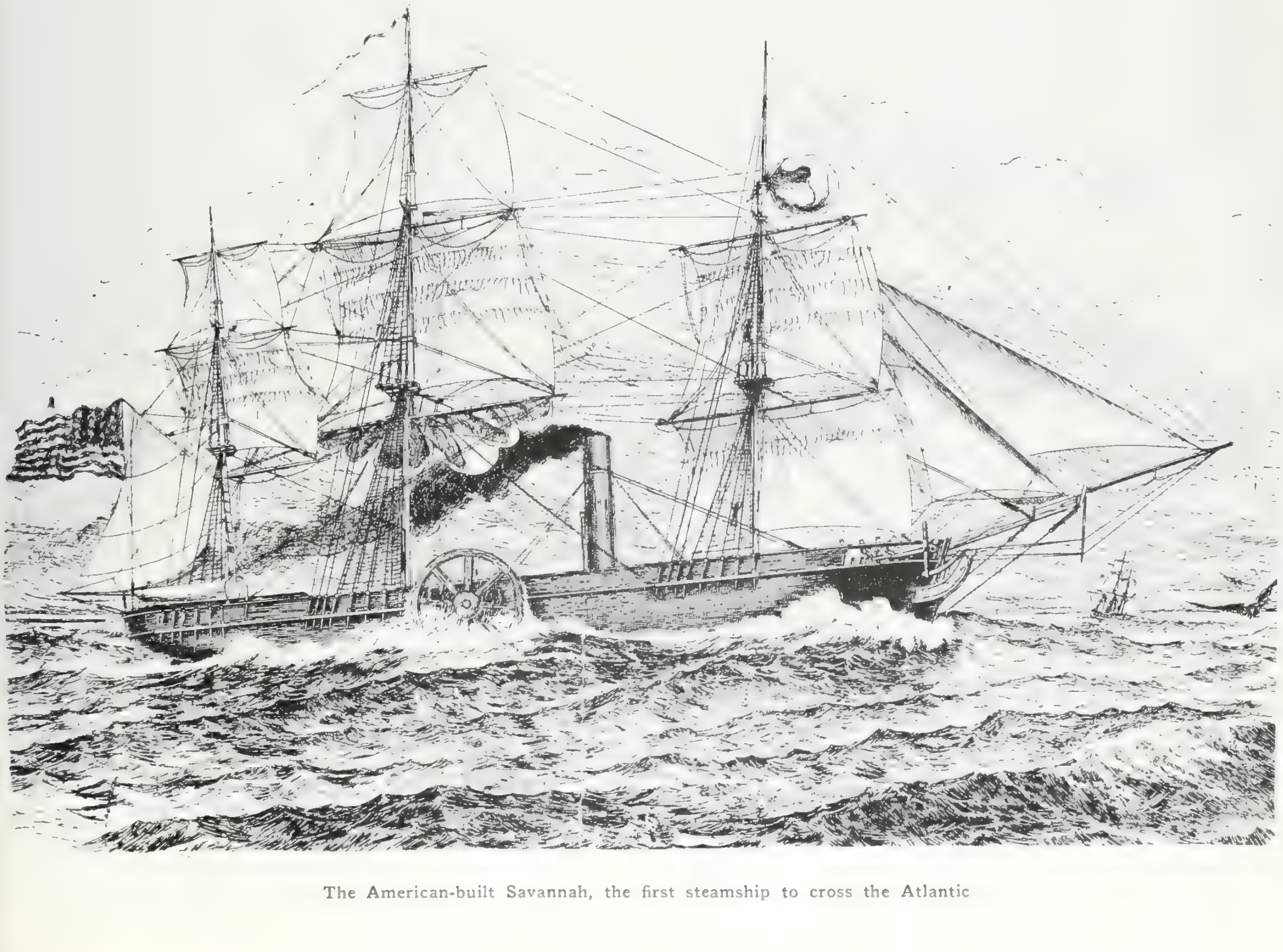
This was the state of things that existed when the Foreign Trade Council was formed, and began to address itself to the complex, elusive but fascinating problem of the restoration of the American merchant marine. From the point of view of the oversea commerce of the world, the position of the United States was a purely subordinate one. In 1913 that commerce was conducted by over 25,000 steamers, having a gross tonnage of 43,954,000 tons, which were owned by approximately 4200 different firms and companies. Of this great body of tonnage, as Mr. P. A. S. Franklin pointed out at our first convention in Washington, only about 1555 steamers, owned by approximately 108 different companies, were engaged in regular line service in the oversea trades. The remainder comprised the great mass of free tramp tonnage, whose operations regulated the ocean freight rates for everybody by the charges which they fixed for the transportation of the great mass of the world's staple products. But on June 30, 1915, the American ships registered for foreign trade numbered only 2768 of 1,813,775 gross tons. It is true that there had been prior to the war an estimated amount of foreign shipping owned by American interests of between 1,500,000 and 2,000,00 tons. Though under foreign flags this tonnage was subject to American management, and efficiently served its purpose in the world's commerce, contributing materially to the extension of American foreign trade.

Coastwise Tonnage

The real basis for encouragement as to the future was to be found elsewhere. Deducting the relatively small proportion of American ships engaged in foreign trade, there remained the tonnage in the coastwise, lake and river trade, numbering 23,809 vessels with an aggregate gross tonnage of 6,505,701 tons. This was a total exceeded only by the merchant shipping under the British flag, and it bore ample evidence of the freedom with which American capital would be invested in shipping when it could be shown to be a profitable business undertaking. The temporary appearance, as a military necessity, of the government of the United States as a shipbuilder and shipowner on a colossal scale, does not render it any less a fact that the future of the American merchant marine must depend on the attractions which it offers to the employment of private capital and the application of private enterprise. The steamship business is one requiring special and exceptional aptitudes. The men engaged in it have to match their wits against the keenest in the world; have to be prompt in decision, resourceful, expedient and expert in the calculation of probabilities. These are qualities which are not usually forthcoming when a government assumes the functions of private enterprise. They represent, in fact, aptitudes which government service seems to deaden, for the simple reason that they are foreign to the demands of official routine, and contrary to the dictates of departmental usage. Three years ago the merchant marine committee of the Foreign Trade Council pointed out in its report to the New Orleans convention that government ownership of oversea transports used for commercial purposes would be a natural concomitant of government-made goods brought to shipside by government railways, sold by government employes and laden by civil service stevedores. As a commercial proposition, government-owned ships in foreign trade could only result in disorganization of existing trade routes in which government ships might engage, while bringing about a complete paralysis of individual effort to obtain for private American ships a larger share of American seaborne commerce. Thus, in the event of government ownership and operation of merchant vessels becoming a settled policy, the problem of the future of American shipping would solve itself by the extinction of private endeavor.

Legislative Confusion

A good deal of confusion of thought has been introduced into this discussion by ignoring the difference between steamship business and that of the railways. It was originally proposed to invest the Shipping Board with authority to regulate the operation of all American shipping firms engaged in traffic between the United States and foreign countries, and to determine and prescribe for them just and reasonable rates of transportation not only between the interstate ports of the United States and between our ports and those of our territories and possessions, but between American and foreign ports. That is to say, the bill was to give to the United States Shipping Board power to control what was called "the single hitherto uncontrolled link in our transportation system"—namely, rates by water everywhere—so far as the link should be supplied by American ships. But the legislative mind was brought to see the essential difference



The American-built Savannah, the first steamship to cross the Atlantic

Vanishing from the sea

between the steamship business and that of the railways. The presumption at least was raised that it might be injurious, not only to shipowners, but to shippers and consignees, if any limitation should be placed upon the absolute freedom of carriers to change their freight rates to suit the conditions of the freight market; for ocean freights vary not merely from month to month, but from day to day, and from hour to hour, especially with reference to the great staples which are traded in on the commercial exchanges. The difference of a fraction of a cent in the freight rate might easily mean the loss of a contract to a merchant or manufacturer at an interior point of the United States who is competing with merchants and manufacturers in other countries.

Government Ownership

Perhaps the most plausible argument in favor of government ownership was that summarized by Mr. Hurley in his recent address before the National Marine League, to the effect that this great fleet created with the taxpayers' money should be used for national purposes; that as the ships have not been built to earn profits as ships, they should become the servants of the nation which built them. That is to say, it is proposed that a government-owned merchant marine should be used to develop the commerce of the nation as a whole, being placed if necessary in trade routes which may temporarily be found unprofitable, but which may ultimately become of great value to the nation as an instrument for the increase of its foreign commerce. Now, it is perfectly true that just as ships constituted the first problem of our participation in the war, so will ships constitute the first factor in our great task of reconstruction. In other words, ships—American ships—will be an essential agency for the maintenance of that just and beneficial relationship with the rest of the world which our participation in the war has created and consolidated. But the objection to government ownership of our merchant marine urged by the committee of the council three years ago is as valid today as it was then—namely, that any policy which places at the disposal of any single class of producers a fleet of government steamers is bound to be unsuccessful. How, for example, under the policy indicated, could it be determined in whose interest the necessity for the development of foreign trade was most pressing; what section of the country would it favor; and would it take account of the transportation of manufactures wholly finished, half finished, or of crude materials? If the operation of government steamers should involve a deficit to be met from the national treasury, the policy dictating it would amount to the bestowal of a bounty upon the most favored commodities and communities. I quote the following from a recent report from Great Britain: "The chief danger of a greatly expanded competition lies in the possession by the United States of a great new mercantile fleet, but all experience shows that whatever hands are in possession of shipping, economic laws will finally obtain and ships will not be put into unprofitable trade simply for the support of any one particular industry."

The chairman of the Shipping Board has not been insensible to the force of these arguments in considering the adoption of a policy controlling the nation's involuntary investment of billions in shipping, and he has reached the conclusion after a most exhaustive survey that the ships of the government-built fleet should be sold to and operated by American citizens under no restriction other than the terms of the bill of sale and the fixation of maximum freight rates; that the ships should be sold at a price which fairly reflects the current world market for similar tonnage; that 25 per cent of the purchase price of each ship should be paid down, the remainder falling due and payable in graded annual installments over a period not exceeding ten years. Mr. Hurley's plan, with perhaps a few minor exceptions, appeals to many shipping men of experience, having at heart the upbuilding of an American merchant marine, as a plan dictated equally by business sense and equity, and in the public interest. There remains to be determined the vital question whether these vessels can be operated profitably under the American flag. America's future is on the sea, and it hears the

A serviceable type of freight-passenger steamer call of genius and initiative. If aided by wise legislation, not necessarily such as to bring reprisals, but rather such as to render the enterprise competitive, our ships will again be seen commercially in ports that have forgotten them. It is somewhat of a truism, but it seems necessary to repeat it in this connection, that the production of ocean transportation, especially in foreign trade, cannot escape from the operation of the fundamental law that production is always a question of profit. Congress has enacted, and may refuse to repeal, the law forbidding the alienation of any American vessel without the consent of the United States Shipping Board, but private enterprise will not care to expend its investment of American money in that direction unless there is reasonable assurance that it will be permitted to operate at a profit any vessels which it may purchase, lease or charter.

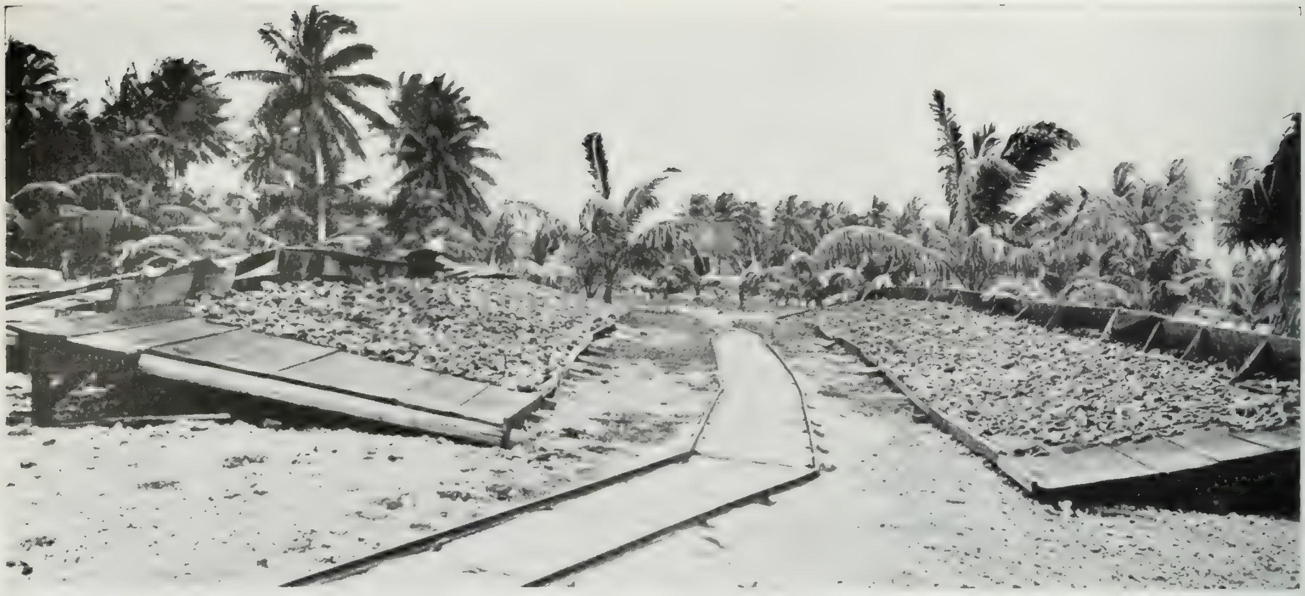
When the most pressing demands for the distribution of food to the starving millions of Europe shall have been supplied, there will come the only less important function of supplying the depleted stocks of the raw and finished materials needed to enable these millions to resume their ordinary productive vocations. One of the earliest requirements of the shipping situation is thus likely to be a general international agreement about the employment of the agencies of ocean transportation in the least wasteful and the most effective way. But, at no distant date, the problem will become for us, as for the other maritime countries, a distinctly national one. Quite probably, international understandings may help in solving the problem, but in all essential respects it is one which must be dealt with by each nation in its own way. On the question of what shall be our way is bound up the industrial future and material prosperity of the United States. For nothing is more certain than that the building of ships, and the employment of ships in ocean navigation, must be definitely reinstated among our great industries, if this Republic is to hold the place it has won for itself in the world. Our shipbuilding yards will soon overcome our domestic and naval requirements, and when these are realized and maintained, we should build for the world's markets. American ships were once among the largest of our exports, and there is no reason why they should not be so again. We sell locomotives and freight cars in all the markets of the world and materials entering into ship construction to countries who are builders of ships, and ask no favors from anybody when it comes to finding buyers for our agricultural machinery and products of the soil. A steamship is a commodity of commerce like any other product of the mechanic arts, and it will have a wonderfully reassuring effect on those who doubt our capacity to assert the place that belongs to us as one of the greatest of maritime powers, if we send from the ports of our Eastern and Western and Gulf Coasts an annual flotilla of newly-launched steamers sold to foreign owners, thereby employing labor in the building of ships, as well as in the exports of materials.

The world at large is today very poor, and that poverty is but thinly disguised by the prevalence of high prices due to the inflation and consequent depreciation of nearly all national currencies. It will require a long period of sustained hard work to make good the enormous losses of four years of war, destructive beyond all conception and exhausting beyond all precedent. The effort to make good the wealth that has been blown to the four winds, to make up for the skill and labor of the millions of producers of wealth who are no more, must be ours no less than that of the nations who have borne the greater part of the heat and burden of the struggle. The prosperity of our farms, our mines, our factories, will be found to be inseparable from the restored productiveness not only of those of our Allies but in the course of time of our recent enemies. If the world war should prove to have been a war to end wars, it will be largely because the world has learned to refrain from translating commercial rivalry into the terms of military conflict—because its ideals of the comity of trade have expanded no less broadly than its ideals of the brotherhood of man. In the new, and let us hope better, world whose reconstruction has begun, the freedom of the seas, as a working formula of peaceful intercourse, should find a larger conception. It should stand, among other things, for open ports and as free an interchange of commodities as the fiscal necessities of the nations will allow.

Modern American-built freighter of the United States Shipping Board

The Cow of Trees

By Andrew Farrell



Copra dries for three days in the sun and wind

IN a striking metaphor, Robert Louis Stevenson once called the cocoanut "the giraffe of trees." And so it is, superficially, to the eye. Intrinsically, it is nothing of the sort. It is the cow of trees. In the South Seas a cocoanut grove is as a herd of beef cattle to us. Since white men first went to the islands they have traded for copra, the dried meat of the mature nut; of late, the trade in copra and cocoanut oil has grown amazingly, especially to San Francisco and Seattle, but even today relatively few persons can define "copra" and still fewer know anything of its manufacture.

Within that broad belt of sea included between the two tropics and stretching from America to Asia, the cocoanut almost invariably is found. There are few islands so poor and sun-stricken as to afford none. The botanist's explanation is simple: The tough outer husk and fiber, as well as the covering of the nut proper, formed an admirable armor against the salt water, so that the cocoanut, through thousands of years, was spread by ocean currents to every land on which it could thrive. And thrive it does, even with its roots in the sea, if only it is not exposed to cold winds and to drought, for, although it may endure the salt, it must have fresh water.

Nothing has, and apparently nothing can, supplant copra as the premier product of most of the islands. During the last hundred years, since the whites first knew of the islands commercially, cocoanut oil and copra have flowed steadily into Occidental markets from virtually every tropical group. There have been other notable products: Hawaii long ago was denuded of its sandalwood; Penrhyn relies more upon pearl shell than upon copra; elsewhere beach-la-mar for the Chinese market is gathered from the lagoon beaches, but, on

A typical cocoanut grove

the whole, copra has first place. In many atolls which lack beach-la-mar and pearl nothing else of commercial value is produced.

Dried for Three Days

Every pound of copra brought into the ports of San Francisco and Seattle from the South Seas may have a pathetic little story behind it. The native always is between the devil of his appetite and the deep sea of desire for white man's goods. He cannot eat his cocoanut and make copra of it, manifestly, but—

However, not all are eaten. It is only the mature nut that becomes copra because the oil content of the green nuts is relatively small and the meat thin. So these hard, ill-flavored, aged nuts that no native would eat from choice, yet rich in that most remarkable vegetable oil, are denuded of their fibrous husk that defies the inexperienced white man but yields readily to a sharpened stick in the hands of the native. Then they are split, the meat removed and dried for three days in the hot tropical sun. Two nuts have gone to make one pound of dry copra. The proof of adequate drying is clear meat, without a thin line of moisture in the center. Months later the musty smell of copra hangs about some wharf in an American port, whence it goes to factories and emerges as soap or oleomargarine.

The mature nut is roughly one-third water, one-third oil and one-third solid matter. The water having been evaporated, one-half the dried copra is oil, and probably the finest vegetable oil of the world.

Is Food and Drink

What the cocoanut means to the native scarcely can be exaggerated. He makes thatch of the leaves. In some islands he still wears a short skirt of shredded leaf. Cocoanut sennit is his universal cord. In most atolls, or low islands, the water is brackish and almost never is drunk. There remains only the milk of a green nut, or, better, the sap of the tree, extracted from a tighly-bound bud, which, fermented, becomes that very unusual and devilish liquor known as cocoanut toddy, and, boiled, is syrup—a brown, sweet, palate-tickling drink. When the islander dances or goes abroad in the rain he anoints his body with cocoanut oil, a perfume for gala occasions and an admirable protection against cold. And every drop of oil takes its toll from the copra production.

To manufacture the oil for his own use the native shreds the mature nut into fine bits and expresses the juice by torsion in the fine, gauze-like stuff taken from the base of the tree fronds. This cream is boiled over a slow fire, perfumed with sweet-smelling woods.

The metaphor of "the cow of trees," indeed, is apt. Mothers feed the expressed juice of the nut to infants for a day or two after birth, and instances are known of children who feed for eighteen months on nothing else than this rich, chalk-white, creamy fluid. Meat of the young nut is a delicious custard. Fresh toddy has a certain lactic taste, which, on fermentation, becomes pronounced, as though it were slightly-soured milk.

Whole Islands Cultivated

Half a century and more ago the first copra plantations managed by white men for their own profit arose in the South Seas. The principal consumers have been steadily enlarging their holdings since. Whole islands, usually atolls, are owned by British companies, which employ native labor at low wages. How long the native will be satisfied with his wage, particularly when he pays white men's prices for white men's goods, is an interesting conjecture. Moreover, the virtual certainty of periodical droughts, such as, for example, beset the equatorial atolls two years ago, and the increased cost of operating vessels to these out-of-the-way islands, are factors that will make for higher prices henceforth. As it is, the native himself (the independent producer on his own lands, that is) receives only a small portion of the European price. At a time when copra was worth $200 a ton in London the native was receiving about $40, or perhaps less, from the white or Chinese trader.

Above: In a coral lagoon, a native towing a string of cocoanuts. The line of the island is in the distance. Center: A native husking a green cocoanut on a sharp stick. Below: Another cocoanut grove. The trees are crowding each other far too much; it is magnificent but it is not good for the trees or for the copra crop.

American Shipbuilding

[*] By Homer L. Ferguson
President, Newport News Shipbuilding & Drydock Company

WHEN we entered the war in April, 1917, there were about one hundred ways available for building steel vessels, and there was about fifteen months' work ahead for each way. The output of the seventy-five thousand men engaged in the industry was about four hundred thousand gross tons per annum, in addition to the output of vessels for the navy.

This output was entirely too small to meet the needs of the country for additional tonnage. The navy immediately took over more than 50 per cent of the capacity of the older yards on both Coasts, thus slowing up the merchant construction. The need of vessels for convoy work and submarine chasing was apparent and paramount, as the tonnage being sunk daily was greatly in excess of the possible output of new vessels. The saving of one vessel loaded with troops or supplies was vastly more important than the construction of a new vessel to take its place.

This handicap on new merchant construction must not be forgotten in any investigation of the methods which were adopted to build more ships. There was one misconception which had a far-reaching effect on the shipbuilding output. It was considered that an output of six million deadweight tons (about four million gross tons) per annum would be necessary to transport and supply an American army in France. It was found that by utilizing our existing overseas vessels, our long-distance coasting vessels and the interned German vessels, and by borrowing from the Dutch and English, and by purchasing large quantities of needed army supplies abroad, it was possible to accomplish all that was needed with a much smaller output. But the attempt to accomplish in one year what should have been spread over three years was at the bottom of most of the difficulties under which shipbuilding labored during the war.

To the United States Shipping Board were entrusted by the government almost unlimited power and money for the operation and building of ships. The Emergency Fleet Corporation was formed to put into effect the general policies of the Shipping Board as regards shipbuilding. Differences of opinion arose almost at once in connection with the policies to be pursued in inaugurating the shipbuilding program. The policies which were formulated, however, are to blame for much wasted effort.

The Steel Program

The problem of steel ship construction was a difficult one. The established yards could take on practically no additional tonnage and there was no supply of skilled shipbuilding labor to draw from. In August, 1917, all vessels under construction were requisitioned by the Fleet Corporation, general overtime authorized, and changes inaugurated to fit these vessels for service in the war zone. This arrangement partially offset the slowing up of merchant construction to make way for the navy, but it did not help appreciably toward the attainment of the six million tons output.

Contracts for steel vessels were let to almost any reputable concern which was willing to start a new shipyard for patriotic or financial reasons. A large number of yards were begun, equipment ordered, and work started. It has been thoroughly demonstrated, however, that both management and skilled men are needed to construct and operate a shipyard. Time passed, money was spent, but deliveries were slow.

The construction of large shipyards for erecting vessels was undertaken, the fabrication of the steel to prepare it for erection being sublet to the bridge and structural steel works of the country located at a distance from the seaboard. Special designs of comparatively small vessels were prepared to meet the needs of this method of building. The output of the steel mills was very nearly overtaxed to meet the anticipated needs of these shipyards, but the output of ships was disappointing.

One of the main difficulties of the large assembly yards in the building of so-called fabricated ships has been the impossibility of securing the deliveries of materials in the order in which needed, so that enormous quantities of steel were furnished but work could not proceed on account of particular pieces being absent. This difficulty is experienced on a minor scale by every shipbuilder even when building only one or two vessels of a given type.

Labor Problem

In addition to the time required legitimately to build up new shipyards, lack of men and management was soon felt, so that promises of fifty vessels in 1918 from the largest of these yards were met by less than ten vessels. Structural and machinery trouble prevented any appreciable use of these few. To meet the labor situation, several steps were taken:

Shipyard workers were exempted from the army draft. This was most important, as about one-third of the men in the shipyards were within the draft age and in good physical condition. There was no possible chance of replacing these men, and any other decision would have been fatal to shipbuilding.

Rates of wages were substantially increased early in 1918, to attract workers to the new shipyards and to enable the old yards to increase their working force. The new rates were made substantially uniform all over the country to prevent one shipyard from being robbed by another. The effect of this and later increases was to increase the cost of vessels so that now the labor cost per ton is over twice what it was for similar work in the same yard two years ago.

Training schools were established to fit structural steel workers for work in the shipyards and to break in green men. In the older yards a considerable increase in the working force was obtained with a relatively small loss of efficiency, despite the drain of the new yards for leading men and skilled workers.

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[*] Address delivered at the Sixth National Foreign Trade Convention.

The total number of shipyard employes has increased about five-fold.

The result of all these efforts under war-time conditions has been a very substantial addition to the steel shipping of the country, despite the sinkings which have occurred; and the output of steel vessels is continuing, and will continue as long as the government puts up the money. The type of vessel is not generally what would have been built under peace conditions, as new kinds of machinery were used to obtain production, and the cost is excessive, so that the initial handicap in competitive trade is very great, and only the scarcity of tonnage in general will enable many of the vessels to be operated at all unless there is a substantial write-off in first cost.

The shipyards of the country have equipment to build vessels in any size up to the largest vessel afloat, and to build the smaller sizes of less than ten thousand tons deadweight in any number required. The men who have been employed in shipyards will remain if steady employment at good wages is assured.

The wages of first-class mechanics engaged in shipbuilding in Great Britain, as recently reported by a representative British shipbuilder, are $20 to $25 per week, whereas the wages of similar mechanics in the United States are from $34 to $40 per week. The wages of first-class mechanics in Japan, as recently reported by a representative Japanese shipbuilder, are $1.25 to $1.50 per day, and the rivet driver in Japan with pneumatic tools averages about 250 rivets per day.

American shipowners state that it is very difficult, if not impossible, for them to compete with foreign owners on account of high wages paid, and more men required. It is interesting in this connection to note that the wages of seamen constitute probably from 7 to 12 per cent of the cost of operation of a vessel, whereas in the building of a vessel in a shipyard from 40 to 50 per cent of the total cost is labor.

We will more likely compete with foreign shipbuilders in the design and building of special vessels for a given service than in building what are known as "tramps."

Constructive Suggestions

If we are to have a maritime nation and a real merchant marine of our own, it is necessary that we build up strong insurance and classification agencies in this country, as they both form vital parts of the merchant marine, and also that we take advantage of our unquestioned prior rights to carry our own products to our own customers and bring back their goods to our own country in return.

It is not my purpose to discuss the disposal of ships now owned by the United States Shipping Board. This subject was treated very fully by Mr. Hurley in his address in New York on March 27. The ships will undoubtedly be used whether they remain the property of the government or are sold to American citizens. If this first fleet of merchant ships is to be kept in being, and the trades in which they are engaged are to be kept up, it will be necessary to build over one million gross tons of merchant ships per annum in order to replace the inevitable depreciation through ordinary wear and tear, collisions, groundings, etc.

A serious factor which confronts those shipyards which for years have engaged in naval work, and which work at times furnished the greater part of their reasons for existence, is that the government has equipped during the war a large number of navy yards for building vessels and has built a few vessels. If the present policy of the government is continued it is likely that the Navy Department will build the greater part of its future vessels, even if they cost more than private builders would ask.

American shipbuilding at the present time is practically at the very peak of its productive capacity. Whereas in August, 1914, the seagoing merchant marine of the United States amounted to less than two million gross tons, the total construction already added in the United States during the war has amounted at the present time to about three million gross tons, and when all vessels under construction have been completed, the gross tonnage of merchant seagoing vessels for the United States will amount to between eleven and twelve million gross tons.

Practically all merchant vessels under construction or under contract at the present time should be completed during the year 1920. Many of the shipyards are faced with the cessation of work for new construction during the present year.

The productive capacity of shipyards in the United States has reached such a point that there is no possibility of that capacity being fully utilized, as they can produce ships at a rate equal to more than the world's requirements before the war.

" She's off "

Direct Selling in Europe

(The Smaller Nations)

*** By H. S. Demarest**

Greene, Tweed & Company

I WISH it to be distinctly understood that the adjective "smaller" relates merely to the comparative geographical size of the nations; for, as markets for goods of American manufacture, most of them could not possibly be called smaller, as their people, possessing the highest degree of culture and civilization, with all the needs and demands of such people, and not having the manufacturing facilities to supply their requirements, are therefore forced to import from the larger manufacturing nations. For this reason the nations of Norway, Sweden, Denmark, Finland, Belgium, Holland, Portugal, Spain, Switzerland, Greece, Turkey and the Balkan States present in many cases larger trade opportunities than do the larger nations who really compete for their trade.

These countries at the present time offer profitable markets to the American manufacturer, who has definitely decided that an export demand for his goods is necessary in order that the output of his plant may be maintained at the maximum, to the end that manufacturing costs be reduced and stabilized.

Those countries, which throughout the war remained neutral, had the opportunity of profitable trading; those which today possess ample resources but empty shelves are anxious to establish trade relations with this country in preference to those which existed with the Central European countries before the war, and which they are not anxious to renew unless the American manufacturers fail to rise to their opportunity.

Our Competitors

While much is favorable to the American manufacturer in his competing for these markets, yet there are disadvantages that should be kept in mind and overcome. The large manufacturing nations of Europe stand in great need at the present time of export trade, and will compete strongly in these smaller nations, with the advantage of lying closer to them and having lower freight rates. Naturally these neutral countries will be Germany's first and strongest point of attack, for she will encounter there less war-engendered hatred than in other nations. These disadvantages, however, need not be serious if the American manufacturer will come quickly into direct contact with his selling problems and not expect some one outside of his organization to solve them for a ridiculously small fee.

A searching investigation in the foreign markets themselves will not only disclose the fact that credit must be extended to foreign buyers worthy of same, but that the granting of credit abroad is as safe as at home. America, the richest nation of the world, demanding on her transactions cash against documents, is not the basis upon which a foreign trade can be built, as an intimate knowledge of trade conditions abroad will quickly disclose.

Scandinavian Countries

Now let us assume, for example, that the American manufacturer, having secured all the preliminary information possible regarding the Scandinavian countries of Norway, Sweden and Denmark, now visits these countries as suggested and finds that they have a combined population of 12,000,000 of highly cultured people, whose keen merchants readily adopt American merchandising methods, and who with very few exceptions speak the English language. He will find that the commercial honor of these countries is of a high order, which, together with their system of sound banks, makes for safe trading.

Important services on various routes are maintained out of Copenhagen by the United Steamship Company and the East Asiatic Company.

The free port of Copenhagen offers splendid facilities for the docking, quick loading and discharging of vessels, warehousing of goods and factory accommodations for assembling and manufacturing, all without the payment of duties and custom restrictions; thus the American manufacturer is enabled to extend his factory or warehouse to a point so close to these important markets as to be able to quickly reach any point in Norway, Sweden, Denmark, Finland, the Baltic ports of Russia, and even Petrograd, by reason of most excellent shipping facilities, thus eliminating to a large extent the advantages of his nearer European competitors.

Free harbors are now being developed in Sweden that will shortly offer splendid facilities in that country as well.

Presuming that the careful investigation of the American manufacturer leads him to the decision of selling direct to these countries, relations are established with the large importing merchants, or a firm appointed in each country as exclusive agents for that country. It should be borne in mind that it is a serious mistake to appoint a firm as agents in one country with exclusive selling rights in another country. If the appointment of agents is deemed best, there should be agents in each separate country, as a strong preference exists for dealing directly with the manufacturing nation.

No demand existing in these countries for the product about to be introduced, the agents and importers will naturally only order limited amounts; and as success or failure of the venture may depend upon the prompt meeting of the demand as it arises, a supplementary stock placed by the manufacturer in the free port of Copenhagen may prove a matter of great importance, particularly if the product is made up in sizes, and style or repair parts are required. From this free port stock, small

Canal scene at a European port

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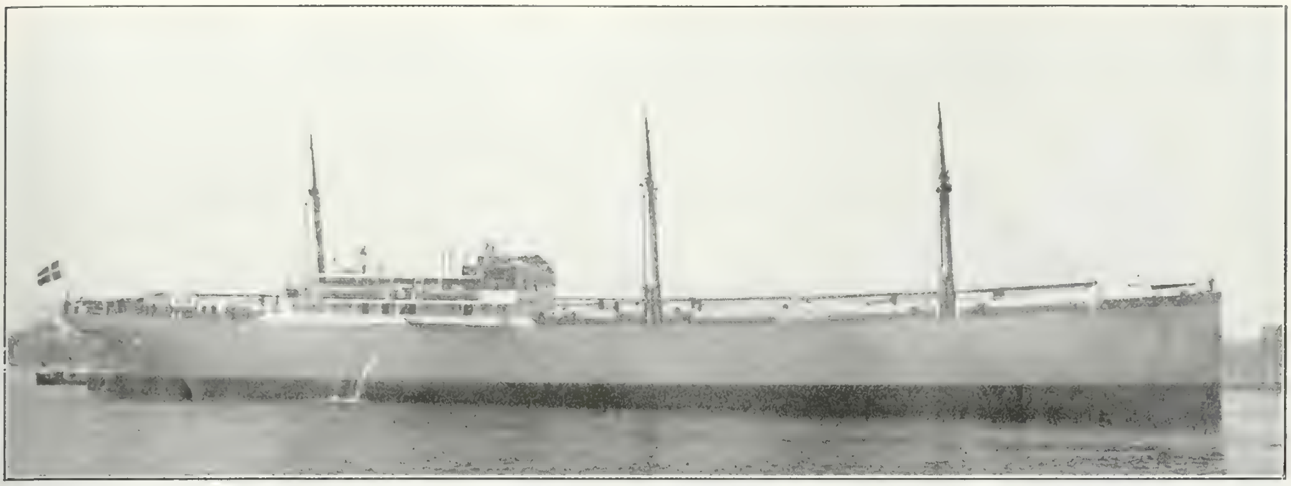
* Address delivered at the Sixth National Foreign Trade Convention.



Typical Danish motorship

shipments can be quickly delivered in any of the Scandinavian and Baltic countries at a price sufficiently above the direct importation price to cover free port charges and encourage direct importation. This will save many an order that could not wait, and hasten the successful introduction of a new product. In addition to the supplementary stock, the manufacturer should locate at Copenhagen a sales expert from his own organization who knows his product perfectly and is well acquainted with the concern's successful American methods of merchandising; from this central point he circulates constantly among the trade in the nearby countries, straightening out difficulties as they arise, educating the salesmen of importers and merchants, noting the effect of advertising, and devising new methods of creating consumer demand. The weekly trips into the various territories would bring the sales expert back to Copenhagen over the week-end, when he could look over the stock in the free port and forward his weekly report home. In this way he would keep the manufacturer in close touch with a developing business that has every chance of success, because of close application; and when developed it belongs to him because of the goodwill thus created.

From this "one-man office" in Copenhagen and supplementary stock in the free port may develop a branch house of any desired size and importance. The advantage of this careful method of direct selling is that it gives the manufacturer every facility for understanding quickly the peculiarities of the market in which the demand for his product is to be created. It is obviously impossible for him to delegate to some other concern a task in which he is expert by reason of his intimate knowledge of the details of the business.

Other Small Nations

The marketing conditions in the other smaller European nations differ from those of Scandinavia only in detail, and not in principle. In each country there is a strategic point from which the manufacturer's sales expert might operate and be able to cover several countries.

In the case of Holland, Belgium and Portugal, the trade of their Colonial possessions should be considered in addition to the local markets.

Holland, with a population of 7,000,000 people of high purchasing power, has also a large trade with her rich Colonial possessions, of which Java alone has a population of 33,000,000 people and 3000 miles of railways. The requirements of the Dutch East India trade, which the American manufacturer could readily supply, is large and varied, and an intimate acquaintance with the influential firms controlling this valuable trade from Amsterdam, Rotterdam and The Hague would more quickly develop lasting trade relations than would be possible by any indirect methods; for it should be borne in mind that Rotterdam lies at the mouth of the Rhine, thus affording Germany the cheap means of quick delivery into this market.

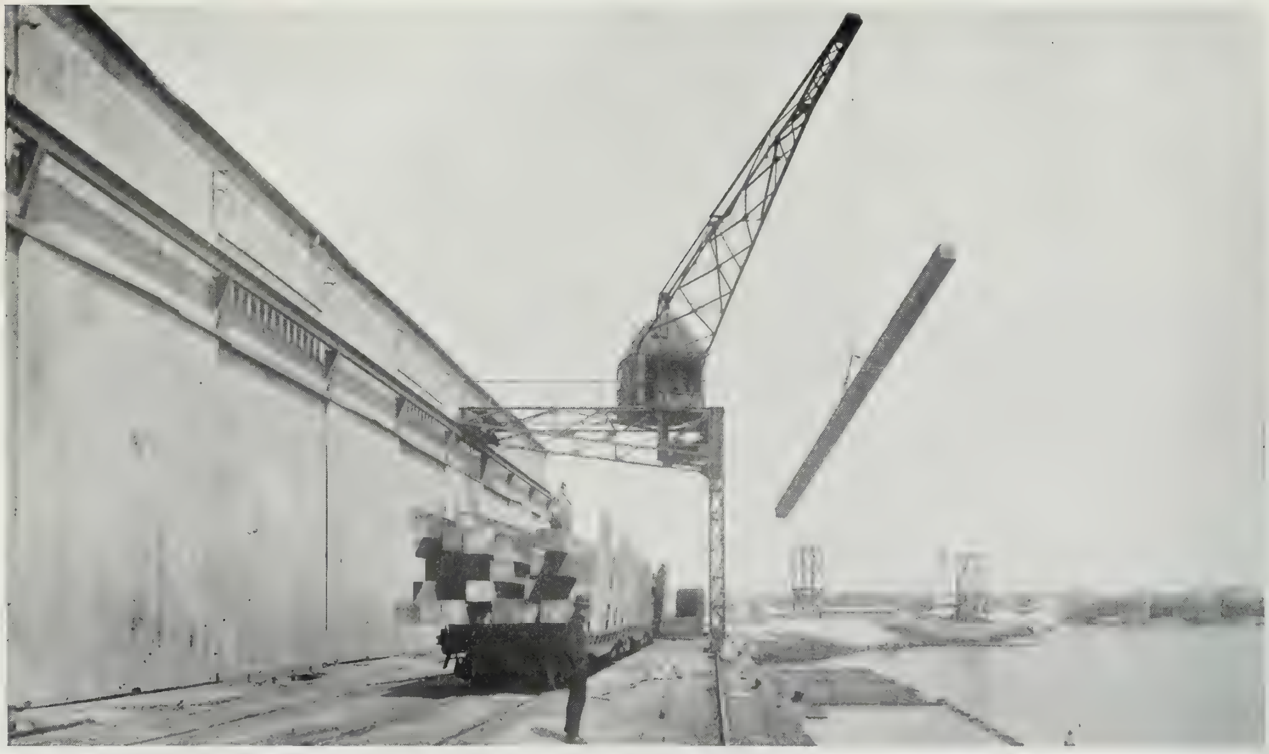
A paper much longer than this one might very profitably be written on the trade possibilities of Holland and her Colonial possessions, as their importance cannot be overestimated.

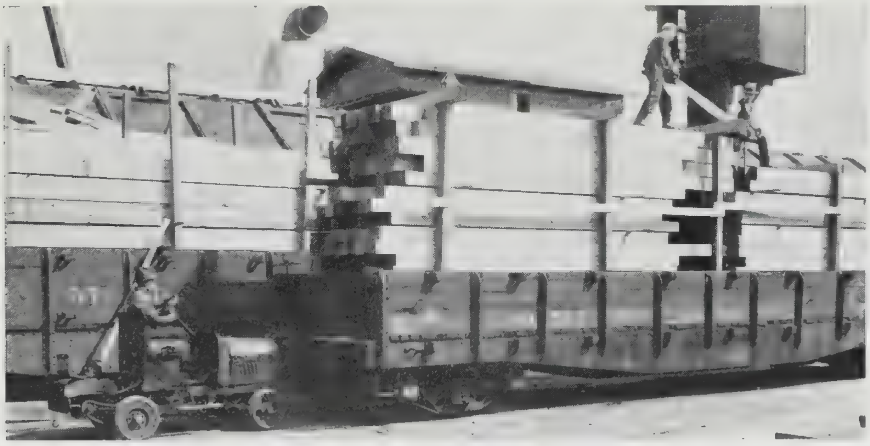
Belgium, the heroic little country who before the war was known as the commercial and industrial balance wheel of the world's trade, is today bravely endeavoring to revive her devastated mines and industries; and the valuable aid that the American manufacturer can give Belgium at this time would build up an abiding goodwill.

While Belgium is not a Colonial nation in the sense that Holland is, yet the trade with her Congo possessions is very important and requires a great quantity of goods that the American manufacturer should supply.

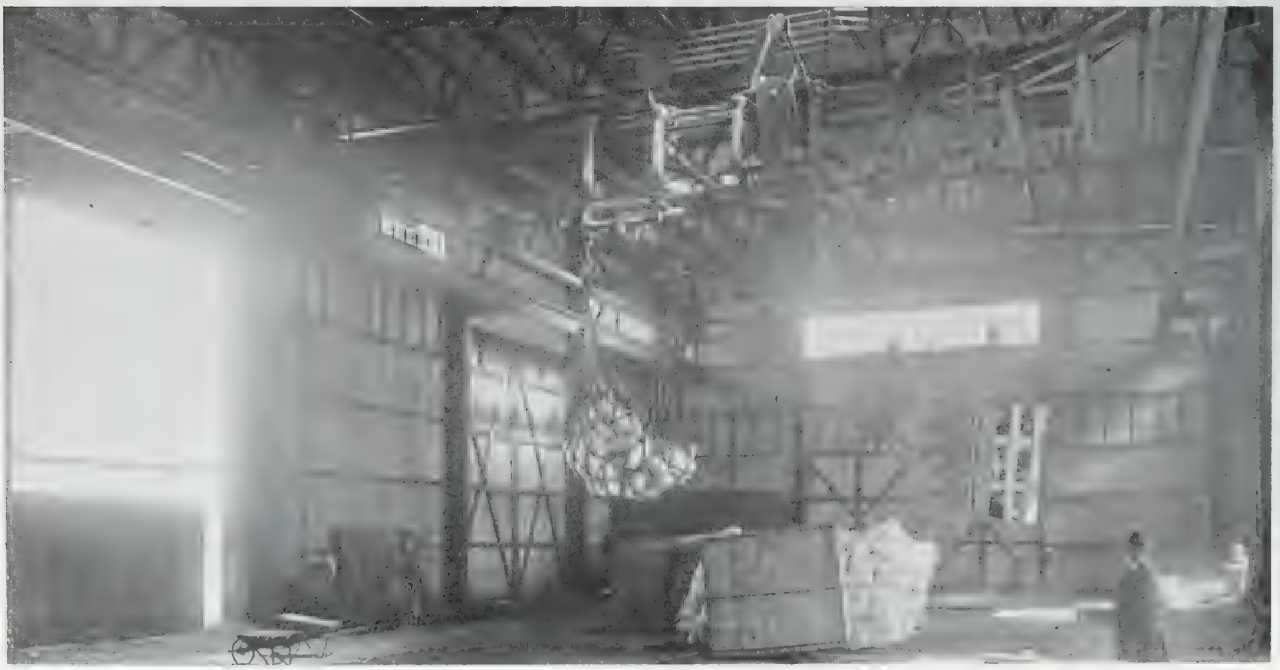
The Belgian banks having established a credit of $50,000,000 with certain American banks, Belgium's ability to finance her purchases is assured.

Portugal, Spain, Switzerland, and those nations whose trade has been more or less affected by the war, each present definite problems worthy of the American manufacturer's best thought and effort, as each market will function as so many watertight compartments of a well-developed sales organization. If this country's capacity for enormous quantity production is to be so maintained that high labor costs may be absorbed, and the developing merchant marine provided with cargoes, then American genius must apply itself to the task of establishing foreign trade relations by that method of direct selling that has through years of persistent effort made Great Britain the great trading nation of the world.





Typical samples of modern terminal freight-handling machinery. Upper: Semi-portal electric traveling gantry jib crane at Beaumont, Texas. Center: Hood tractor spotting loaded car at a Seattle shipyard. Lower: Sprague overhead carrier handling mixed cargo in the terminal shed.



PORT DEVELOPMENT AND TERMINAL MACHINERY

Solving New York's Port Problems

By Frank Plachy, Jr.

THE many problems that confront the port of New York have long since been recognized as of more than local importance. New York is essentially a national port, and anything calculated to damage or benefit it is of the greatest interest to the nation as a whole. Its problems are now and have always been strikingly different from those of any other American port, or, indeed, of any port in the world, and have called for the solving of engineering questions and difficulties requiring the very highest quality of technical skill.

The most discouraging factor in bringing out the efficient management of the port has been the unsatisfactory result of attempting to co-ordinate so many conflicting jurisdictions. The states of New York and New Jersey, the city of New York, the various municipalities touching the waterfront at different points, and the national government, all exercise authority of one kind or another over the port, the result being a hodge podge of diverse interests that can seldom be brought to pull together on any single proposition.

New York has not been alone in its failure to secure unified port control and development. England has had much the same trouble to deal with in the port of London, where until 1908 there was an indescribable conflict of authority over different sections of the Thames and where the annual loss from this source ran into a vast total. Liverpool, on the other hand, is an example of what unity can bring about. The board having complete authority over the Mersey River, and all activiities connected with the port of Liverpool, was established in 1858, since which date a predetermined plan of development and gradual growth has won for that city the honor of being England's leading port, the total of exports and imports having passed London for the first time in 1917, under conditions which practically guarantee for Liverpool continued supremacy.

With the example of Liverpool's experience confronting the maritime world, there can be little doubt that the plans now under consideration for a unified plan and control of the great port of New York will not only perpetuate it as the national port of the United States, but will bring about remarkable economies and efficiencies in the handling of freight and in reducing the costs of transportation for the export and import freight of the country and will reduce the cost of living for the vast population living near the port.

The careful study now being made of every phase of the port of New York by the New York and New Jersey Port and Harbor Development Commission, of which Major-General George W. Goethals is chief consulting engineer, the work being under the immediate direction of B. F. Cresson, Jr., came about in this way: Some three or four years ago certain Jersey interests brought suit before the Interstate Commerce Commission at Washington seeking to be relieved of certain lighterage charges. Recognizing the far-reaching nature of the suit, various commercial and civic organizations of the City of New York intervened to prevent what would have been a prohibitive differential against the Greater City. During the hearings held by the commission, a vast amount of information came to light showing the duplication of costs, wastes of time, space and labor and the general lack of efficiency in many activities of the port.

Walter E. Edge, then governor of New Jersey, who had always evinced a careful and unselfish interest in the port, declared that the time was at hand for the different jurisdictions touching the port to get together and quit fighting. The result of his work was that two state commissions were appointed to make a complete and unquestionably authoritative study of all matters connected with the port, not only on the physical side, but also the controverted elements entering into the legal or administrative side. These commissions, sitting jointly, reported to the legislatures of their respective states a year ago that two years would be required to make the study and that it would cost New York and New Jersey a total of $200,000 apiece. Each legislature gave its approval and the necessary appropriations were made with an expedition rather unusual in the slow-moving wheels of legislation. The need for exact information was so clear, however, that no arguments to prove the value of the expenditure were necessary.

When the joint commission undertook this big job, they were under no misapprehension concerning its difficulties or the ramifications into which it was certain to lead. The demands of the war made it almost unbelievably difficult to get the right sort of trained engineering assistants, but a careful search of the big engineering organizations of the nation's leading industries finally resulted in getting together the group of men who have already made remarkable progress in the big job they have undertaken.

The first work was to meet the operating heads of the various transportation elements entering the port. The opinion of all was that the investigation was vitally needed and the utmost co-operation was promised and delivered. The costs of operating their New York terminals were breaking the backs of the railroads and they welcomed anything likely to show them a way out of their troubles.

It was then determined to make the physical end of the study three phased: First, to find the real cost of every item involved in the movement of freight entering or leaving the many elements that together make up the port. Second, to find where lost motion existed and where duplication of work was pyramiding transportation costs. Third, to devise plans by which matters could be remedied, efficiency of operation introduced and the cost of operating the port reduced to a figure that could be considered a normal one.

The order in which the study was carried out took up railroad operations first, then steamship, lightering and trucking in the order named. The commission started with a force of twenty-eight men, who had to be divided into three shifts in order to keep a check on the total operations of the port, which continue, of course, throughout the entire twenty-four hours of the day. Since the study was started, the engineering staff of observers and investigators have been at every individual point of transportation for twenty-four consecutive hours. This included break-up yards far back in Jersey, switching and assembling points, loading and unloading stations, piers and the entire chain of facilities for keeping freight on the move. Tug boat operators were particularly looked into, because of the inevitable use of lighters or barges in handling most of New York's traffic, and exact records made of the time required for every operation studied.

The work has been completed to a point where a complete story has been developed, illustrating the manner in which the port is run and comparisons can now be made of the different operations in the port's activities.

With the records assembled in the field, a trained statistical force was then assembled, which went into the offices of the railroads touching New York and made comparative studies of receipts and expenditures covering every phase of harbor operation, so far as it pertained to the different roads. Fine co-operation with the commission's representatives was extended by the operating officials of all the railroads, largely through the work done by a "contact committee" established by Regional Railway Director Smith, in charge of all rail operations in the New York district during the period of Federal control of the roads.

The work done by the statistical force determined the actual cost of every operation in connection with the movement of freight. Figures have been obtained showing exactly what it costs to bring freight to the yards in the hinterland back of the city; what it costs to classify it and the average amount of time consumed; the expense of moving l. c. l. freight to the lighter, or the cost of putting freight cars on car floats and moving them about the harbor. The expense of the stevedore services was carefully inquired into and a body of data assembled that gives authoritative information on that controverted branch of, harbor mechanics.

The engineers then felt that the next step would be to get a picture, statistically speaking, of the operation of the port in pre-war days. July, 1914, was determined on as a fair example of pre-war conditions and a study made of the books of four carriers, including operative and administrative expenses, together with interest and maintenance charges. The employes of the commission are now engaged in making a careful analysis of the figures of July, 1914, and for 1918, comparing them at every point with reference to all the changes in the cost of operation that have resulted from the war and to determine what operations are at present unduly costly, to find out what substitutes are possible for present methods and what general changes can be introduced by which the cost of moving freight can be reduced.

The keystone of all the commission's work is briefly this: If the cost of moving one ton of freight at New York can be reduced and the exact saving determined, this saving per ton can be multiplied by the annual tonnage of the port, the result capitalized and the amount then determined that the port can afford to spend in bringing about the improved efficiency and lowered cost of operation. That would represent the economic proof on which investment in improvements could be predicated and the element of guessing entirely eliminated. The far-reaching effect of any savings made at New York is so great that the cost of making the present investigation will be insignificant in comparison with possible economies brought about.

Another important work now going on is an investigation to see what the city markets are losing through congestion at present terminals. An ideal situation is being planned which is based on the elimination of excessive costs found in the present situation and which can in turn be capitalized.

A result already obtained by the investigation is the possible release of some piers now used by the railroads to shipping. This would be a change of far-reaching importance, owing to the limited pier space on Manhattan Island, where the worst of the congestion is now centered and where railroads own what appears to the layman to be an unduly large percentage of the available water frontage. A more economic use of certain sections of the city not now served by modern transportation facilities is also being devised which will result in eliminating long hauls by trucks over narrow city streets and will greatly reduce the congestion now hindering the movement of freight at downtown traffic points.

In its work the commission is taking the general attitude of looking at all problems from the point of view of the railroads and then from the point of view of the city, although the two are so inextricably bound together that they are hard to separate. Regardless of the future ownership of the railroads, whether Federal or private, operating costs of the roads at New York will have a direct effect not only on the prosperity and living costs of the people in the New York district, but they will, if too high, prove a depressing influence on the export and import trade of the entire country.

The warehouse has been an important element in the study of the investigating staff, and the whole chain of them, from Passaic and Paterson to Brooklyn and Long Island City, have been carefully investigated and cost of operation determined. Figures dealing with their various capacities have been assembled, together with data showing whether they are dependent upon rail, water or truck connection with other transportation facilities, total capacity, cost of operation, average duration of goods in storage, and possible economies in operation.

Careful work is being done in connection with the possibility of securing additional terminals in New York harbor for the state barge canal, which is expected to play as important a part in the future expansion of the port of New York as its predecessor, the old Erie Canal, did in building up the commercial supremacy of the city nearly a century ago. The movement of bulk freight, such as grain and steel, via all-water transportation facilities, in place of the more costly methods inevitably associated with rail transit, is being carefully gone into and a body of dependable statistics assembled that will prove remarkably illuminating in connection with a subject that has been particularly connected with controversial arguments in the past, with pessimistic views of railroad operators receiving the bulk of attention from the public.

Such topics as that of the fruit auction are being studied, taking the commission's experts into lines that, while seemingly not germane to their subject, are yet closely connected with the general principles of efficient and economical port operation. The disposal of sewage and the waste inevitable from the population of so vast a city as Greater New York are problems that have vexed New York's municipal authorities for generations. They have also been the most prolific sources of engendering disputes between the various municipal jurisdictions located in and around the port. The engineers are devoting particular attention to this matter with the hope of working out once for all a plan by which sewage disposal will be taken out of the realm of politics and controversy and settled in a manner beneficial to the health of the city's people and by means which will not call for an undue strain on the city's finances.

A part of the commission's work on which its report is being waited for with an especial degree of interest is that dealing with the theoretical and actual performances of various types of port machinery and appliances, including all types of shiploading and unloading apparatus. Careful tests as to speed of operation, relative consumption of operative power and tonnage capacity have been made for a large variety of cranes, ship winches, automatic loading devices, pier and shed equipment and the other incidental mechanical appliances that go to make up the machinery of a great modern seaport.

In its studies of marine matters, the commission's workers have examined the various types of ships that take part in New York's traffic. Coastwise, trans-Atlantic, West Indian and other steamships were studied, as well as the myriad of craft that supplement the rail connections of the port and form the floating bridges between the rail terminals and the deep-sea craft seeking to find or deliver freight. Studies were made showing the relative cost of loading ships from piers or from lighters, and attempts have been made to work out a plan by which the present excessive number of handlings of freight can be reduced.

It is understood that the commission is at work on a series of charts showing movement in volume of various staple commodities to and through the port, this to be visualized by lines of different thicknesses to show the flow of commerce from various sections into and through New York. By studying these charts, the veriest tyro in complicated problems of transportation will not fail to be struck with the extent to which the entire country depends upon New York for the movement of the goods it sells abroad or imports for its own consumption. It will then be plain that the prosperity of New York is the most reliable index to the prosperity of the entire nation and the best barometer of the condition of our export trade.

At the present time, approximately 41 per cent of the foreign trade of America passes through New York. Vast amounts of freight, both incoming and outgoing, are now being diverted from New York to Southern ports because the capacity of New York, under present wornout methods of operation, is at its maximum point. With the improvements already known to be possible and which will be reduced to mathematical exactness when the report of the engineers is published, the theoretical capacity of the port of New York can be increased to a figure where it will exceed any call likely to be made upon it for generations to come. With a prompt carrying out of scientific and profitable improvements, it is now calculated that New York can handle approximately 65 per cent of the entire foreign trade of the United States, and can do it cheaper, better and more expeditiously than any other American port.

London and Liverpool combined handle more than 67 per cent of the foreign trade of England, a nation which depends almost absolutely for its prosperity on its sea-borne traffic. New York is the logical servant of the rest of the American continent requiring an outlet on the Atlantic and the work of placing it in a position to fulfill its stewardship with efficiency and economy is a direct matter of interest for every American.

The work done by this joint commission, under the direction of Mr. Cresson and his staff of engineers, statisticians and investigators, calls for the thanks not alone of the people of New York and New Jersey, but of the general citizenship of the country. The following men comprise the commission: William R. Willcox, chairman; J. Spencer Smith, vice-chairman; Eugene H. Outerbridge; Murray Hulbert; DeWitt Van Buskirk; Frank R. Ford; William Leary, secretary; C. A. Ruhlman, assistant secretary; Julius Henry Cohen, counsel. America has need for all the improvements that its best technical skill can devise in bringing our industrial and transportation facilites to ther maximum point of efficiency. The forthcoming report of the commission will be awaited with the greatest interest, and when made public will be studied by business men and transportation experts all over the world. Probably never before has such an exact and widespread investigation been made of a subject, technical in its nature and bristling with controversial points, where the personal interests of various groups have in the past operated to prevent an unbiased opinion being formed by the general public, and particularly by legislators.

Merchant Marine Fundamentals

By M. C. Tuttle

EVERYBODY interested in the development of the American merchant marine has given anxious thought to the size of our shipbuilding program. Everybody has wondered whether the development of a great commerce will result from the ownership of many ships. Those unfamiliar with the intricacies of the shipping problem have hesitated to form an opinion of matters which apparently require a technical knowledge for an intelligent understanding. Very few have considered whether the problems involved in the development of a merchant marine could be stripped of all technical ties and reduced to a few simple fundamentals. It may be possible to discuss this problem in an elementary way without getting into either shipbuilding or ship operation.

If one can dull his imagination to the point of forgetting the romantic and the picturesque, he can state that a ship, a car or an automobile truck is simply a conveyance for freight. During the war we needed any kind of conveyance which would carry goods and men across the sea to Europe. There was no competitive operating feature involved in this problem. It was simply a question of providing sufficient means of conveyance or of losing the war, and to this end we properly made contracts on any basis which would produce the largest tonnage. We took certain general precautions to protect ourselves against obtaining uneconomical and useless ships and we have forgotten too soon the dire need which prompted us to buy anything that showed promise of taking cargoes to Europe. If the gravity of our wartime needs is forgotten, then we should measure the performance of the Shipping Board by past standards which in nowise applied to those times. The price of any hulk that was at all usable was indicative of the need of those times, and the only test that should be applied to our wartime contracts is that of whether or not these contracts would have produced usable tonnage quickly.

With the armistice a new problem at once arose in regard to our ships—that was whether the ships we had bought for wartime use were serviceable in peace and there came in the question of competition between these ships and the ships of other nations.

Returning to the definition of the ship as merely a vehicle for conveying freight: Our situation after the armistice would be similar to that of the contractor for heavy earth work who must remove huge quantities of material very quickly and for that purpose needed automobile trucks, the poorest of which was more economical than a horse-drawn vehicle. With a shortage in the truck market he would be justified in buying a limited number of trucks less efficient than the best, but with the return to a normal condition of affairs he is not likely to be able to compete with a rival contractor who is possessed of high-grade trucks when he is equipped with low-grade trucks. He cannot compete in hauling lumber, using trucks designed for earth work, against a contractor equipped with trucks designed for moving lumber.

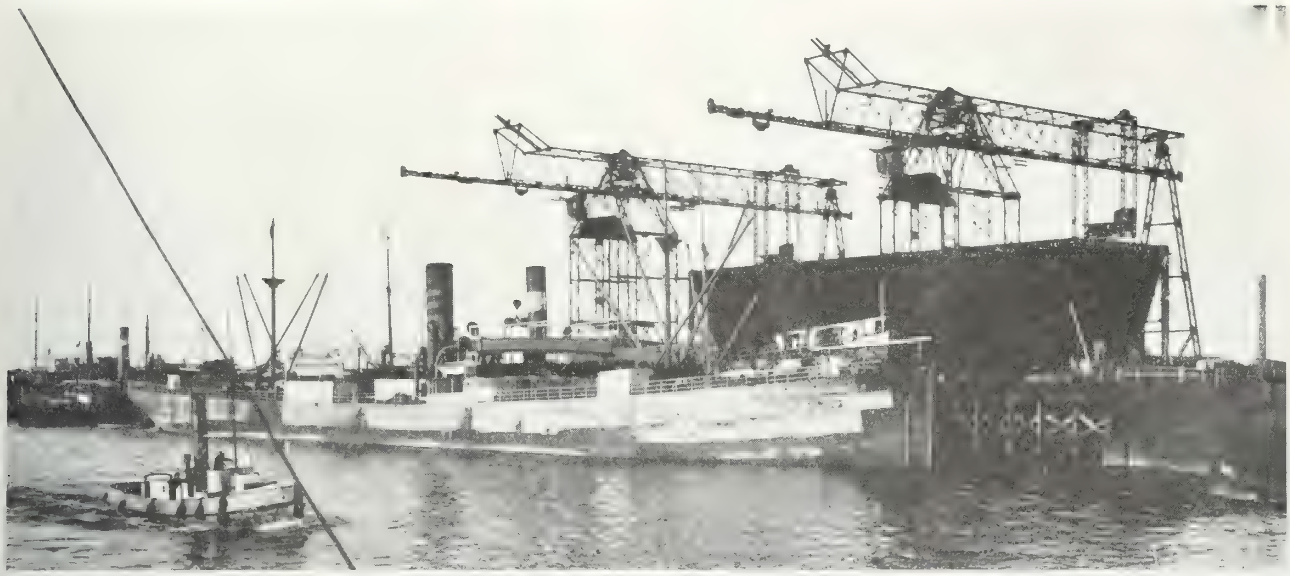
After the armistice we knew that the ships we had under contract were not designed for a special trade. We also knew that it was a tremendously expensive thing to stop all these contracts and to redesign the ships for special trades, and accordingly the Shipping Board had to decide whether it would stop construction, disrupt the shipping business and very slowly find out just what ships would be required and then design and build them, or else they had to continue with such part of the shipping program as seemed to offer hope of producing reasonably useful ships. It is safe to say that no one knows at all accurately what the business of the world is going to be for the next few years.

Many reason that besides the replenishment of lost tonnage there will be an abnormal growth of shipping to supply materials needed for the rebuilding of France and Belgium. Against this reasoning stands the fact of the tremendous destruction of wealth with the poverty and need of economies which the war has produced. It seems reasonable that with high prices, with many people bankrupt and with the habits of economy well drilled into half the world, there will be less requirements for freight service per individual than there have been in years previous. The great many ships specially designed for given trades are still engaged in military service, and these boats will be gradually released and returned to their old runs. The competition of the specially designed ship will be a difficult one for the ready-made ship to meet, and if our yards are fully occupied with the turning out of ready-made ships, obviously they will not be free to develop the ship specially designed for given trades.

The Shipping Board has contracted for between a third and a fourth as much ocean tonnage as existed in all the world before the war. So far they have succeeded in cancelling only a small fraction of these commitments, so that the United States, which was not a ship-operating nation, is going to own, within the next two or three years, a very great number of freight carriers. The question then remains whether we know how to get the business for these freight ships or whether freights will remain high enough to give a profit on the operation of a ready-made ship, and whether other nations can enter custom-made against our ready-made boats.

Following this line of reasoning, our success as a shipowning nation will depend on our ability to get business for these ships. Business for them will come through going out after it and through giving good service after we once get started. An empty ship, like any other idle piece of equipment, is expensive. If our ships move under load a greater proportion of the time than the ships of other nations, they will earn more, even if they cost more. America has been credited with the ability to organize promptly and effectively to accomplish any necessary end. This inherent ability will certainly be turned to the getting of business for our ships when we begin to operate ships. Granted the ability to get the business, and assuming the knowledge of world shipping, there is no reason why the United States should not utilize the ships it decides to own.

Improved Port Facilities—Exporters' Great Need



Coal-handling facilities

SHIPPING men are keenly aware, even if the public is not, that the creation of a merchant marine and the upbuilding of a great volume of foreign trade for America is only half accomplished when the ships themselves are launched. A necessity equally vital, if our flag is to stay on the ocean, is the work of bringing to a point of modern efficiency the facilities of our ports and terminals. The actual transport of goods after they are loaded in ships is a comparatively simple matter; the expeditious and economical handling of them from the time they leave the farm or factory until they are stowed away on board the vessel that is to complete their journey is an exceedingly involved and difficult one.

We are building a vast merchant marine, a considerable part of which is already on the water. All our energies up to the time of the German military collapse were directed to the one end of building as great a tonnage of steel and wooden ships as the shipworkers of the nation could possibly put out. During this period of rush it was almost an impossibility to give problems connected with a merchant marine the attention and careful thought they require. Conditions have now been completely altered, and if the United States is to become a maritime nation, careful attention must be given to our terminal problems.

Drydocks Needed

Probably the most immediate requirement in connection with our new merchant tonnage is to provide adequate repairing facilities for the ships already launched. No one will attempt to deny that large repair and alteration bills will have to be paid before many of the vessels launched during the past eighteen months can really be ready to compete on ocean trade routes. The situation is such that numbers of items like the following are beginning to appear in shipping journals and in the general press of the country:

> "St. Johns, N. F., March 2.—A large number of ships built in the United States and Canada during the war to meet the demand for increased tonnage have put into this port during the past few weeks for repairs, and the St. Johns' drydock is working to full capacity with a long waiting list.
>
> "Rough seas encountered along the North Atlantic Coast proved too much for the ships, according to marine men, who said that defects in machinery and hulls were plainly evident when the vessels were overhauled.
>
> "Many old ships, which were neglected during the war, also have broken down and hauled up here for repairs."

The situation described in the above clipping is a picture of that prevailing in many other places, and even the veriest tyro in shipping matters can understand that it will be a constantly growing condition. There is already a great scarcity of repairing facilities for vessels now in trouble. What the situation will be a year from now, unless vigorous action is taken at once to meet it, is not hard to predict.

Action Necessary

While Mr. Hurley is touring the country for the purpose of asking commercial clubs, Middle West farm organizations and mining bodies what they think ought to be the policy of the Shipping Board in respect to our new merchant marine, practical exporters and shipping men are growing impatient at the seeming failure of the present authorities to realize that the profitable operation of ships requires quick handling—that is, there must be a

The Locomotive Cranes at a French port

minimum of time lost in port. Only the time actually spent in transit earns money for ships; port charges, interest, insurance, wages and other ship expenses will soon turn an otherwise profitable vessel into a losing one if port and harbor facilities are such that economical and rapid loading and unloading of cargo is impossible.

Mr. Hurley proposes to ask Congress for adequate legislation for port development in all of the country's important export centers. It is impossible to tell what Congress will do; past experience has certainly not been such as to paint a very rosy picture of what may be expected. Not one thing of a tangible nature has so far been done by the Federal government to aid America's new merchant marine in its efforts to carry American goods to foreign lands and to compete on equal terms for the carrying trade of the world. The only Federal activity now at work is the Commission on Port and Harbor Facilities, a branch of the United States Shipping Board, which is making a study of between twenty-five and thirty American ports on our three coasts with an idea to advising the best arrangements of docks, piers, rail connections, coaling devices, loading and unloading machinery and other matters connected with terminal development.

Mechanical Conveyor for General Cargo

Port Conditions

The results of the study made up to date may be summarized as follows:

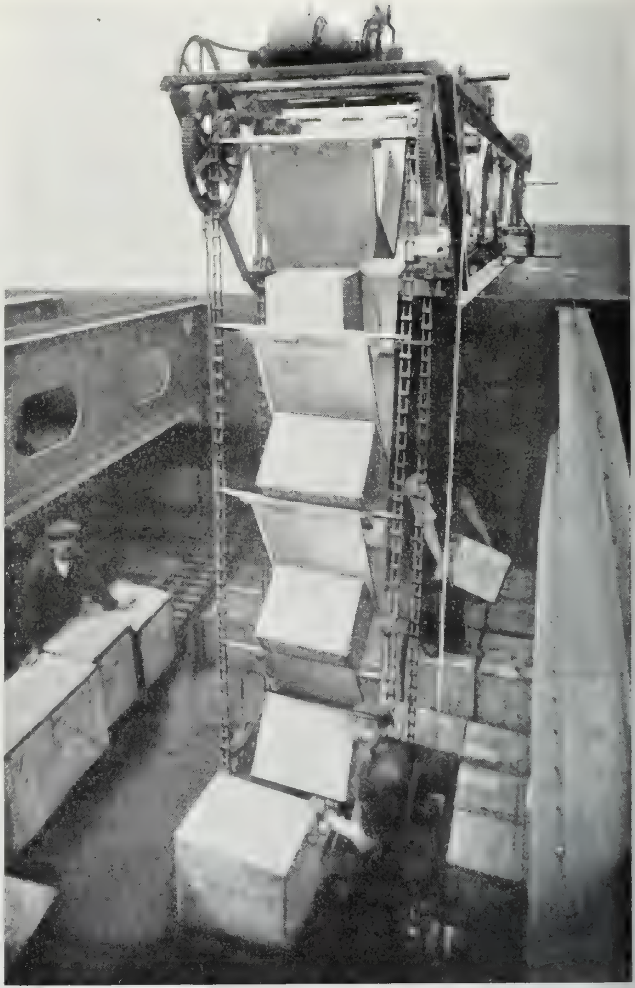
Seattle has made the furthest advance of any port in America. It is the only port with facilities for the quick loading and unloading of ships that could be compared with the efficient ports of England, France and Germany.

San Francisco is well awake. Its people and its port authorities are keenly alive to the importance of their problem and a plan has been devised that will assure for that city a permanent place in the competition on the Pacific Coast for the carrying trade to the Orient.

Los Angeles and San Diego are also alive to the situation and are taking measures that are likely to be adequate for the volume of shipping that either may reasonably expect to handle.

Galveston has a plant that is modern and quite efficient for the handling of the specialized products that make up the bulk of its traffic.

Beaumont has developed a port that is regarded by shipping men as a model unit in a national port scheme. This city, of course, is a very small factor in the country's export trade, but the advance it has made, especially in the handling of lumber, makes it well worth the attention of all students of port development.



Conveyor for general cargo, shown in use on ship

New Orleans is developing fast. The municipal authorities have extended a degree of co-operation to the shipping interests centered in that city quite remarkable when compared with most of our other seaboard cities. Warehousing facilities at New Orleans are splendid. That great aid to economical traffic handling, the harbor belt line, reaches an exceptional degree of efficiency at Louisiana's great city, and costs to ships are kept down wherever possible. Various private interests have developed machinery for specialized products at New Orleans which make that city particularly interesting to students of these matters. Bananas and grain are handled at a cost believed to be lower than at any other port in this country.

Norfolk has a good municipal port, but it was taken over by the Federal government at the outbreak of the war, so that the city is not yet deriving the benefit from its investment that would follow public operation.

Baltimore and Philadelphia have ambitious port plans, but up to this time there has seemed to be a lack of co-ordinated work in carrying them out. However, the location of these two ports and the work already done to bring them up to a state of modern efficiency is such that with reasonably good fortune both may expect all the traffic they can take care of.

Boston has some elaborate piers and is making ambitious plans to dispute with New York for a large share of the traffic now being handled by the nation's metropolis, but shipping men say that its general port plan is not practicable.

New York, with about 41 per cent of the entire trade of the United States, lags behind all other ports in the matter of up-to-date handling of freight. The nation's chief gateway, with every opportunity to lead the entire world in the matter of port and terminal development, has no plan for placing the city where it need never fear the competition of any of its neighbors, and traffic is now being diverted from it to other ports, pacticularly to Baltimore and Norfolk.

From Car to Hold

The interest of the exporters of the country in the work of economical handling of traffic at terminals is a direct and vital one. It is clear that it is not possible to reduce in any appreciable degree the cost of running either railroads or ships. Competitive operation for decades has brought a condition of efficiency hard to excell. However, when we turn to the handling of goods at the terminals, especially at New York, we find a state of affairs that puts an appalling load on the cost of goods destined for overseas shipment. If our goods are to be sold abroad in competition with European and Asiatic nations, the cost of laying them down in foreign ports must be within reason. Such costs will not be within reason unless a tremendous improvement is made in the terminals which form the bridge between the railroad haul and the water haul. The whole question of a great merchant marine profitable to American business is embodied in the work of creating modern and well-equipped ports for the expeditious and economical handling of goods.

The drawbacks now hampering American exporters are mostly those connected with the handling of general cargo. In handling bulk cargoes no nation has approached the United States. When shipping coal, grain, oil, sugar, molasses and a few other special products, Americans have devised systems which for speed and economy cannot be approached anywhere in the world. All the more reason, then, why American brains and ingenuity should be used to build ports in which the handling of general cargo will be brought to an equal speed and efficiency.

Bunkering Facilities

We are particularly weak in coaling facilities. All practical shipping men realize that the time to bunker a ship, either freight or passenger, is to take advantage of the time when cargo is being placed on board or being unloaded. As a matter of fact, no modern bunkering apparatus exists in the port of New York. The usual method of coaling ships is to bring a lighter alongside and then move the coal into the ships' bunkers by means of derricks attached to the ship's masts. This entails a loss of time little short of criminal. A number of European ports arrange this matter in such a way that no time can actually be charged up to the single operation of coaling.

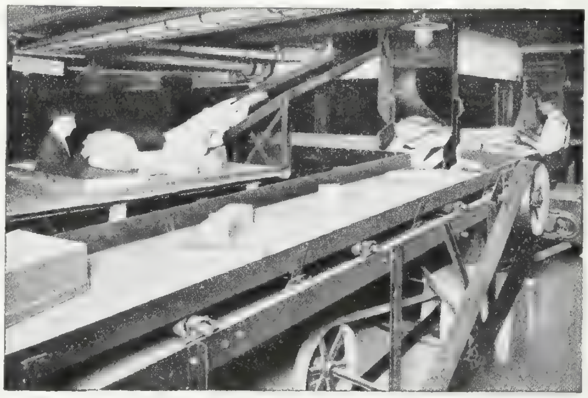
New York's primitive condition so far as coaling is concerned was vividly illustrated in January and February of 1918, when dozens of vessels loaded with supplies urgently needed in Europe were compelled to lie in the harbor for weeks until coal could be brought from Pennsylvania, loaded on barges which were continually getting stuck in the ice of the harbor and the slips, and then reloaded from the barges into the vessels which were to consume it. The fact is that not one port in the United States possesses what can be termed a really scientific method of bunkering coal-burning ships.

Combined Electric Truck and Lift

Before we can have successful operation of our new merchant marine, three essentials must be provided:

First—Our ports must be equipped with modern mechanical equipment able to handle promptly and economically all kinds of miscellaneous cargo.

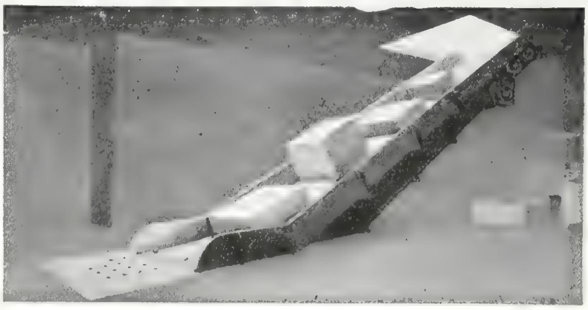
Second—We must provide means for speedy bunkering of ships without causing any loss of time in port for this purpose.



Ideas in Conveyors that may be used on Docks and in Warehouses

Third—We must have facilities for the speedy repairing of merchant vessels where they can be put into proper operating condition without being compelled to lie up for long periods while awaiting their turn at shipyards. We already possess a merchant marine of such character that a great deal of repairing is certain to be needed for many years to come. There is, therefore, every reason why adequately-equipped repairing plants should be immediately constructed, especially in the neighborhood of the port of New York.

The above three requirements must be met to assure the American merchant marine a fighting



A Handy Mechanical Lift

chance in competition for the carrying trade of the world. In other words, what we want is terminal equipment with which to speed the loading and unloading of cargo. If we can supply for our ships such efficient port machinery that the number of trips in a year between this country and Europe can be doubled, we have in effect duplicated our entire carrying fleet, while at the same time we have doubled ship earnings, reduced the cost of carriage to the export business of the country, and made it possible to pay high wages.

On one thing most shipping men are agreed—we are in no position at this time, either from the standpoint of the ships themselves or the connecting links on shore, to operate our new ships as cheaply or efficiently as any of the great European carrying countries or Japan. Unless the next twelve months witness a radical change of front on the part of our Federal and various municipal authorities, our merchant marine will find itself in the same fix on the water as that in which our railroads found themselves on land during the war period. Practically every big rail terminal in the country is now inadequate to handle the strain placed on it by the traffic of the nation, and the same is true of our ports. There is a connection so vital between rail and water service at all our important seaports that nothing can exceed in importance the necessity of making each the efficient complement of the other.

New York Docks

It will surprise many people to know that New York, the greatest port in the world, is without a single dock equipped with the most modern of freight-handling machinery. Even the great Chelsea piers that line the North River from Gainsvoort Market to Twenty-third street and which cost many millions are not supplied with the apparatus necessary for the quick and cheap handling of cargo. All these piers are intended for the use of the hand truck, a method of loading and unloading modern ships as obsolete as a Washington hand press for printing newspapers.

When we enter the overseas-carrying trade we are competing with the whole world. We can build ships as rapidly and as well as any other nation, but we must go further. Unless we can operate them rapidly and economically the advantage will still lie with the other nations. The one way out of this problem for the United States is to devise and perfect mechanical cargo-handling apparatus for the handling of general cargo freight as we have already done in the case of oil, grain and coal. When we have done that, the higher wages that must be paid to workers in this country will no longer be a factor of importance.

Signs of Awakening

That we are not entirely asleep regarding the necessities of the modernization of our ports is shown by the organization within the past six weeks of the Association of Material Handling Machine Manufacturers. These firms, realizing that within a very few months the seaboard cities of America will be compelled to stir themselves and provide modern apparatus for carrying on ocean trade, have taken time by the forelock and arranged to meet half way any request for ideas or suggestions that may come to them. In view of the fact that every port on the Atlantic and Gulf Coasts is in urgent need of modernization, it is reasonable to expect that a tremendous field of operations will soon open to firms able to show the port authorities of the country how time and money may be saved in the handling of export and import traffic.

At the present time no one conversant with the facts will deny that America's new export trade is being asked to pay heavily for the privilege of shipping goods out of the country for sale in foreign lands. The proved fact that goods, once loaded, may be moved from Havana to Boston, a distance of 1320 miles, cheaper than from one pier to another in Boston, and that a cargo, once loaded, can be moved from New York to Rio de Janeiro at less cost than would be required to move it sixty feet while on shore, shows that something is radically wrong.

The war brought about a condition of affairs in railroad matters and shipping problems in which every citizen is taking a keen interest. Ports are a vital link between car and ship. To bring about an improvement that will make the nation's ports an efficient factor in the transportation of our products is clearly the duty of every American, but the exporter has a stake in the matter much bigger than anyone else. He already must pay higher costs for supplies and for labor than his foreign competitor, and he cannot afford to allow anything to continue that is certain to be a drain on his business. It is just as feasible for New York to have up-to-date facilities for loading and unloading, cleaning, repairing and bunkering ships as it is for any city in Germany. To spend billions for a merchant marine and then fail in providing proper terminals for it would be the greatest piece of business folly in the history of the world. Adequate facilities to assure the greatest possible service return from our ships are now lacking; it is up to the business men of America to see that the needed improvements are speedily brought about.

Electric Tractor in use on a San Francisco Wharf

On the Shores of Gray's Harbor

FIRE of mysterious origin which broke out about five o'clock Friday evening, May 9, at the Grays Harbor Motorship yard in Aberdeen, destroyed hull No. 21, an almost completed 4000-ton Ward type steamer for the United States Shipping Board; plumbers', tinners' and pipefitters' shops and a construction shed in the old Lindstrom section of the yard. The total damage is estimated at almost $500,000. A favorable wind, which blew flames and smoke out over the harbor, enabled the firemen to prevent the spread of the fire to the main machine shop plant, three hulls on the ways, and seven vessels lying at the yard docks.

The blazing hull of the steamer furnished one of the most spectacular fire scenes ever witnessed on Grays Harbor. The flames spread with amazing rapidity through every part of the ship, and within an hour had so riddled the planking that the outer works presented the appearance of a huge gridiron, riddled with jets of fire.

Cargo lumber shipments from Grays Harbor in April aggregated 23,320,000 feet and were carried in thirty-two vessels. Five more vessels cleared than in March and the amount of lumber carried was about 3,000,000 feet more. Of those clearing in April twenty-six went coastwise with 19,550,000 feet of lumber—one to Alaska with 230,000 feet, four to foreign ports with 2,253,000 feet, and one to Philadelphia with 1,287,000 feet. Of the foreign bound ships two went to Callao, one to England and the other to Mexico.

Six Grays Harbor off-shore lumber carriers have gone down to Davy Jones' locker in the last year: Schooner James H. Bruce, bound from Eureka to Newcastle, wrecked on Beveridge Reef, off Nicholson Island; schooner Expansion, bound from San Francisco to Suva, stranded near Suva; schooner Annie Larsen, en route to Hilo, wrecked off Maiden Island; schooner A. M. Baxter, bound from Suva to San Francisco, wrecked near Suva; schooner Ethel Jane, bound from San Francisco to Manila, wrecked in typhoon off Guam; auxiliary schooner Janet Carruthers, wrecked off Grays Harbor. This fact, together with that of the transfer to the East coast of most of the auxiliary schooners built upon the Pacific, has greatly decreased the number of vessels available for foreign lumber cargoes.

A new Pacific Coast record for loading an Emergency Fleet steamer with ties was accomplished recently at the Eureka Cedar Lumber & Shingle Company's mill in Hoquiam, when 1,352,000 feet of ties were swung aboard the steamer Klamath in twenty-one hours of working time. This beats the loading record made on the Wanzu in April by two hours, despite the fact that the Klamath carried 70,000 feet more of lumber. No other port on the West Coast has approached the speed records made in loading either the Wanzu or Klamath, which records are particularly noteworthy since both of these steamers are designed for the stowage of general cargo and the broken up hold space makes lumber stowage especially difficult.

With firm belief that he can pull the auxiliary schooner Janet Carruthers off the North Beach during the high tides of June, J. H. Price of Seattle, who purchased the wreck for about $11,000, has had two donkey engines from Portland shipped to the stranded vessel. The donkey engines will be placed aboard the schooner and with cables attached to anchors dropped into the deep water, an effort will be made to pull the Carruthers from the shore. Tugs will be in waiting at the opportune time to take charge of the vessel when it is afloat. The cost of getting the lumber cargo and machinery from the vessel ashore has been heavy, but Mr. Price states he expects to place the machinery in a schooner he is building in Seattle. He does not think he will be out anything on the lumber and machinery, but expects to make good any loss that might occur by saving the hull, which will bring a good sum if brought safely into port.

Organization of the Associated Commercial Bodies of Southwestern Washington has been perfected and steps begun to secure survey of the long-contemplated canal to connect Grays Harbor and Puget Sound at Olympia. Officers of the new organization include Colonel W. J. Thompson, Tacoma, chairman; A. C. McNeill, Montesano, vice-chairman, and H. B. Fultz, Olympia, secretary. Commercial clubs and chambers of commerce of the district have been asked to co-operate and gather all data possible for submission to Colonel C. T. Sturdevant, United States district engineer, with headquarters at Seattle.

Spectacular fire in an Aberdeen, Washington, shipyard

SEATTLE

By Special Correspondent

PUGET SOUND seafaring men are buzzing almost continuously over the new schooner rig displayed in these waters with the arrival of the Columbia River, now loading cargo at Vancouver. The new rig, in the absence of any previously accepted nautical term, is now referred to as the "jackass topsail," and many have been known to refer to the vessel itself as the "jackass schooner." The rig differs from the accepted schooner equipment in that she flies a triangular piece of canvas from each of four forward masts instead of the accustomed kite, and Captain Murchison, her master, declares that the rig has proved most advantageous.

Since its advent among Seattle shipping men, the new rig is being suggested for the schooners building hereabouts, as well as a possible equipment for some of the wood ships of the United States Shipping Board now idly riding at anchor in Lake Union, which are offered for sale by the United States Shipping Board.

It is asserted that any of the Ferris, Hough or Ward type wood ship can, with but few alterations, be turned into sailing craft, and would prove ideal carriers. The only differences voiced in the matter of thus equipping these vessels is as to which style should be adopted. Some advocate barkentine, others show a decided preference for the five-masted schooner, and yet others consider that these vessels would do well as full-rigged ships.

Lumber shipping circles showed considerable activity during the month. Five wood vessels of the Shipping Board Fleet took railroad ties for the government, destined for Philadelphia and Poughkeepsie. It is understood here that fifteen more wood ships are to be assigned as lumber carriers to load ties at Puget Sound ports for the Atlantic.

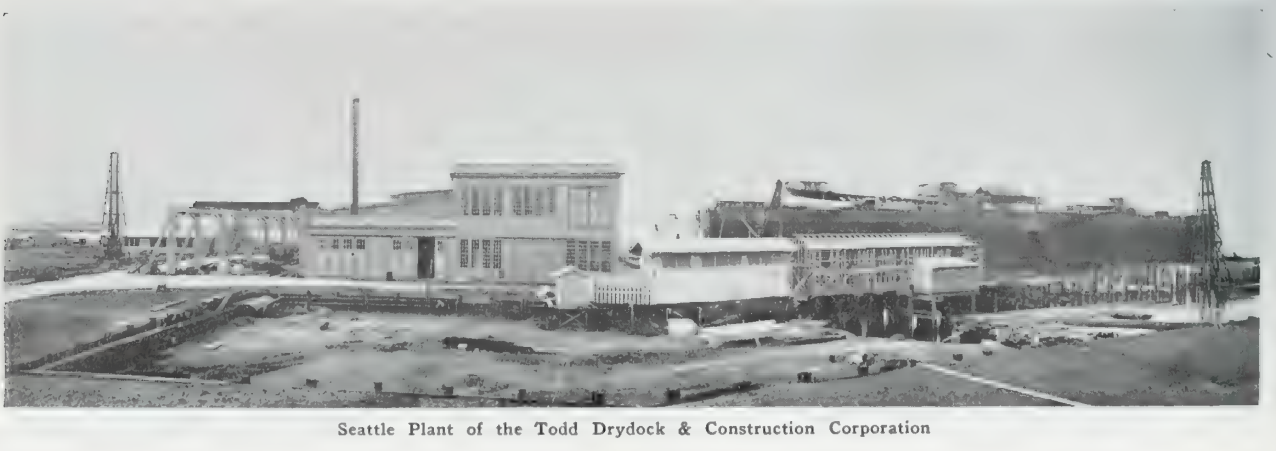
H. C. Cantelow, assistant general manager of the Pacific Steamship Company, left during the month for Washington, D. C., where he is to join H. F. Alexander, president of the Admiral Line, at an important shipping conference to be held with Edward M. Hurley, chairman of the Shipping Board. W. D. Benson, traffic manager for Frank Waterhouse & Company, was also summoned to this conference, which is expected to clarify much of the uncertainty now existing as to trans-Pacific shipping in general and the port of Seattle in particular.

During the month three liners—the Senaloa, Baja California, and Governor Forbes—resumed the service of the South American Pacific Company from Seattle to South American ports via San Francisco. The fourth steamer of this line, the Regulus, is still under government control.

Seattle is to have another new ocean service. Under an arrangement with the United States Shipping Board the Matson Navigation Company of San Francisco is to place four vessels on the once popular triangular run between Seattle, Honolulu and San Francisco.

On May 25 the Skinner & Eddy plant celebrated the launching of the fiftieth big steel ship built by that firm since it was established early in 1916. Of the fifty vessels constructed under the supervision of General Manager David Rodgers, master shipbuilder, all but four, including the fiftieth vessel, are in commission, and two of these four are to be delivered the first week in June.

Seattle shipbuilders delivered ten big steel ships to the United States Shipping Board in the month of May, and these deliveries, accompanied as they were by the necessary rigid trial tests, often resulted in a vessel making three trial voyages before the required adjustments were brought about to the satisfaction of the Shipping Board inspectors. In fact, the local harbor was the scene of well over thirty trial trips, including the wood vessels, during the past month. Early in May there were six vessels engaged in tryouts on the waters



Seattle Plant of the Todd Drydock & Construction Corporation of Elliott Bay and Puget Sound virtually at the same hour.

The wood steamships Wayucan and Fort Riley, the former built by Meacham & Babcock and the latter by the Seaborn Shipyard at Tacoma, have been assigned to W. C. Dawson & Company of Seattle to load ties for the Atlantic Coast, and both vessels are now taking on this cargo at Puget Sound mills.

The Osaka Shosen Kaisha liner Manila Maru arrived on May 11 with a fire in her No. 5 hold. The flames were discovered when the ship was five days out from Flattery, and the hatches were not removed until she had shifted from Seattle to Tacoma. At the latter port it was found that over 800 tons of freight and twenty-seven sacks of mail had been considerably damaged by fire, smoke and water, principally the latter. Cause of the blaze has not been determined.

Three Seattle-built wood vessels constructed for private owners entered commission during the past month. These are the auxiliary-powered schooners Brisk, Trolltind and Snetind, the first and last being five-masted craft, while the other is a two-masted full Diesel-powered ship. The Brisk loaded lumber at Tacoma, taking approximately 1,600,000 feet. The Snetind, operated by the Comyn, Mackall & Company interests for the Universal Shipping & Trading Company, loaded virtually the same quantity at the Port Blakely mill. The Trolltind, also under charter to the same concern, took on 300,000 feet of lumber here, and then proceeded to San Francisco to complete her load with general merchandise. All three vessels are to proceed to the United Kingdom for orders, making the first direct lumber vessels leaving Puget Sound for British or Northern European ports in a number of years.

The policy of the United States Shipping Board of honoring cities which have "gone over the top" in the several Liberty Loan drives by the naming of units of the big merchant fleet after them, will be initiated in the Seattle shipyards when the Skinner & Eddy plant launches vessels to be named City of Spokane, Colorado Springs and Wheatland, Montana, all three of which will probably be put in the water in June.

Owing to the failure of the United States Interstate Commerce Commission as yet to ratify the proposed agreement between the railroad administration and the steamship operators in the matter of absorption of freight handling and wharfage charges of commodities in transit to and from overseas, the Port of Seattle Commission, which recently enacted a new tariff based on the new agreement, was forced to reinstate its old tariff pending the final action. As a result, Commissioner W. T. Christensen, elected through the support of Commissioner Robert Bridges, has aligned himself with Commissioner Thomas S. Lippy, and the two have publicly announced their intention of curbing alleged interference practised by Bridges.

Honors for per capita subscriptions to the Victory Loan among the Seattle shipbuilding plants went to J. F. Duthie & Company.

S.S. Western Ally on the Todd Drydock

PORTLAND

By Special Correspondent

KEEL laid April 4, hull launched May 8, and ship completed May 19, is a record of thirty-six working days in turning out a completed 8800-ton steamer that Portland builders feel will not be exceeded during the last days of the government's construction program, and it stands as a record today in the United States.

The vessel is the City of Eureka, named in honor of the California city because it was first in the Victory Liberty Loan, and the plant at which the vessel was built that of the Columbia River Shipbuilding Corporation, which launched nine ships from February 1 to May 8, and in the same period delivered eight. The City of Eureka was sponsored by Mrs. Alfred F. Smith, wife of the president of the corporation.

Two special surveys were conducted on the hull of the City of Eureka during construction, the last being the day she was floated, and she is without doubt a thorough job. Five days after the hull was afloat the boilers were steamed up and all was in readiness for her dock trial, the main engine, a turbine, being sealed, and the entire circulating oil system tested.

The Columbia River Shipbuilding Corporation manufactures its own boilers and all of the auxiliary machinery and parts, and four ships, before the City of Eureka, were fitted out in from eleven to fifteen days each, so that this corporation can claim to be one of the fastest outfitting organizations in the country. The management has taken the stand that date of delivery is more important than date of launching.

Launching a 9500-ton steamer with her own whistle blowing, as her three Scotch marine boilers and main engine were in place, also all auxiliary machinery, the masts, funnel, davits and lifeboats, deck winches, windlasses and the like, was a new wrinkle the G. M. Standifer Construction Corporation introduced to the maritime world May 17, when the steamer Wawalona was floated.

Miss Elizabeth Menefee, niece of L. B. Menefee, vice-president of the corporation, was sponsor, and the Vancouver, Washington, plant was thronged with local residents and many from Portland. The Wawalona was the fourth 9500-ton steamer to be launched at the plant and the day she left the ways, the first of the line, the Cokesit, sailed from Portland with a cargo of flour for Europe.

The same corporation has floated several wood steamers with their masts and tophamper in permanent place and the hulls 100 per cent finished, only awaiting the installation of machinery, but the completeness with which the Wawalona was launched is said to establish a new mark in yards of the United States for a vessel of the size and design, and probably the same degree of construction has not been attained on a carrier of equal size anywhere in the world.

The Standifer ships are the largest under construction in Oregon and the plant is one of the most complete in the country, having been laid out expressly to meet war tonnage demands, also with a view to entering actively into competition for other tonnage during times of peace.

Up to May 15 there had been forty-eight completed wood steamers delivered to the government by builders of the Oregon district, just half of the total provided for being turned over. There were

Launch of the S.S. City of Eureka

S. S. Wawalona just after launching

thirty others ready, save for minor rudder changes, which were undertaken by the government on ships of the Ferris design. Up to May 1 there had been 108 vessels launched in the list of wood carriers, forty-five being Ferris ships, twenty-four of the Hough type, ten known as modified Ferris ships, because of having been equipped with twin engines and the hull lines altered somewhat; twenty-one Ballin steamers, which are composite vessels with steel topsides, and eight of the Peninsula type; a 4000-ton carrier designed by the Peninsula Shipbuilding Company and fitted with turbine engines. The total tonnage floated up to May 1 was 403,000, and during May several more hulls were sent overboard.

Thomas A. Thacher, attorney at San Francisco for the Shipping Board and Emergency Fleet Corporation, concluded an investigation May 15 of charges of alleged discrimination, countenancing excessive charges for lining material and labor and such accusations, brought against C. D. Kennedy, Portland agent for the division of operation, by W. J. Jones, a stevedore. Mr. Kennedy was exonerated, not alone of complicity, but Mr. Thacher said there was not the slightest justification for bringing criticism on Mr. Kennedy or members of his staff.

The Supple-Ballin Shipbuilding Corporation terminated its government hull program May 15 with the launching of the Diana, the eleventh hull floated there. The plant has floated the fleet since February 21, 1918, and the day the Diana went into the water the eighth completed steamer was delivered to the government. Of fifteen wood steamers recently sold in the East by the Shipping Board, five were of the Ballin design. The yard has delivered to date one-sixth of the total completed steamer deliveries in the Oregon district.

Members of the Oregon Wood Shipbuilders' Association, in session May 15, decided not to disband their organization until final adjustments had been made with the Shipping Board on contracts completed as well as those cancelled.

Dr. Andrew C. Smith of Portland, a well-known surgeon, who has been interested in the development of Southwestern Alaska for the past few years, has purchased the steamer Bergen, at Seattle, to operate between Kodiak and Nushagak. He has a mail contract between the two points. The Bergen was obtained from the Southern Alaska Cannery Company and will be in operation early in June.

The Commission of Public Docks has announced an additional program for storage facilities at the new St. Johns terminal, which will include tanks for molasses, soyo bean oil, cocoanut oil and such commodities. A fill is to be started shortly and when that is ready the tanks will be erected, all being in connection with the new Oriental service now in operation from Portland. B. F. Cresson, Jr., consulting engineer of the New York-New Jersey joint state harbor commission, who was here the middle of May inspecting water terminal facilities, pronounced the St. Johns project excellently located.

The Port of Portland Commission has determined to construct a sixth pontoon for the St. Johns drydock, bids to be called for at once. The dock is capable of lifting at least 8000 tons, and with the extra pontoon is expected to meet all demands during the next two years. The Commission of Public Docks has a 12,000-ton drydock on its program that may be undertaken shortly. Its construction will require fully a year.

C. E. Cox, Pacific Coast representative of the McIntosh & Seymour Corporation, is in Portland in connection with the installation of two sets of twin engines in two hulls of the Peninsula type, which the Emergency Fleet Corporation ordered converted from steamers to motorships. The engines are of 750 horsepower each, being of the six-cylinder type, and were originally built for 5000-ton fabricated vessels. Similar engines installed in five vessels built for the Australian government at Seattle have proved highly satisfactory.

Two Portland-built wood steamers have been assigned to load ties and lumber on the Columbia River for the United Kingdom—the Awensdaw, of the Supple-Ballin fleet, which the Pacific Steamship Company will operate, and the Fort Stevens, constructed by the Grant Smith-Porter Ship Company, and to be managed by the Columbia Pacific Shipping Company. The government has named a rate of $45 on ties and $50 on merchantable lumber, shipments of the latter material on each vessel being limited to about 200,000 feet.

The return of the liner Rose City, of the San Francisco & Portland Steamship Company, to the Portland-San Francisco service, proved welcome to the traveling public last month. With Captain T. J. Macgenn in command and John Jackson, veteran engineer for the company, in charge of the important "black gang" department below, the vessel promises to retain her oldtime popularity.

Scotch Marine boilers being shipped from a Portland shop

LOS ANGELES

By Special Correspondent

PLANS for the immediate extension of local harbor improvements are being made by the harbor commission as the result of the approval by the people of the city in the bond election, May 6, last, of the issuance of $4,500,000 worth of bonds for harbor improvements. The harbor funds have been exhausted for many months. The first steps to be taken by the harbor commission will be the enlargement of the office and drafting force of the department in order to prepare the necessary plans for the actual work. Funds for this purpose will probably be borrowed from the city treasury, as the bond money cannot be available before September 1.

The first work to be undertaken will be the completion of Harbor boulevard. Construction work will begin at Fifth and Front streets, San Pedro, and also at the southerly side of the west channel. The portion of Harbor boulevard in San Pedro now ends at Fifth and Front streets. Southern Pacific and Pacific Electric tracks along Front street will be removed easterly or toward the main channel of the harbor and the Boulevard completed to the outer harbor and crossing above railroad tracks at Fourteenth street.

Dredging of the west basin with the reclamation of land lying along the railroad tracks leading from the west basin channel entrance in a northerly direction will be another improvement begun immediately. Some seventy acres of land will be reclaimed there. It is planned to construct a drawbridge across the west basin entrance. This bridge will be of sufficient strength to carry freight trains if found necessary.

Through the extension of a jetty at Fish Harbor, tidelands which are expected to return an annual revenue of $1,400,000 are to be reclaimed.

Another immediate improvement will be the construction of a municipal ferry system and of terminal equipment, such as coal barges.

The harbor bonds were approved by the people by a large vote, the immediate cause of the approval being the resolutions of endorsement which all of the civic bodies of the city adopted previous to the election. There was no organized opposition to the bonds and the Saturday prior to the election the Los Angeles and the San Pedro Chambers of Commerce organized a large harbor day excursion which drew thousands of city people to the harbor. When Wilmington and San Pedro were annexed to Los Angeles, thus giving the larger city a port, it was agreed that $10,000,000 would be spent on harbor improvements within ten years. Five and a half millions have already been expended, and this bond issue takes care of the balance.

The most significant clearance from the local harbor in the last month was that of the steamer West Cajoot. The vessel was built by the Los Angeles Shipbuilding & Drydock Company and was the first steamer turned over to the recently formed Los Angeles Pacific Navigation Company for service between here and the Orient. The steamer will have sailed 14,500 miles before returning to this port. She will carry a cargo of 7956 deadweight tons of Los Angeles and Southern California products to Shanghai, Hongkong and Manila, loading on return with rice, burlap, gums and tea.

Two projects of interest to the local harbor and the Pacific Coast south of San Francisco were begun in the last month, viz., actual construction on the 10,000-ton drydock of the Los Angeles Shipbuilding & Drydock Company, and the organization of the Southwestern Drydock Company. Dredging for the drydock of the Los Angeles company is nearing completion, a pocket of fifty feet depth having been made in the west basin. Early in May, President Baker of the company placed a force of 500 men at construction work on the dock, which will be of the floating type. The filing of the articles of incorporation of the Southwestern Drydock Company took many local shipping men by surprise, as no intimation of the plans of the company had been made public. The company is incorporated for $1,000,000, divided into 10,000 shares of a par value of $100 each. The incorporators are Marco Hellman, W. F. Howard, Daniel F. Drake, Irving W. Hellman, Benjamin E. Page, James A. Talbot and W. G. Talbot. Officers of the company announced that construction work on the dock would begin as soon as the necessary detailed plans had been prepared and approved, probably within the next six weeks.

That the Southwestern interests intended to utilize the full extent of their leasehold in East San Pedro has been known for many months, as efforts of other interests to sub-lease a portion of these holdings always have met with refusal.

Local shipyards will not bid for contracts for foreign tonnage in the near future. This was the statement of officers of the Southwestern Shipbuilding Company and of the Los Angeles Shipbuilding Company. Their yards will be filled with contracts for the Emergency Fleet Corporation for many months. Neither of the local companies has bid on the new contracts for the Fleet Corporation. The latter recently asked for bids for vessels of 16,500 and 12,500 tons.

B. F. Cresson, Jr., who represents the harbor department of the port of New York, was a visitor to Los Angeles last month, inspecting facilities. He will make a tour of the entire Pacific Coast.

Dredging of the channel to connect the Long Beach and local harbors is proceeding rapidly. The dredging was begun in the Long Beach end and the dredge is working its way here.

TACOMA

By Special Correspondent

IT is believed that within a short time an active campaign will be started by Tacoma to boost the marine business of the city and place before shipping interests throughout the United States and in foreign countries just what facilities this port possesses of interest to steamship companies. In this connection it has been realized for a number of years that Tacoma business interests and the papers there have not played up the port trade as they should have done. Tacoma has now reached a point where such publicity is vitally necessary. The world should know the port commission work and the plans being made by this body for bettering shipping facilities.

One point that will be hammered upon is the fact that there are several good harbors on Puget Sound and that Tacoma is twenty-eight miles from Seattle. Seattle and Tacoma to Eastern shippers have become synonymous with much resultant detriment to Tacoma.

Tacoma will, within two years, under the proposed plans, have the finest dock facilities that it is possible to arrange. Machinery will enter into the cargo-handling proposition and there will be no congestion of freight on the rail side, which has been found in some ports where fairly good dispatch has been given freight over the docks.

In the Shipping Board's official statement of the harbors of the United States, Tacoma and Seattle are credited with having the only harbors with water enough for vessels of any draft. Tacoma in this report is credited with only six steamship lines. A rough list gives Tacoma thirteen lines, three of these having their terminus at their general Pacific Coast offices at Tacoma. These three are the Garland, the Osaka Shosen Kaisha, and the Pacific Steamship Company, the financial interests of the latter being handled in Tacoma, where the head officers have made their homes.

Just to what extent the publicity question will work out has not been determined fully, but it is being discussed with the hope that a fund can be raised for systematically advertising local facilities in a manner and through mediums which will show shippers just what the advantages of Tacoma in marine lines mean to them.

Christened by Miss Marguerite Bonnell, daughter of General Manager J. E. Bonnell, of the Tacoma Shipbuilding Company, the 3500-ton Ferris-type steamer Dione was launched at midnight the night of May 7. This makes the eighth vessel constructed at this yard. At present two cancelled hulls are in the stocks partially finished. These, it is believed, will be converted into barges or rigged as barkentines.

The old passenger steamer Magnolia, owned by Captain O. G. Olsen and Arthur Hunt, which has been converted into a tug boat, has undergone trial runs and is making good as a towing vessel. It is not believed that there is a tug on Puget Sound which can keep up with the Magnolia, and the boat is surpassing the expectations of her owners as regards towing. The vessel is 118 feet long by 18 feet beam and powered with a triple expansion engine.

Making the eleventh vessel launched since the Todd Drydock & Construction Corporation began work at Tacoma, the 7500-ton steamer Ossining was successfully launched the morning of May 6. The vessel was sponsored by Miss Retha Hicks, and twelve-year-old daughter of Dr. and Mrs. Grant S. Hicks of Tacoma.

With the launch of the Ossining, the Todd plant is now getting down to an active stage of construction, which bids fair to set the pace in these lines for a number of yards in the United States.

Gratifying reports have been received from members of the crews of vessels built at the Todd yards. From the time the Anacortes left Tacoma until she arrived at New York on her return voyage from La Rochelle, France, not one cent of money was spent on repairs and her machinery worked to the highest satisfaction of the engine-room crew.

Launch of the S.S. Ossining and her sponsor, Miss Retha Hicks

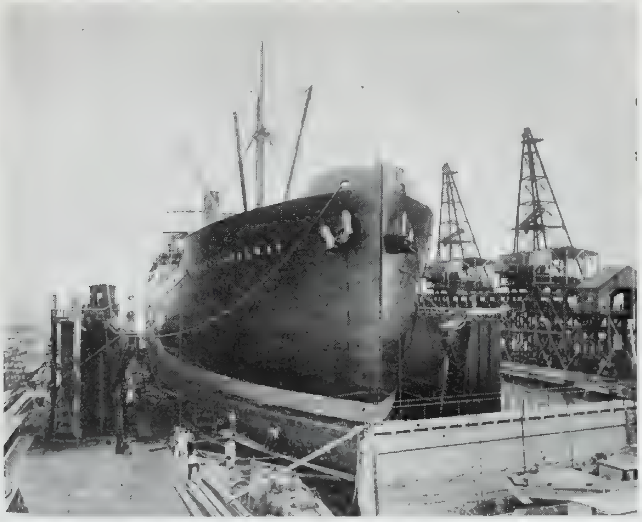
Honolulu Notes

THE Inter-Island Steam Navigation Company has been working hard to enlarge its plant and soon will have greatly increased docking facilities. The dry dock pier, after removal of the dock, will be able to take care of vessels of 400 feet in length. New slips which are now under construction and should be ready for use by July are of the following dimensions: Slip No. 1, 850 by 180 feet; Slip No. 2, 950 by 160 and 230 feet wide at the proposed location of the drydock. Pier 2, also under construction, runs 650 feet on the slip, while Pier 1, just completed, is 156 feet on the harbor and 612 on the slip. With the facilities under construction, the harbor will be in very good shape in the near future to take care of large tonnage.

Honolulu's bunkerage business is increasing rapidly. The present storage capacity of the Inter-Island plant is 100,000 tons with unlimited additional space as it may be needed. The plant for coaling the ships that call at this port consists of two complete Hunt coal conveyors, both for discharging and reloading purposes. These are capable of discharging from 3500 to 4000 tons of coal per day.

There are two automatic conveyor barges for bunkering with a capacity of 1800 tons each, and a maximum discharge of 300 tons apiece. When a rush order is necessary the two can load a ship at the rate of 600 tons an hour.

Announcement was made by Colonel H. C. Newcomer early in May that Congress has authorized a preliminary survey of the port of Honolulu to determine the needs of Honolulu for Federal aid under the rivers and harbors act. Call was made by him for communications from any interested persons setting forth just what is needed and explaining in detail the amount and character of commerce existing or reasonably prospective which will be benefited by the improvement, and the propriety of its construction and maintenance by the United States government. All of these tenders must be in his hands by June 1, after which the survey will be made and the results thereof forwarded with his recommendations to Washington.



Practically all of the requests made by the harbor board were recognized by the legislature as being reasonable, and appropriations greatly to enlarge harbor facilities were incorporated in the loan bill which was put through at the end of the session. This will give the harbor funds to complete its wharf system and allow a much greater ease in docking ships and discharging and storing cargo. More than $2,000,000 is thus made available for the Island ports, the majority of the money to be spent in the harbor of Honolulu, and construction to begin in the near future. After this work is done, according to marine engineers and others in intimate touch with harbor development, the port will be as nearly a model for its size as can be found on the Pacific.

Negotiations on the much mooted question of a free port zone for Honolulu, after being argued pro and con in the recent session of the territorial legislature, this month reached the stage where Governor McCarthy was empowered to appoint a commission of representative business men of the Islands to meet and consider the advisability of the question. There is very strong opposition to the proposed free port.

Mayor Rolph's steamer, the Annette Rolph, arrived in Honolulu May 4 in distress from Suva after a trip from that port lasting thirty-four days. The vessel was making only two knots an hour when it sighted Diamond Head and its boilers were in bad shape. The supply of provisions was at low ebb and Captain Rasmussen was on the point of putting out two boats to look for help when the engineer announced they could make Honolulu. Less than 100 tons of coal were in the bunkers when they entered the harbor long after

Upper: S.S. West Hardaway in dock of the Inter-Island Steam Navigation Co.
Lower: View showing work on the enlarging of the Inter-Island docking facilities

dark had fallen. The vessel will very probably be here some time undergoing repairs.

The third wreck that has taken place on the coast of the windward islands of the Hawaiian group in the past few weeks occurred April 25, when the American schooner William Oleson piled up on the coast of Nihau, off the island of Kauai, about 8:30 o'clock. The captain, D. McDonald, believed himself to be well to the north of all the islands, but had drifted down in the ocean current during a dense fog and struck without warning. All his men were saved, but the cargo of 530 tons of copra and 364 barrels of oil were lost. N. H. Hickman of San Francisco was the owner. The schooner, a four-master, was built nineteen years ago in Alameda and has plied the southern seas many times. Captain McDonald was part owner. His share of the vessel was not insured.

Instead of relief from the passenger congestion that has gripped Honolulu for the past several months, the situation is getting steadily worse, as steamer after steamer has been arriving from the Orient fully booked up in all classes but steerage, and the Matson liners, which now number the Manoa, Lurline and Sachem, to Honolulu, are inadequate to handle the traffic. Hundreds are booked for weeks ahead. For example, Stephen Mather, director of national parks, who has been in the Islands some days looking into the proposal to make the Kilauea volcano district into the westernmost link of the national park system, was disappointed in his request for transportation made to the T. K. K. through Washington and may be forced to sign on as a member of the crew of a freighter. His early return to Washington is imperative. Transportation was promised him and at the last moment he was notified there was no space available.

VETERAN PILOT RETIRES

CAPTAIN J. R. MacCaulay, veteran pilot of Honolulu harbor, has just closed an eventful career of fifty-one years as a mariner, the last twenty-seven of which he has been acting as port pilot. On May 1 he brought his last charge, the steamer Stanley Dollar, into the inner harbor. The captain affirms he is far from going to the "bone yard," but intends to spend the next few years on a pleasure cruise in which all he will have to do will be to enjoy life. He will go on to San Francisco on the transport Sheridan the middle of May and from there to New York and across the Atlantic to visit his boyhood home in Stornoway, Scotland, returning late in the summer.

Hardly a skipper plying on the Pacific but knows Captain MacCaulay, who has literally taken thousands of ships in and out of Honolulu. He has a record in his journal of one ship where the "skipper," to his astonishment, proved to be a very attractive young woman.

He first went to sea in a China tea clipper in 1868, at the age of fourteen. In 1881 he came to the Hawaiian Islands as chief officer of the American ship Paul Revere and from that date until 1893 was in the service of the Hawaiian government.

The captain was the central figure in a picturesque incident of old Hawaii, when the revenue cutter Lehua was fitted out with cannon and ordered out, with MacCaulay in command, to scour the seas for a pirate ship reported to have outfitted in Vancouver with the avowed intention of "raising hell" in Honolulu. Word of the reception committee that awaited their arrival must have reached them in time to turn the pirates back, for they never appeared and the Lehua returned after a three months' search.

Captain J. R. MacCaulay

Captain MacCaulay was chief officer of the Claudine when it carried the Hawaiian commissioners to the Coast on annexation business. To the annoyance of San Francisco port officials, the Claudine calmly sailed past all port restrictions and broke all the rules in the book, but the commissioners arrived in time to catch their train for the East.

COLUMBIA RIVER STEAMER

Steamer service between Portland and Lewiston, Idaho, on the Snake River, which has been suspended for more than a year, is to be resumed June 1 by the Oregon City Transportation Company with the steamer Grahamona. She is a sternwheeler with a capacity of about 200 tons and is among the lightest draft vessels of the inland fleet.

Portland's Oriental lumber trade is exhibiting indications of a strong revival. The Japanese steamer Kaian Maru, a new carrier of the 8800-ton class, loaded early in the month with more than 4,000,000 feet for Shanghai, and the Shimpo Maru arrived the last of the month to load for the same port, both vessels being furnished cargo by Dant & Russell. The Atogosan Maru, of the Mitsui fleet, is due to leave Yokohama for the river June 6 to load 3,000,000 feet for the other side.

PANAMA

By Special Correspondent

THE Sierra Cordoba, the first of the five German steamships, formerly interned in Peruvian ports, on which repairs were completed by the mechanical division of the Panama Canal, was turned over to the marine superintendent, for the United States Shipping Board, ready for sea on April 5, 1919.

This ship was formerly in the South American trade and took refuge in the Peruvian port of Callao at the beginning of the war, where she was kept interned until turned over to the United States Shipping Board for repairs and operation, by the Peruvian government. As soon as this arrangement was effected, the Canal dredge Culebra was sent to Peru for the purpose of towing the ship to Balboa for repairs. The Sierra Cordoba arrived at Balboa in tow in October, 1918, and since that time work on her has been rushed, and, considering the condition the ship was in, the record made by the mechanical division is remarkable.

Due to the long internment and the destruction wrought by the German crew, the ship was in a very dilapidated condition. Practically no maintenance and repair work had been performed on the ship after Germany's declaration of war and the hull was badly corroded. The cylinders of the propelling engines were badly damaged by explosives; main valves, air pump gear and other miscellaneous brasses and fittings were dismantled and thrown overboard. Many important and essential castings of the auxiliary machinery were broken to pieces with sledge hammers or could not be found. In crippling the ship, particular care had been taken to destroy or remove such parts as would render extensive design work necessary for their replacement.

The water had been removed from the main boilers and fires burned in the furnaces to their full capacity in an endeavor to completely destroy them, which was only prevented by the presence of superheating tubes with which the boilers' flues were fitted. All furnace fittings were destroyed and the riveted joints, boiler stays and tubes damaged. The Huns did the work of destruction, dismantling and disabling of this ship with their characteristic thoroughness, but the Americans at the Canal went at the work of rehabilitation with the same thoroughness and in a fighting spirit.

Microscopic, physical and chemical tests on various specimens of the boiler plate showed the steel still to be of good quality and unaffected by the great heat to which it had been subjected. Therefore, the boilers were rebuilt, using new rivets, stays and tubes. The furnace fittings were readily replaced by the Canal foundry, and repairs on the stack, uptake and forced draft ducts proceeded simultaneously with those of the boilers. As hydrostatic and steam tests of the completed boiler plant indicated excellent workmanship, no delay was experienced in placing the entire machinery department under steam.

In the meantime, patches had been fitted to the main engine cylinders to replace parts that had been broken, were missing, or completely destroyed. Cast-iron liners were then inserted in the cylinders to take the pressure strains in the cylinder barrels; damaged ribs and flanges were built up by the electric welding process and machined so that when finished the cylinders were substantially repaired and in working condition.

By the excellent work of the shop forces in designing missing parts, renewing parts from samples and repairing castings, it was possible to restore this vessel to a condition practically as good as new. The work represented approximately 400 separate jobs, all completed within six months after the arrival of the ship at the Balboa shops. The ship was repainted and given a general overhauling. All electrical fixtures were removed and the entire ship rewired and refitted with American fixtures.

British Transport carrying homeward bound New Zealand troops passing through the Big Cut in the Panama Canal

S. S. Callao made over from the old German steamer Sierra Cordoba

The Sierra Cordoba was renamed the Callao, after the Peruvian port of that name. She was formerly owned and operated by the North German Lloyd Steamship Company, and was one of the four fastest and best equipped passenger vessels of that line, plying between Bremen and Buenos Aires. She was built in 1912 and registered at Bremen. Her capacity is 8226 tons gross and her length 461 feet over all, and 438 feet at load water line, with a hold thirty-eight feet two inches deep. Her indicated power is 4000 horsepower and she was capable of a speed of thirteen knots. She was fitted for 115 first-class passengers, 1572 third-class and steerage, and has quarters for a crew of 179 officers and men. The capacity of the four holds is 364,838 cubic feet.

The vessel is fitted with two triple-expansion marine engines, driving twin screws, power being furnished by four marine type Scotch boilers at a working pressure of 200 pounds. The boilers are heated by coal and are fitted with the Howden forced draft system. The auxiliary machinery is of first-class quality, including one Atlas-Werke evaporating and distilling plant, two sixty K. W. D. C. generator sets, one auxiliary condenser, one Vulcan-Werke ash hoist engine, one Clayton system disinfecting machine, and one Atlas-Werke main and one auxiliary steering engine, fitted with telemotor control gear.

The Callao made a successful trial trip on April 2, during which her machinery was operated at maximum capacity. The ship then passed through the Canal to Cristobal, where cargo was loaded for New York, for which port she was cleared on April 8. Upon arrival at New York the Shipping Board was so well pleased with the work done at the Panama Canal that the following radiogram was sent to Governor Harding:

"Washington, D. C., May 2, 1919.

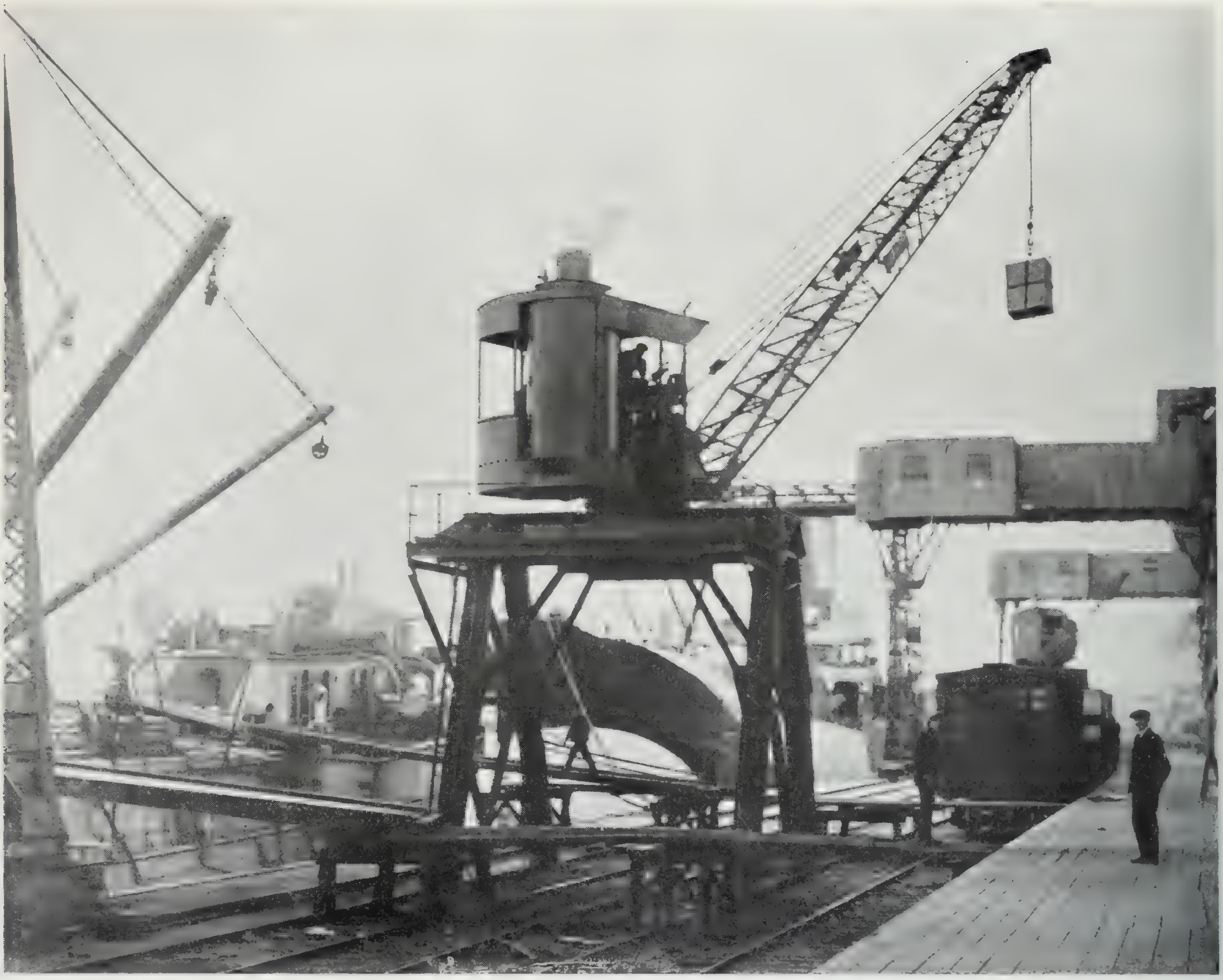
"Colonel Chester Harding,
Governor, the Panama Canal,
Balboa Heights, C. Z.

"Shipping Board highly appreciative of very efficient work performed by your organization in repairs of the Sierra Cordoba, now named Callao, which recently arrived at New York after a most successful passage. On behalf of myself and the board, I desire to express thanks and appreciation of what you have accomplished. You will be gratified to know vessel is now on her way to Europe to bring our boys home.

EDWARD N. HURLEY, Chairman."

SCANDINAVIAN MERCANTILE MARINE

This year the well-known Norwegian shipping register, Norske Veritas, has been enlarged so as to include all Swedish and Danish as well as Norwegian ships of over 100 tons, so that it becomes a complete register of the Scandinavian mercantile marine. From statistics given in the register, it appears that the commercial fleets of the three Scandinavian countries were composed as follows: Steamers and motorships—Norway, 1393 ships of 1,580,268 tons; Sweden, 1029 ships of 890,338 tons; Denmark, 446 ships of 616,421 tons. Sailing vessels—Norway, 190 ships of 239,084 tons; Sweden, 219 ships of 63,263 tons; Denmark, 197 ships of 65,703 tons; making a total for the whole of the Scandinavian mercantile marine (steam and sail) of 3474 ships of 2,455,077 tons. It is interesting to note that, although Denmark has the smallest fleet of the three countries, Copenhagen stands first among individual towns as being the port of registry of 323 ships of 542,618 tons, with Christiania second (311 ships of 441,915 tons) and Gothenburg third (322 ships of 402,469 tons). The amount of new tonnage under construction at the beginning of this year was: Steamers and motorships—Norway, 135 ships of 90,245 tons; Sweden, 73 ships of 99,670 tons; Denmark, 57 ships of 67,002 tons. Sailing vessels—Norway, none; Sweden, 10 ships of 3000 tons; Denmark, 10 ships of 1925 tons; making the total for the whole of Scandinavia 285 ships of 250,842 tons.



Brownhoist harbor crane, Quebec Harbor Commission, Quebec

Wharf Crane at Quebec

THE city of Quebec, as far as port facilities go, is one of the best equipped ports in North America. It has a number of the most modern wharves, good warehousing facilities, grain elevators and a considerable amount of modern unloading machinery. This harbor work is under control of the harbor commissioners of Quebec.

Brownhoist Wharf Crane Instalied

The war resulted in increased activities at this already important port, with the result that additional handling machinery had to be installed. One of the principal machines added was a Brownhoist wharf crane. This machine has been in successful operation for some time. It is a steam-operated machine of the well-known Brownhoist portal pier type. The machine travels on rails spaced 15 feet 10 inch centers, and the portal pier is high enough to clear railroad cars operating on a track running between the legs of the pier.

Mounted on the pier is a hoisting and rotating crane. This crane swings in a full circle. The crane has a boom fifty-five feet in length and is also equipped with mechanism for raising or lowering the boom. The machine is operated by one man, and the motions of hoisting, rotating and traveling along the track can be performed separately, or these movements can be combined.

Rotates at 300 Feet a Minute

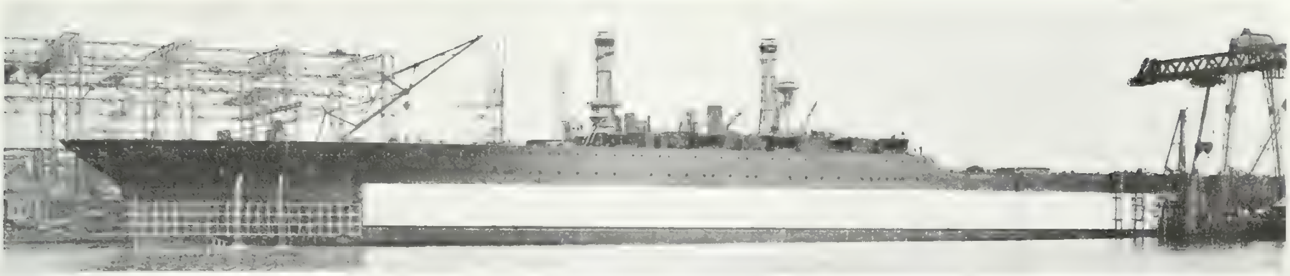
When working with a whip line, a load of 9500 pounds can be hoisted at the rate of 250 feet a minute. When handling the maximum load, a hoisting speed of eighty feet a minute is obtained. Rotating with full load is at the rate of 300 feet a minute.

The fact that these functions can be combined results in high speeds in the operation of unloading or loading a boat.

This wharf crane has a capacity of handling 5800 pounds at its maximum radius of 55 feet, and at its minimum radius of 20 feet a load of 23,000 pounds can be handled. As will be seen, capacities of the crane are such that in the handling of miscellaneous ships' cargo, it will take almost any package that goes into the ordinary ship's hold.

FIRE AND MARINE REINSURANCE

IT appears that before the war it was a practice of German insurance companies to reinsure the risks of insurance companies all over the world and from this reinsurance they made enormous profits, Consul General Albert Halstead of Stockholm reports. At that time the United States had very few marine insurance companies and the fire insurance was very largely in British hands. The war having developed an American mercantile marine. American marine insurance developed considerably. The opportunities afforded the American fire and marine insurance companies to enlarge their fields of operation and to engage in a reciprocal reinsurance with foreign countries should now be considered.



U. S. S. Tennessee at outfitting dock

U. S. S. Tennessee

THE battleship Tennessee was launched at the Brooklyn Navy Yard, New York, on April 30. The Tennessee is a sister ship of the California, building at the navy yard, Mare Island, California, which is scheduled to be launched early in the fall. As a result of experience gained during the war, numerous changes have been made in these vessels, and the Tennessee embodies the latest ideas in protection and subdivision.

Principal data:

Length over all, 624 feet.
Breadth, extreme, to outside of armor, 97 feet 5¾ inches.
Mean draft, 30 feet 6 inches.
Displacement, 32,600 tons.
Launching weight, 16,000 tons.
I. H. P., 28,000.
Speed, 21 knots.
Water tube boilers, 8.
Fuel oil capacity, normal, 1900 tons.

Armament:

Twelve 14-inch guns.
Fourteen 5-inch guns.
Four 6 pounders.
Four anti-aircraft guns.
Two torpedo tubes.

The Tennessee will be manned by a crew of fifty-eight officers and 1024 men. This ship will burn oil exclusively, and, like the New Mexico, will be equipped with electric drive. This system of propulsion was installed on a battleship for the first time on the New Mexico, and has proved its value. The keel of the Tennessee was laid on May 14, 1917. Although her construction has been materially delayed on account of urgent warwork, it is expected that she will be completed early in 1920. The present ways are to be reconstructed for the purpose of constructing battleship No. 50, which has been assigned to this navy yard. There was only three and five-eighths inches clearance between the ship and the ways in the launching of the Tennessee. The lubricant used was Neptune launching grease.

The first Tennessee, side-wheel steamer, was captured at New Orleans, Louisiana, by the Union fleet on April 25, 1862. She was commissioned in the United States Navy on May 8, 1862; name changed to Mobile, September 1, 1864; and sold on March 30, 1865.

The next Tennessee was an ironclad ram, captured by Farragut's fleet at the battle of Mobile Bay, August 5, 1864. She was taken into the United States Navy, laid up at Algiers, Louisiana, and sold on November 22, 1867.

The third Tennessee was a steam sloop launched at navy yard, New York, July 8, 1865, as the U. S. S. Hadawaska; renamed Tennessee on May 15, 1869. She was then timbered up to the necessary height to allow a spar deck to be built in her, and she thus became a first-class frigate, 4840 tons displacement, 335 feet between perpendiculars, 45 feet 2 inches beam. "On account of her roomy and comfortable quarters for officers and crew and her fine qualities as a sea boat, she was a general favorite in the service." (Report, Secretary of Navy, 1887, page 238). Up to 1875 the Tennessee was most of the time in ordinary at the New York yard. From May 1, 1875, until July 23, 1878, she was flagship of the Asiatic squadron. From December 10, 1879, to January 20, 1887, she was the flagship of the North Atlantic squadron. She was sold September, 1887, for $34,525.

The fourth Tennessee was an armored cruiser, launched December 3, 1904, at the William Cramp & Sons Shipyard, Philadelphia, Pennsylvania, and commissioned July 16, 1906. Name was changed to Memphis, May 25, 1916. Wrecked August 29, 1916, in harbor of San Domingo.

The new Tennessee was built under the direction of Captain J. A. Spilman, naval constructor at the Brooklyn Navy Yard.

U. S. S. Tennessee in the East River just after launching

IMPROVEMENTS IN OAKLAND'S BIG YARD

THE Moore Shipbuilding Company of Oakland is going after its share of the shipbuilding business of the world. This fact became evident with the announcement by officials of the company that the plans heretofore adopted in the policy of expansion have been broadened in favor of a still more modern arrangement in the company's shipyard for the conservation of time, energy and expense in building and repairing the largest of ocean carriers. These plans, recently completed, mean the expenditure of $2,500,000 in building two marine railways and the largest floating drydock on the Pacific Coast. The drydock will be situated, with reference to the machine shop and fabricating departments of the shipyard, so as to make the arrangements most economical in constructional features.

Work has just been commenced on the drydock, which is to be placed in a specially dredged basin on the site of the present building slips Nos. 2 and 3. It had originally been planned to have the drydock on the property recently purchased from the Western Pacific Railroad Company, where the Moore Shipbuilding Company had secured an additional frontage on the estuary of 530 feet. This plan was abandoned in order that the drydock would be nearer the machine and plate shops and other producing units essential to the building and repairing of vessels. This arrangement also allows the company to take advantage of the cranes which now serve the building slips that are to be supplanted by the drydock.

The drydock, itself capable of handling any vessel that can pass through the Panama Canal, will consist of five sections, each section being ninety feet long, with an overhang that will make an aggregate length of 500 feet and 125 feet in breadth of beam. It will accommodate vessels as high as 20,000 deadweight tons and will be the only drydock of its kind with so large a capacity between the Atlantic Coast and the Orient.

Further augmenting the equipment of the Moore shipyard will be the two units of marine railway, each 375 feet in length and able to handle smaller vessels, up to 5000 deadweight tons, seeking alterations or repairs. The marine railways are now being built where it was first intended to build the floating drydock, on the 530 feet of harbor frontage purchased from the Western Pacific Railroad Company. The cost of these two units will be $1,250,000, and work on them is well under way.

IMPROVEMENTS AT CLYDE

The symbolical key to the new shipbuilders' town of Clyde, in Contra Costa county, California, was formally presented to R. N. Burgess, president of the Pacific Coast Shipbuilding Company, by A. J. Frey, assistant manager of the Southern Pacific district, Emergency Fleet Corporation, at the opening of the 176-room Hotel Clyde on May 17. Mr. Frey served as president of the Clyde company, which built not only the hotel but the entire town of Clyde, designed especially for the employes of the shipbuilding company, whose yard lies three miles distant, on Suisun Bay, a branch of San Francisco Bay. Town and yard are to be connected by special electric transportation.

As a result of the government's participation, the town was laid out with the benefit of the experience of one of the best known of American architects, Bernard R. Maybeck, who gave his advice on matters of town-planning as well as architecture. G. A. Applegarth was architect of the hotel and of many of the houses, and the town was actually built under the direction of A. H. Markwart.

View of the gatehouse from the yard, Moore Shipbuilding Co. As each department in the yard went over the top 100 per cent on the Victory Loan its record was posted as shown in the picture. This created a great enthusiasm and competition between departments and the yard piled up a total of over $641,000

Above: Hotel Clyde, the new hostelry built for the employes of the Bay Point yard of the Pacific Coast Shipbuilding Co.
Below: S.S. Diablo on her trial spin

Above are shown the sponsor and her party at the first launching from the yard of the Union Construction Co. on the Oakland waterfront. The big freighter Hatchie, first of ten sister ships to be built by this yard, took her maiden plunge beautifully and will undoubtedly prove a credit to her builders. She was sponsored by Miss Marion Peake, daughter of Mr. H. G. Peake, Vice-President and General Manager of the Union Construction Co. In the picture with the sponsor are shown her mother and Mrs. W. W. Johnson and daughter. Below: The S. S. Hatchie ready for launching.

SAN FRANCISCO FREIGHT REPORT

OUR last report was dated April 19, and the opinion we had then that freights would improve has been thoroughly realized.

The American iron sailer Chin Pu was chartered by Strauss & Company for June loading at $35, Cork for orders, United Kingdom, Havre, Antwerp or Dunkirk, full cargo of barley, option of Scandinavian ports $40. She was expected here about the middle of May, but about a fortnight ago cables came advising that the cargo of oil cake from Manila was on fire and that the captain had beached his vessel at Nagasaki. She will now, therefore, be more like August loading than anything else.

Strauss & Company also took the first steel steamer chartered this season, namely, the Japanese steamer Oridono Maru, to the United Kingdom, Havre, Antwerp, at $38, option of Copenhagen at $40, full cargo barley, vessel to receive orders at her last coaling port in Virginia.

The American wooden barkentine Rose Mahoney, which had been waiting in the harbor for freights to improve for over a fortnight finally succeeded in getting a very good rate for that class of vessel, Balfour, Guthrie & Company having paid her $36.50 per ton on barley to a port in the United Kingdom.

The United States Shipping Board followed the rise in freights and raised their rate of $30 on wooden steamers for barley to the United Kingdom to $35, at which rate G. W. McNear, Strauss & Company and the United States Trading Corporation each took a steamer for May-June loading.

The only time charter reported was the Japanese steamer Yoshida Maru, No. 1, at 15 yen a ton on the deadweight, delivery Seattle, for a trip over to China with re-delivery Moji, taken by the Robert Dollar Company.

Lumber freights are also steadier and higher, excepting for the Orient, in which direction Japanese steamers have been chartered at from $22.50 to $25 a thousand, Shanghai and Taku Bar, Dant & Russell having chartered the Kaian Maru and the Shimpo Maru, and the Antogosan Maru, for Shanghai or Taku Bar, was taken by the Pacific Export Lumber Company.

The motorship Albert Menin has been chartered at $21 for lumber from Coos Bay to one port in Cuba. The motorship Suzanne was chartered at $45 for ties, Columbia River direct to a United Kingdom port, by Thane & Company.

Rates to Sydney were quoted at $32.50, Melbourne and Adelaide $5 to $6 additional, but no transactions to report.

The greatest activity in freights has been the demand for ties and lumber to the United Kingdom. The United States Shipping Board, fortunately, was willing to furnish their wooden steamers to the different shippers who had an opportunity to sell to English buyers. Christenson, Hanify & Weatherwax were the first ones to make a sale, and they are reported to have taken about twenty United States steamers on the basis of $45 a thousand feet, freight prepaid, for full cargoes of ties, with the option to charterers of 200,000 feet of lumber at $5 extra on lumber. Then A. F. Thane & Company came into the market both for redwood and fir sleepers, and they are reported to have been furnished ten similar steamers on the same basis. Since then almost every well known shipping firm has taken from one to five of these steamers at the same rates of freight. Had it not been for the United States government supplying this tonnage, we should, no doubt, have seen a much higher market.

Lumber freights to the United Kingdom have jumped from $47.50, a month ago, to $55, by increases of from $1 to $2.50 a thousand. For instance, the Mount Shasta was chartered at $52.50. A week later the Mount Hood and the Mount Whitney were chartered at $53.50, all freight prepaid and free of commissions to charterers, and today a lumber vessel can get $56 from a mill on Queen Charlotte Island, British Columbia.

For the West Coast the Alert has been chartered by the Mohns Commercial Company at $32.50 to Callao.

A new departure has been the chartering of two United States Shipping Board steamers for copra from this port to Europe, one at $50 per 2240 pounds weight to Spain and one at $45 to England.

We quote Africa at 225 shillings, Buenos Ayres $50 to $55, and there is a good demand in every direction. PAGE BROTHERS, Brokers.

AUSTRALIAN SHIPPING

THE export business between Australia and America is still stagnant, but there is a prospect of an improvement taking place shortly.

Considerable shipments of all lines of general cargo are being sent to the United Kingdom, but as already reported, shippers are inclined to hold their stocks in anticipation of being able to ship to the Continent. We are inclined to think that the shortage of tonnage, however, will control the position for some time.

Since last writing, several American sailing vessels have sailed for Pacific ports in ballast, and the only business available at present is coal for Honolulu, the rate being about 50 shillings a ton, but this does not appeal to charterers or owners.

The 3800-ton steamer Glorietta was dispatched the latter part of May to Honolulu to join the Matson fleet, carrying a partial cargo from Portland. She was built by the Albina Engine & Machine Works, which has its last ships for the government almost ready for the water. The plant launched the hull of the Glyndon May 5, she being the fifteenth hull to be floated there. Alice Benson Beach, a colonel in the National League Motor squad, which did timely service during the war, was sponsor.

San Francisco Shop of the Moore Shipbuilding Company

C. H. STODDARD CONSULTING MARINE ENGINEER FOR THE HEINE BOILER COMPANY

THE Heine Safety Boiler Company, well-known manufacturers of Heine water tube boilers, with plants at St. Louis, Missouri, and Phoenixville, Pennsylvania, are fortunate in securing the services of Charles H. Stoddard as their consulting marine engineer.

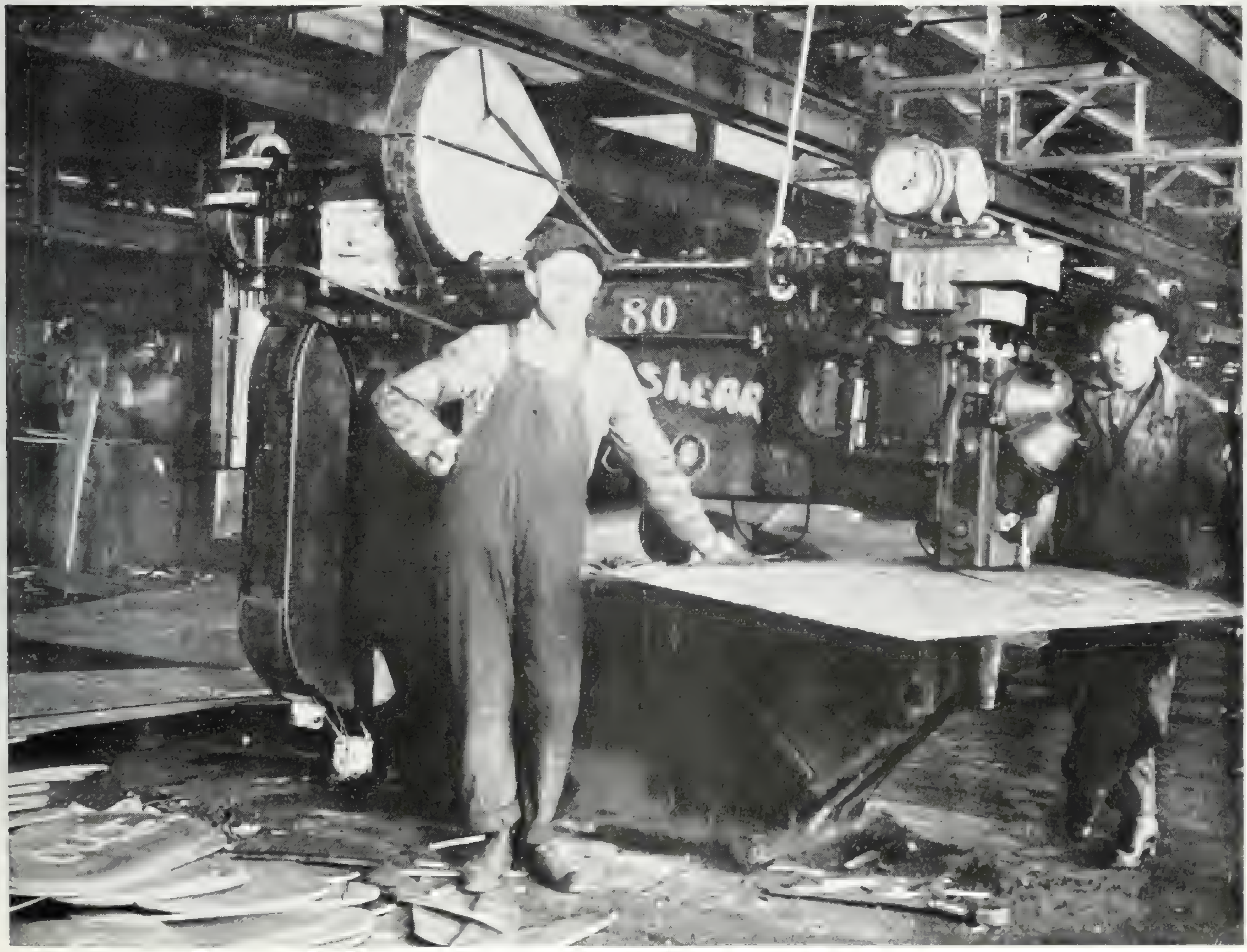
Mr. Stoddard is a native of California. He received his technical education at Stanford University, where he was a member of Pioneer class, 1891-1895, specializing in mechanical engineering. This class also turned out H. C. Hoover and Will Irwin.

From 1895 to 1900 he was employed in shops and drafting rooms in Cleveland, Ohio, and Pittsburgh, Pennsylvania. Then returning to the Pacific Coast he entered the drafting room of the Union Iron Works of San Francisco.

He was chief engineer of the Fulton Iron Works and of the Risdon Iron Works of San Francisco, and for nearly three years was civilian superintendent of Shops at Mare Island Navy Yard.

On January 1, 1916, he went to Moore & Scott Iron Works, and held the position of chief engineer of that company, now called the Moore Shipbuilding Company. He assisted them in their expansion from a repair shop employing 250 men to a shipyard with 9500 men on their payroll, holding contracts for forty-two steel cargo boats for the United States Emergency Fleet Corporation.

C. H. Stoddard



Quick-Work shear, Moore Shipbuilding Company

FIREMAN'S FUN
Insures Hulls, Cargoe
HEAD OFFICE: CALIFORNIA AND SANS
JOSEPH HADLEY, European Agent
3 LOTHBURY, E. C.
LONDON
G. KIRKHAM SMITH, Special Agent
714-715 BOARD OF TRADE BUILDING
PORTLAND, ORE.
FRANK G. TAYLOR, GENERAL AGENT FOR WASHINGTON, OREGON, AL

Underwriting Methods

By Chas. F. Howell

IT is becoming more and more evident that the plunging, haphazard underwriting methods that sufficed for the piling up of war risk premiums while the great world struggle was on are not going to answer under peace conditions. The war created an abnormal situation and built up, almost over night, an unnatural demand for extensive cover against the imminent perils of transoceanic navigation. The rates were of a bonanza character, and the profits became so immense that marine insurance adventurers flocked into the field to reap the inviting harvest, regardless of their dearth of skill and utter lack of experience. For a time the going was good and brokers and novice underwriters made fine fortunes in a few months. But now pre-war conditions are entirely of the past, and the business has settled down to its normal state of straight marine writing; the war risk gambler is facing the necessity of either playing his cards according to the strictest rules or else getting out of the game entirely. The really wise ones will follow the latter course. A capable marine underwriter cannot be made over night. It has taken him years to acquire an indispensable experience, and the new companies cannot get him because his kind are few and he is already safely stowed away in a luxurious berth. The margin of profit in marine insurance, under ordinary peace conditions, is extremely narrow. It taxes the finest judgment to avoid the many pitfalls that are laid for the underwriter by crafty brokers and conscienceless shippers and owners, and when he has done his best there is not much to show for his work. What, then, is to be expected of the novices who insisted that the war premium was the thing, and that a large income would take care of losses because the company would receive an average line on every risk and was certain to come out ahead? Already the results of this false theory are fast coming into evidence. The new companies are going to the wall every week. In New York City fresh rumors of company disasters are on the street each morning, and momentous changes in personnel occur almost daily. Reorganizations and retirements are the order of the hour. The result is found to be a restricted and more conservative market, with the entire elimination of the inexperienced and reckless plunger.

Satisfaction is generally expressed over the working of the new license requirements made of marine brokers by the New York Insurance Department. As a result of the extraordinary demand for marine insurance during the war a condition grew up in the brokerage field which demanded prompt and drastic consideration at the hands of the supervising authorities. Shippers were ruthlessly overcharged in excess of the premium rate by complaisant underwriters; the vessel insurance market was cornered again and again; cover notes were issued by brokers without the authority of any insurer, and provisional insurance was bartered and sold from hand to hand. The New York department took the matter up when the situation had grown so outrageous that underwriters all over the world were sneering at American marine insurance conditions, and after a series of hearings before Insurance Superintendent Phillips corrective legislation was enacted. The result has been the discontinuance of objectionable practices, without interference with the legitimate conduct of the business. Marine brokers are now required to be licensed, and agents as well, and the new insurance law has restored this branch of underwriting to its former good standing in the East.

Rate experts are unanimously of opinion that American marine insurance companies will have to get more for their coverage if they are to survive with their present facilities for protecting the foreign trade of the country. But, singularly enough, the underwriters show a disposition toward still lower rates. The fierceness of prevailing competition appears to be carrying some of them beyond the limits of sound judgment. According to reliable authorities more money has been lost on strictly marine underwriting during the first four months of the present year than in the whole of 1918. The trouble lies in the fact that losses sustained during the last two years of the war are only now beginning to come in, owing to the disturbed state of communication in 1917 and 1918, with the consequence that funds in company hands that were regarded as safely earned must now be heavily drawn upon to meet incurred liability. That great bugaboo of the marine underwriter, the wooden ship, is held up as a glittering example of what comes about through inadequate rates. A vast fortune in marine insurance money has been wasted upon them. They differ so materially, one from the other, with respect to insurable value, that each underwriter is forced to be in himself a court of

NSURANCE COMPANY
eights and Disbursements
EETS, SAN FRANCISCO, CALIFORNIA

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LOS ANGELES

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ATLANTIC MARINE DEPARTMENT
37-43 WALL STREET NEW YORK

BRITISH COLUMBIA, 264 COLMAN BUILDING, SEATTLE, WASHINGTON

last resort and to accept or reject as his judgment dictates. That means either higher rates or else disaster as the consequence of folly. Even in the cases of desirable risks of a better character, the profit-margin is altogether too narrow for comfort, and the rate increase would appear to be indispensable.

It would probably surprise the layman to know that war risk insurance is still being written, but such is the case. Floating mines continue to present serious problems of hazard, and shippers find it necessary to protect themselves against them. But, of course, the premiums have been greatly reduced through a reduction in rates. The war level was about 10 per cent; the present rate is one-half of one per cent for the most hazardous risks.

Concrete vessels interest marine underwriters immensely, but the general attitude toward them is one of thinly veiled suspicion. No data of any consequence are available to guide the insurance man in this unfamiliar path, and science shies at experiment. However, it is allowed that concrete construction is standing its tests admirably, and the fact that numerous ships of this class are being built leads to the belief that conservative protection at adequate figures will have to come. Naval architects have been called in to give the underwriters the advantage of their opinions, and the meeting rooms of the American Hull Underwriters' Association have seen repeated conferences on the subject. Rates, terms and conditions are continually being discussed. At present the lines that are carried are small, the rates high and the conditions restricted. To date the underwriting experience has been favorable. The Faith—the famous California product of last year—is regularly cited as an example of success in concrete construction, despite the defects it disclosed, but the classification societies, such as Lloyds, the Bureau Veritas, and the American Bureau of Shipping, appear to have suspended judgment. They are not prepared at present to lay down specifications for the construction of concrete vessels. This is not to be wondered at, for developments are so numerous and rapid, both as regards material and design, as to render any set of rules obsolete by the time they can be formulated. The average underwriter lists the following objections: The difficulty of running concrete into a "form" so narrow that the metal reinforcement almost fills the space, which may be necessary if the vessel is not to become too heavy, per capacity ton, to be considered a commercial success; the dangerous increase in porosity incident to the use of a treated stone which is lighter than water; and, most important of all, the effects of vibration. With regard to the last, it is urged by underwriters that tests of land structures of reinforced concrete are scarcely applicable to ships, as the problem of space occupied by concrete—that is, weight—is not so essential with them as with vessels, and the vibration in the former case is more intermittent and infrequent. Usually, also, as in the instance of a railway bridge, the structure is subjected to a strain that is in one direction only during the vibratory period. Again, a ship is a moving object, subject to continually changing strains and stresses, while the vibration of the machinery is, though perhaps of smaller amplitude, of higher frequency, and continuous. The effect of this, in anything but the heavily constructed vessel, and even to some extent in that, would be the crystallization of the metal reinforcement and the disintegration of the concrete itself, due to their varying elasticity, at the point of juncture between the metal reinforcement and its concrete covering. Unless builders can overcome objections of this character, it is possible that the concrete ship may fall within the class of "undesirable risks," from the underwriting point of view.

Marine underwriters are likewise cold to the auxiliary schooner. Their build and engine power place them among the hybrids, and scientific rate-making is impossible. Written at a low rate and with broad conditions, they are a source of anxiety and of frequent loss. The fate of the auxiliary schooner City of Gulfport, en route for South America with a cargo of corn, is a case in point. She was a recent total loss from fire. It cost the hull underwriters about $150,000. The cargo was insured abroad. The trouble with this type is that they are neither sailing ships nor steamers. Their small engines are incapable of sufficient power adequately to control them, and their sailing ability has been slighted through an unwise dependence upon their engines. The experience of the underwriters has been unfavorable with this class for a number of years.

The following points will be found of great importance to owners of ships and cargoes in the matter of salvage settlements. When a salvage expense is not general average, it is distinguishable from particular average in that it is a loss deductable by underwriters from the amount to be paid by them as total loss in particular average. In cases where the total cost of repairs and expenses is being estimated for the purpose of calculating whether a vessel can be considered as a constructive total loss, salvage expense—either already incurred or merely contemplated—is added to the cost of repairs. In general, salvage expense cannot be collected from underwriters under the sue and labor clause of marine insurance policies. However, where the contract for salvage is on a basis of pay for time, material and labor expended and equipment used, irrespective of success or failure, charges therefor may be proceeded for, in certain cases, under the sue and labor clause as for particular charges. This does not apply, of course, to policies that are written "F. P. A."; that is, free of particular average.

Shippers will be interested in an apparently new field that is developing for further marine insurance coverage. Fairplay, the well-known English publication, directs attention to the interesting circumstance that shipowners have gradually enlarged the scope of the terms of their bills of lading, leaving it to the shippers to cover the additional risks by insurance. It is quite possible that this inclination may be followed in the United States, to the increase of the market for marine protection. Although in some of the trades bills of lading are more or less uniform, each line has bills peculiar to itself. It is suggested that underwriters would do well, when asked to quote rates for the extra risks placed upon shippers by special clauses in their bills of lading, to inquire as to the conditions under which the goods are shipped.

President C. P. Stewart, of the American Merchant Marine Insurance Company, gives some excellent tips as to the duties of marine brokers—and, coming from such an authority, shipowners and exporters would do well to examine them to the end that they may receive the service to which they are entitled. Mr. Stewart is of opinion that the very best solicitor is the one who knows his business and can discuss policy conditions and rates with the assured. A knowledge of ships, their fitness for a particular trade, and of values and markets, is necessary. "A broker," says he, "is called upon to discuss vessels with their owners and with underwriters from the time they are projected until after they have been lost or broken up. He is required to know something of all businesses, and his work is international in character." Mr. Stewart's ideal broker must have a finely developed sense of responsibility, and should be a man who takes more interest in his work than in his commissions. He must have a solid groundwork of information before he is competent to advise the shipowner or merchant as to the kind of insurance he can obtain properly to protect his clients. The broker's duty does not end when he has effected the insurance. He has then only performed half of his duty. He must protect his client when losses occur, and he must frequently prepare complicated adjustments. It is true that a part of the work is usually done by an average adjuster, but the broker who knows nothing of adjusting is hardly a man to be relied upon. These sound observations are given here, and at some length, because it is well for merchants, shippers and shipowners to know the kind of service they are supposed to receive and should have at the hands of their marine brokers. If the men who are handling their business at present cannot fill the bill, there are others who can and should.

There is an important appeal to shippers and shipowners in the preparations that the government is understood to be making to demand full indemnity from Germany for the losses sustained by American ships and cargoes from submarine attacks. It has just become known that late last year instructions were issued from Washington for marine underwriters to submit reports of their losses to the State Department; and this is construed as meaning nothing less than that the government is preparing a full bill of damages against the Hun marauders. It is impossible at present accurately to forecast just what methods will be utilized to effect reparations, but without doubt some international tribunal will be established to consider and pass upon these claims. Claimants will, no doubt, be required to file full and complete documents supporting their contentions, as also to meet in general the requirements and rules of procedure adopted by the State Department in 1906 with reference to claims against a foreign government. Ultimately, such additional rules as may be prescribed by the international commission will govern the final presentation of these claims for decision. Claimants, however, will have to be prepared to exercise considerable patience, as it may take several years for a final judgment to be reached. The adjudication of the Alabama case set a precedent in such matters, and much technical detail will have to be gone into in the present cases, aside from the fact that there are many important decisions to be reached before the matter of indemnity can be disposed of. However, it is vastly encouraging to feel that something substantial is likely ultimately to eventuate for the relief of sufferers at the hands of the ruthless enemy.

IMPROVED SALVAGE FACILITIES

THAT the West Coast of North America has need of superior salvage facilities for the rescue of vessels in distress has been demonstrated many times by casualties to shipping from Panama to Unalaska and many abortive attempts have been made on the Pacific Coast of the United States to organize a salvage company with equipment sufficient to salve wrecked vessels. The business is of a speculative nature and has not the advantage, which most speculations have, of a quick turn over. To equip properly a salvage plant requires a large initial outlay and to be efficient it must be ready at all times for a quick call, which necessitates a constant outlay in wages of a sufficient working crew and for fuel for keeping steam on at all times. The conservative man dislikes to see a large amount of capital lying dormant, even though ultimate returns may warrant this, and hesitates to venture into what appears to him to be of the wildest of wild cat speculations, but the history of salvage plants shows that the returns are sure, and with the growth of shipping on this coast, which, unfortunately, of necessity, means a larger number of casualties to shipping, the venturing of the necessary capital should be looked upon as an investment rather than as a speculation.

Fortunately for shipping interests, there is one concern on this coast that is willing to back up its belief in salvage as a business venture by maintaining, not merely a good plant, but a first-class salvage equipment which is kept up to date by the addition of all tried improvements.

The British Columbia Salvage Company, with headquarters at Victoria, British Columbia, has for many years been known as one of the best salvage companies on the coast, and it has operated as far south as Panama and north into Alaskan waters. It has recently reorganized, now being known as the Pacific Salvage Company, with a capital of $500,000. For many years the steamship Salvor was its principal wrecking boat, but a few months ago this steamer was replaced by the steamer Tees, which was thoroughly equipped for all kinds of salvage work. Since its reorganization it has acquired the British sloop of war Algerine, and this boat is now being outfitted with all of the latest improved appliances known for salvage purposes. The steamer is built of iron, the bottom being covered with a four-inch sheathing of teak, which in turn is coppered. This will enable her to work among rocks without fear of a puncture through the bottom. There are numerous watertight compartments, formerly ammunition tanks, which make her practically unsinkable. She is a twin screw vessel and can make fifteen knots under forced draft, ten knots, however, being her most economical speed. Her bunker supply of coal will keep her under steam for fourteen or fifteen days and her beam and deck space are such that a much larger supply of coal can be carried without impairing her efficiency. She will have a complete outfit of heavy anchors and cables and will also be supplied with two of the latest submersible pumps. A complete machine shop will be located in the 'tween decks and she will have a wireless apparatus which will enable her to communicate with any point in Alaska up to two thousand miles. Pipes and fittings are all of copper and brass and throughout she is extremely well found and fitted for the work she will undertake. Besides the Algerine and the Tees, the Pacific Salvage Company has the Alaskan and the Santa Cruz for salvage work.

All of this speaks very well for our Canadian neighbors and the plant established "across the line" will render assistance to wrecked vessels all along the coast, but why should not some good residents of the United States establish a plant as well or better constructed for service in our waters? As the laws stand now, it is always necessary to obtain the consent of our government for the Canadian plant to work in American waters, and the Pacific Salvage Company must also obtain the consent of the Dominion government for any of its units to leave Canadian waters. Fortunately up to the present time there has been no difficulty or delay in securing the desired permission, but a critical time might come when one or the other of the governments would object and the loss through delay might be very considerable. One company cannot cover the entire coast, but, the situation being as it is, it is well that we have a thoroughly up-to-date, efficient and speedy craft to rely on.

AVIATION INSURANCE

THE insurance of aircraft appears to be an accomplished fact, as a number of leading insurance companies of London have appointed an aircraft insurance committee to report on risks offered. From reports received it seems that any one company may issue its policy for the full amount wanted, but all risks are pooled and each company, a party to the scheme, bears a proportionate part of any loss. The committee of Lloyds' Register has been requested to classify aircraft in the same way that vessels navigating the waters are now classified, and it looks as if navigation of the air will in a comparatively short time be placed on a commercial basis.

From an underwriter's standpoint, it will be intensely interesting to watch and participate in the birth and growth of commerce by air, and in the meantime one cannot help but speculate what changes in laws and customs must be made to meet the new and untried conditions. Will the navigation of the air be governed by common law such as now applies to transportation by land or, as seems more natural, will the admiralty law with numerous modifications apply? Will the difficulties of applying the laws of general average to air ventures be so great as to cause their abrogation by the many world countries, as has been advocated in connection with sea ventures, or will they be made so comprehensive as to include, say, not only the value of cargo jettisoned, but any damage done by cargo jettisoned—that is, damage to property it may strike in falling—or even loss of life or personal injury? What will be the liability of the aircraft owner and where will his liabilities end? What exceptions against loss can be made and against what losses can he insure?

All of these and many other questions come into the speculative mind, but the certainty of their arising and of their settlement cannot be doubted

PEACE PLANS OF BRITISH ENGINEERING FIRM

THE different works of the important engineering firm of Armstrong, Whitworth & Company, which during the war employed 70,000 people drawing a monthly wage of $5,000,000, are stated to have made ample preparations for the transition from war to peace. Their riverside shops at Elswick, where heavy naval and land gun mountings were constructed, will in future manufacture marine engines and boilers. Their projectile and ammunition plant at Scotwood is now turning out locomotives, and when fully equipped is expected to have an annual output of 300 to 400 heavy locomotives.

The Scotswood brass foundry of this firm is being removed to Elswick, where it is proposed to considerably enlarge the plant to supply not only the requirements of the firm, but also a large amount for home and foreign markets. It is further planned to enlarge the steel-casing foundry at Elswick as well as the extensive drop-forging plant, while a new iron foundry will be laid down upon a site connected with the steel works at this place, and the manufacture of hand pneumatic tools will also be largely increased. New and more efficient types of tools are to be made, and the company is reported to be arranging for the manufacture and supply of the whole of the required compressing plant for operating these tools. The Elswick engine department, which dealt with the manufacture of hydraulic cranes, dock gates, etc., was removed during the war to Glasgow, where it has now been amalgamated with the works of A. J. Main & Company.

Armstrong's Openshaw works will be largely engaged in the production of machine tools and small tools. The important shipbuilding plants on the Tyne are said to be equipped now to turn out all classes of commercial craft.

Pacific Coast Shipbuilding Returns

Albina Engine and Machine Works, Inc., Portland Ore.

Purchasing Agent, **W. L. Deute.**

Hulls Nos. 11 to 19, 300 by 44 by 21.5; engines 22-36-60, 1400-h. p. Glymont launched April 23.

Allen Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **G. E. Hunt.**

Two Allen type vessels, 274.6 B. P. by 44.9 by 26.4.

American Concrete Pipe & Shipbuilding Co., Seattle, Wash.

One 7,500-ton concrete steamship.

One 150-foot steam concrete tugboat.

Two concrete scows, 120 feet long.

American Marine Iron Works, Portland, Oregon

Purchasing Agent, **Carl R. Jones.**

Contracts covering cast iron fittings for steel and wood yards of G. M. Standifer Construction Corporation, Vancouver, Wash.

Ames Shipbuilding and Dry Dock Co., Seattle, Wash.

Purchasing Agent, **Mr. C. A. Barron.**

Twenty-seven vessels under contract, mostly 8800- ton freighters. West Islay, launched April 26.

Anacortes Shipbuilding Co., Anacortes, Wash.

Purchasing Agent, **Will W. Dunn.**

Two wooden vessels, Ferris type, 281 by 46 by 23.6; engines 19-36-56; 1500-h. p. watertube boilers. Delivery August, 1919.

Anderson Shipbuilding Corporation, 602 Alaska Building, Seattle, Wash.

Purchasing Agent, **W. G. Hall.**

Nos. 8 and 9, full powered motorships, 260 by 46 by 26, 3250 deadweight tons, twin screws, 1000-h. p. engines.

Apex Manufacturing Company, Emeryville, Cal.

Purchasing Agent, **A. Youngholm.**

Three hundred metallic life boats for U. S. Shipping Board.

Twenty metallic life boats for shipyards.

Astoria Marine Iron Works, Astoria, Ore.

Purchasing Agent, **Mr. J. A. Jackson.**

Completely outfitting 27 Hough and Ferris type wooden vessels.

Contractors for United States and French governments.

Overhauling and repair of ships a specialty.

Babare Bros., Old Town, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. Babare.**

Four wooden freighters, Ferris type.

Ballard Shipbuilding Co., Ballard, Wash.

Purchasing Agent, **Mr. T. W. Smith.**

Three wooden steamers, 215 by 40 by 18.

Ballin Water Tube Boiler Co., Portland, Ore.

Sixteen Ballin type water-tube boilers for eight steamers. For the Supple & Ballin Shipbuilding Co.

Twelve Ballin type water-tube boilers for six steamers building at the G. M. Standifer Construction Corporation.

Barnes & Tibbitts, Alameda, Cal.

Purchasing Agent, **Mr. J. J. Barnes.**

Installation of machinery and fitting out nine vessels for Emergency Fleet Corporation.

General repair and dry-docking business.

Benicia Shipbuilding Corporation, Benicia, Cal.

Purchasing Agent, **L. S. Jones,** Alaska Commercial Bldg., San Francisco, Cal.

Bethlehem Shipbuilding Corporation, Ltd. (Union Works Alameda Plant), San Francisco, Cal.

Purchasing Agent, **Mr. A. H. Williams.**

Three 12,000-ton steel freighters; hulls 170, 215 and 216.

Eighteen 12,000-ton dw. steel tankers.

Contracts for six additional freighters.

Howard, launched April 26.

Cameron-Genoa Mills Shipbuilders, Ltd., Victoria, B. C.

Purchasing Agent, **Mr. P. D. Bannerman.**

Four Wooden freighters, 250 by 43.6 by 25, 950 h. p., 2800 tons dw.

Ralph J. Chandler Shipbuilding Co., Wilmington, Cal.

Six wooden vessels, Ferris type, 281 ft. 6 ins. by 46 ft. by 26; engines 19 by 32 by 56 by 3; 1400 h. p. Two tubular boilers. For U. S. Shipping Board.

Chilman's Shipyard, Hoquiam, Wash.

Purchasing Agent, **Mr. Iver Chilman.**

Two 3-mast auxiliary schooners 130 by 33 by 14. One 300-h. p. engine, for Belgian interests.

Coast Shipbuilding Company, Portland, Ore.

Four wooden freighters, Ferris type, 281.6 and 268 by 46 by 26, 1400 h. p.

Columbia Engineering Works (Linnton), Portland, Ore.

Purchasing Agent, **Mr. C. W. Steele.**

No. 14, motorship, 173 by 36 by 15.5; single screw Avance 320-h. p. oil engine. Delivery March, 1919. For Chr. Christensen, Jr. No. 15, topsail schooner, 178 by 36 by 15. Delivery April, 1919.

Columbia River Shipbuilding Corp., Portland, Ore.

Purchasing Agent, **Mr. H. A. Killam.**

Fifteen steel merchant ships, 8800 tons dw., General Electric and De Laval turbines, Scotch marine boilers. Deliveries 1919. Five of above now on ways.

Commercial Boiler Works, Seattle, Wash.

Purchasing Agent, **Mr. J. H. Fox.**

Contracts for:

156 Scotch marine boilers, 14.9 inside dia. by 11 ft. long, H. S. 2695.5 sq. ft., W. P. 210 lbs., for vessels building on Pacific Coast. Delivery, twelve completed boilers per month.

Coos Bay Shipbuilding Company, Marshfield, Ore.

Manager, **Mr. J. H. Polhemus.**

Contracts for four Ferris type vessels. Length over all 281.6, 3500 dw. tons. Deliveries starting November 1st.

J. Coughlan & Sons, Vancouver, B. C.

Purchasing Agent, **J. Joseph.**

Four 8100-ton dw. freighters, 400 by 52 by 31, 3000-h. p., three Scotch marine boilers. For Dominion Government.

Crowley Launch & Tugboat Co., San Francisco, Cal.

..Purchasing Agent, **John L. Crowley.**

Six 28-foot launches with 10-h. p. engines.

Four 45-foot launches with 50-h. p. engines.

Eight covered barges, 125 by 40 by 12.

Derrick barge, 75-ton lifts, 125 by 50 by 12.

J. F. Duthie & Co., Shipbuilders & Engineers, Seattle, Wash.

Purchasing Agent, **E. C. Gaumnitz.**

Fifteen 8800-ton cargo vessels, 2800-h. p., 425 feet by 54 feet x 29.9; Scotch boilers.

Elliott Bay Dry Dock Company, Seattle, Wash.

Local repair work, cleaning, painting and overhauling.

Elliott Bay Shipbuilding Co., Seattle, Wash.

Purchasing Dept., **C. A. Morrow.**

Six vessels, 260 by 46 by 26.

Contracts for five 3500-ton carriers.

Elliott Bay Yacht & Engine Co., Seattle, Wash.

Large amount of repair work.

Feeney-Bremer Company, Tillamook, Ore.

Contracts for three wooden ships, Ferris type, 281.6 by 46 by 26.

Foundation Company of British Columbia, Ltd., Victoria, B. C.

Purchasing Agent, **Mr. D. D. Long.**

Twenty 3000-ton dw. twin screw wooden steamers, 293.2 by 47.6 by 23.6, two Scotch marine boilers.

Winnipeg, launched April 26.

Foundation Co., Portland, Ore.

Local Purchasing Agent, **G. M. Raymond.**

Foundation Co., Tacoma, Wash.

Purchasing Agent, **Mr. Whiteside.**

Seattle Office: Smith Building.

Fulton Shipbuilding Company, Wilmington, Cal.

Purchasing Agent, **A. H. MacFarland.**

Four Hough design wooden steamers.

Nine Ferris design wooden steamers, 3500-ton, engines 19 by 32 by 56, 1400-h. p., two tubular boilers.

Wovoka launched April 15.

Grant Smith-Porter Ship Company, Aberdeen Shipyard, Aberdeen, Wash.

Purchasing Agent, **Mr. Z. A. Toye.**

Contracts for eleven Ferris type steamers.

The Grant-Smith-Porter Ship Co., Portland, Ore.

Purchasing Agent, **Mr. P. S. Sinnock.**

Contract for twelve Ferris type ships; length 286 feet, beam 46 feet, depth 28 feet; two standard E. F. C. boilers.

Grays Harbor Motorship Corporation, Aberdeen, Wash.

Purchasing Agent, **Mr. H. L. Rich.**

Twelve 4000-ton ships of Ward type. For Emergency Fleet Corporation. Deliveries about two a month.

Great Northern Concrete Shipbuilding Company, Vancouver, Wash.

Purchasing Agent, **Mr. Pacquet.**

Three concrete hulls, Nos. 4, 5 and 6, 100 by 25 by 12.6.

Hammond Lumber Co., Eureka, Cal.

Purchasing Agent, **W. R. McMillan.**

Three steamers, Ferris type.

Hanlon Dry Dock & Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **C. J. Foard.**

Twelve cargo vessels, 320.9 by 46 by 26.9; three water-tube boilers. For Emergency Fleet Corporation.

Harrison & Lamond, South Vancouver, B. C.

One auxiliary schooner.

Helser Machine Works, Inc., Portland, Ore.

20 large size hawser reels for Pacific Coast Shipbuilding Co.
12 same as above for Pensacola Shipbuilding Co.
30 same as above for J. F. Duthie & Co.
44 same as above for The Columbia River Shipbuilding Co.
56 8¼ by 8 single geared winches, single gypsey.
28 8¼ by 8 single geared winches, double gypsey.
56 9 by 9 single geared winches, single gypsey.
All of above winches for Southwestern Shipbuilding Co.
180 cargo winches for Schaw-Batcher Shipbuilding Co.
200 9 by 9 cargo winches.
300 8¼ by 8 cargo winches.
80 9 by 9 cargo winches for Southwestern Shipbuilding Company.

Hesse-Martin Iron Works, Portland, Ore.

Purchasing Agent, **Mr. R. M. Hoffman.**

All auxiliary machinery for ten wooden steamers building by the G. M. Standifer Construction Co.

All auxiliary machinery for twenty-four wooden steamers building by the Grant-Smith-Porter Ship Co., at Aberdeen.

Anchor windlasses, cargo winches, steam capstans and steam steering gears for eight wooden steamers building by Supple & Ballin at Portland.

Forty steam cargo winches for ten steel steamers building by the Northwest Steel Company.

One hundred and thirty anchor windlasses, forty steam steering gears and fifty hand steering gears.

Herzog Electric & Engineering Company, San Francisco

Purchasing Agent, **H. C. Toumey.**

One Herzog double electric steering gear on M. S. "Katherine" at Hanlon Shipyard.

G. W. Kneass, San Francisco, Cal.

Purchasing Agent, **G. W. Kneass.**

Two tow boats, 60x15, 125-h. p. engine. For Peterson Tow Boat & Lighterage Company.

Three hundred metal life boats for Bethlehem Shipbuilding Corporation, Union Plant.

Kiernan & Kern Shipbuilding Co., Portland, Ore.

Purchasing Agent, **Mr. McCall.**

Four composite steamers of Ballin design.

Kruse & Banks, North Bend, Ore.

Purchasing Agent, **Robert Banks.**

Six hulls, Ferris design, 286 by 46 by 28.

Llewellyn Iron Works, Los Angeles, Calif.

Builders of Marine Engines, Boilers, Tanks, etc., for Emergency Fleet Corporation.

Present contracts include 1400-h. p. and 2800-h. p. marine engines with marine boilers for same, for most of the ships being built on the Pacific Coast.

Also reinforced concrete bars for concrete ships being built for the Emergency Fleet Corporation at the San Francisco Shipbuilding Company's yard in Oakland and at the Pacific Marine & Construction Company's yards in San Diego.

Long Beach Shipbuilding Company, Long Beach, Calif.

Purchasing Agent, **Mr. John Craig.**

Ten steel vessels of 9000 tons.

Eight steel steamers, 8,800 deadweight tons each.

Wallingford, 2302 gross tons; 244 by 42 by 26; 900 h. p.; engines 18 by 30 by 44 by 30; two watertube boilers. For U. S. Shipping Board.

W. Keene, launched April 26, 1919.

Los Angeles Shipbuilding & Dry Dock Co., Los Angeles, Cal.

Thirty-two 8800-ton dw. vessels, 410 by 54 by 29.9, 3500 I. H. P. three Foster water-tube boilers. For Emergency Fleet Corporation. Delivery 1919-1920.

West Hika launched May 12.

The Wm. Lyall Shipbuilding Co., Ltd., North Vancouver, B. C.

Three auxiliary schooners, 235 W. L. by 44.6 by 20.6 moulded.

Two 200-h. p. Fairbanks Morse Semi-Diesel engines for these boats.

Eight full-powered steamers, 1500 tons deadweight. For Republic of France.

Main Iron Works, San Francisco, Cal.

Four ocean-going tugs; engines 17 by 25 by 42 by 30; two Scotch marine boilers in each ship. For Emergency Fleet Corporation.

Machinery for two tugs for Rolph Shipbuilding Company.

Four water tube boilers.

Shafting for concrete ships for Emergency Fleet Corporation.

Marine Pipe and Machine Works, Inc., Seattle, Wash.

Purchasing Agent, **Mr. E. A. Lamb.**

One 6-cylinder Sumner type heavy oil engine, 650-h. p. For Chilean Government.

Two 1200-h. p. triple exp. steam engines.

Martinolich Shipbuilding Co., 306 California Bldg., Tacoma Wash.; Yard at Dockton, Wash.

Purchasing Agent, **Mr. Martinolich.**

Three wooden 4-masted auxiliary schooners, 250 by 43 by 21; twin 240-h. p. Skandia engines. For Norwegian interests.

Matthews Shipbuilding Company, Hoquiam, Wash.

Purchasing Agent, **G. F. Matthews.**

Lumber carrier for Hart-Wood Lumber Company, 250 ft. long, capacity 1,500,000 ft.

Two auxiliary 4-masted schooners, 250 by 43 by 21. Twin 240-h. p. Skandia engines. For M. Isaakson, Norway.

McAteer Shipbuilding Company, Seattle, Wash.

Purchasing Agent. **Mr. Ramm.**

One steel vessel, 160 by 30 by 16.

Two four-masted schooners, 250 by 44 by 21; Skandia engines.

McEachern Ship Co., Astoria, Ore.

Purchasing Agent, **Mr. O. E. Draper.**

Three steamers, 286 by 46 by 28; Hough design.

Meacham & Babcock Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **Mr. W. N. Voegtly, Jr.**

Ten hulls, Ferris type.

Moore Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **M. G. Waites.**

Sixteen 9400-ton dw. steel freighters, 402 feet 6 inches by 53 feet by 34 feet 6 inches; 2800 h. p. For U. S. Shipping Board.

Ten 10,000-ton dw. steel tankers, 425 feet by 57 feet by 33 feet; 2800 h. p. For U. S. Shipping Board.

Fitting out:

Nokatay, Miskianza and Nockum, launched April 27.

Motorship Construction Co., Vancouver, Wash.

Purchasing Agent, **J. W. Dougherty.**

Large number of wooden and metal lifeboats and Columbia River fishing boats.

Also contract for 750 lifeboats for Emergency Fleet Corporation.

National Engineering Corporation, Wilmington, Calif.

Outfitting ships for Emergency Fleet Corporation.

New Westminster Construction & Engineering Co., New Westminster, B. C.

Purchasing Agent, **Mr. H. M. Fullerton.**

Four 2800 dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

Five 1500-ton dw. wooden freighters, 204 by 40.6 by 17, 550-h. p. twin engines, watertube boilers.

Nilson & Kelez, Seattle, Wash.

Purchasing Agent, **Mr. Kelez.**

Eight wooden hulls, Ferris type.

Northwest Steel Company, Portland, Ore.

Purchasing Agent, **Mr. W. C. Smith.**

Eleven freighters, 2500 I. H. P., 425 o. a. by 54 by 29.9, 8800 tons dw.; geared turbine drive; 3 Scotch boilers fitted for coal.

Four freighters, 2800 h. p.; dimensions same as above; 3 Scotch boilers.

Tripp, launched April 23.

Deer Lodge, launched April 11.

Pacific American Fisheries, South Bellingham, Wash.

Purchasing Agent, **Mr. B. U. Slyster.**

Pacific Boat & Iron Works, Portland, Ore.

Two hundred metal lifeboats and 100 liferafts for steel yard in this district.

Contract for several Corser's one-man simultaneous releasing hooks for lifeboats.

Pacific Coast Shipbuilding Co., 317 First National Bank Bldg., San Francisco, Cal.; Plant, Bay Point, Cal.

Purchasing Agent, **Mr. J. M. Duke.**

Nine 9500-ton dw. steamers.

Cockaponset launched May 22, 1919.

Pacific Construction Co., Ltd., Coquitlam, B. C.

Purchasing Agent, **Mr. R. W. Holland.**

Two 2800-ton dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

No. 3, Wooden steamer, 250 by 43.6 by 25, 1000-h. p. watertube boilers.

No. 4, Same as No. 3.

Nos. 5 and 6, 1500-ton full-power barges, 204.8 by 39.8 by 17, 275 I. H. P. engines, 5 water-tube boilers.

Pacific Marine and Construction Company (Scofield Engineering Company) San Diego, Cal.

Contracts for two concrete ships of 7500 tons.

Pacific Marine Iron Works, Portland, Ore.

Purchasing Agent, **Mr. V. L. Hamlin.**

Contracts for four 1600-h. p. triple expansion engines.

Contracts for six 1400-h. p. triple expansion engines.

Patterson-MacDonald Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **W. J. Thomas.**

Ten wooden steamers, 281.6 by 46.10 by 27, twin screw, triple expansion engines, 1550-h. p. 30-15½-25½-42. Two Heine boilers.

Pacific Shipbuilding Corpn., Seattle, Wash.

Purchasing Agent, **C. H. Jones.**

Yard designed with six building ways.

Peninsula Shipbuilding Co., Portland, Ore.

Purchasing Agent, **Mr. H. H. Fisher.**

Seven steamers, 287 by 49.8 by 27.6. To be equipped with Westinghouse turbines.

Four sailing vessels.

Puget Sound Boiler Works, Seattle, Wash.

One Scott Patent Water Tube Boiler, 200-h. p. pressure, for Anderson Shipbuilding Co.

Contracts for condensers, water feed tanks, boiler casings and smoke stacks.

Large amount of local marine repair work.

Puget Sound Bridge & Dredging Co., Seattle, Wash.

Purchasing Agent, **Mr. Moore.**

Complete installation of machinery for twenty-four wooden vessels.

Two wooden hulls, Grays Harbor Motorship type.

Six 5,000-ton wooden hulls.

Geo. F. Rodgers & Co., Astoria, Ore.

Purchasing Agent, **W. N. Browning.**

Contracts for two 3500-ton cargo carriers

Six hulls, Ferris type, 3500 tons dw., 281.6 by 46 by 26. For U. S. Shipping Board.

Munra launched April 30, 1919.

Rolph Shipbuilding Company, Eureka, Cal.

Purchasing Agent, **John D. Stelling.**

Nine steamers, Ferris type, for U. S. Shipping Board.

Two four-masted barkentines, 1,650,000 feet lumber capacity. To builders' account.

One tug-boat, 750 h. p., for Rolph Navigation & Coal Company.

Sanderson & Porter, Raymond, Wash.

Four wooden hulls, Ferris type, standard wood steamships. Delivery 1919.

S. S. Kitau launched April 1, 1917.

San Diego Marine Construction Co., San Diego, Cal.

Purchasing Agent, **C. W. Stose.**

No. 132, "U. S. No. 2," 35 by 7 by 2, 150-h. p.

No. 135, "U. S. No. 3," 40 by 7 by 2, 200-h. p.

No. 136, Tow-boat "Pullet," 55 by 12 by 7.6; 100 h. p. Leary oil engines. Delivery April, 1919. For San Diego Tow Boat Company.

San Francisco Shipbuilding Co., 310 California St., San Francisco, Cal.

Purchasing Agent, **Mr. J. M. Cummins.**

Two 7500-ton dw. bulk oil steamers and one 7500-ton dw. freighter, reinforced concrete, at Government Island Plant, Oakland, Cal.

Schaw-Batcher Company, South San Francisco

Purchasing Agent, **K. I. Dazey.**

Three single-screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2500-h. p. Curtis turbines, 4 Heinie boilers.

Ten single-screw freighters, 8800-ton dw., 427 by 54 by 29.9; 2800-i. h. p. reciprocating engines, 24½ by 41½ by 72 by 48; three Scotch boilers. Deliveries 1919.

Seaborn Shipyards Company, Tacoma, Wash.

Purchasing Agent, **P. J. Anderson.**

Fourteen hulls, Ferris type. Deliveries by April, 1919.

Four-way yard prepared for any kind of wood construction.

Seattle Machine Works, Inc., Seattle, Wash.

Purchasing Agents, **Frank H. Wheelon** and **D. Crause.**

One 2700-h. p. triple-expansion engine for Skinner & Eddy Corporation.

Four 750-h. p. triple-expansion engines for Pacific American Fisheries.

One 500-h. p. triple expansion engine for McAteer Shipbuilding Co.

Two 2500-h. p. triple-expansion engines for Ames Shipbuilding & Dry Dock Company.

Seattle-North Pacific Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **F. H. Magune.**

Ten freighters, 402.5 by 53 by 34.5. Parson turbine, three Foster boilers. Deliveries 1919.

Skandia Pacific Oil Engine Co., Oakland, Cal.

Purchasing Agent, **Mr. L. M. Bliss.**

Twenty 825 B. H. P. Werkspoor Diesel engines for installation in 5600 tons steel fabricated motorships.

Six 500-h. p. Skandia oil engines; four 240 h. p. and six 120 h. p. engines.

Additional engines of smaller capacity.

Skinner & Eddy Corporation, Seattle, Wash

Purchasing Agent, **Ray Anderson.**

Contracts for sixty 9600-ton dw. freighters.

S. S. "Eldena," launched March 21.

Sloan Shipyards Corporation, Olympia, Wash.

Purchasing Agent, **Mr. L. P. Byrne.**

Sixteen freighters, 281.6 by 46 by 26, 19-32-56 by 36; 1400-h. p.

Smith & Watson Iron Works, Portland, Ore.

Purchasing Agent, **Mr. H. W. Bates.**

Contracts to furnish all castings, fittings, condensers and auxiliary machinery for thirty ships building by Columbia River Shipbuilding Corporation.

Somarstrom Shipbuilding Co., Columbia City, Ore.

Four wooden steamers, Hough design, 288 feet long.

Four wooden steamers, Ferris type.

Southwestern Shipbuilding Co., Los Angeles, Cal.

Twenty-three single screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2800 i. h. p. reciprocating engines; three Scotch boilers. For U. S. Shipping Board.

West Chetac launched May 14, 1919.

Standard Vault & Metal Works, Portland, Ore.

Purchasing Agent, **Mr. R. G. E. Cornish.**

Life boats, life rafts.

Sheet metal equipment for ships.

G. M. Standifer Construction Corp., North Portland, Ore., and Vancouver, Wash.

Purchasing Agent, **Mr. H. Luckett**, Vancouver, Wash.

Four wooden freighters, 281 by 46 by 26; 1700-h. p., Ferris type.

Five composite steamers, Ballin design, 4500 tons.

Fifteen steel steamers, 9500 tons. Delivery early in 1919.

Akanaquent, launched April 26.

Stephens Bros., Stockton, Cal.

Two wooden towboats, 50 by 13 by 8, for Island Transportation Co.

One 65 ft. by 14 ft. butcher boat, equipped with 6-cylinder Wisconsin motor. For Pollard Brothers.

One 40 ft. by 7½ ft. raised deck runabout cruiser, equipped with 6-cylinder Wisconsin motor. For Mr. W. Q. Wright, of the Bay & River Dredging Company.

St. Helens Shipbuilding Co., St. Helens, Ore.

Purchasing Agent, **Mr. Barnett.**

No. 42, schooner, 286 o. a. by 48 by 27; to the order of Chas. R. McCormick & Co.

W. F. Stone Shipbuilding Co., Oakland, Cal.

Purchasing Agent, **Mr. Lester F. Stone....**

Four 150-foot wooden hulls for seagoing tugs, 30-foot molded beam by 17 ft. depth.

Miscellaneous repair work.

Supple & Ballin Shipbuilding Corporation, Portland, Ore.

Purchasing Agent, **Mr. Charles Burton.**

Four 4500-ton steamers, Ballin design, 309 feet o. a. by 44 by 26, diagonal planked, steel reinforcing on top sides, single screw; 1500-h. p.

Nos. 9 to 12.

Tacoma Shipbuilding Company, Tacoma, Wash.

Purchasing Agent, **Mr. D. D. McKay.**

Contracts for six Ferris type vessels. For U. S. Shipping Board.

T. R. Trahey, Ballard, Wash.

One oil barge, 110 feet long and 32 feet wide, capacity 150,000 gallons. For General Petroleum Company

Tregoning Boat Co., Seattle, Wash.

Purchasing Agent, **Mr. C .Tregoning.**

A large number of lifeboats and ship power launches.

Todd Dry Dock & Shipbuilding Co., Tacoma, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

Eight cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 watertube boilers.

Twenty-four cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 S. E. S. boilers.

All of above for Emergency Fleet Corporation. Deliveries by January, 1920.

Todd DryDocks, Inc., Harbor Island, Seattle, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

General drydock and repair work.

Union Construction Company, Oakland, Cal.

Purchasing Agent, **Mr. Chas. L. Froding.**

Contracts for 10 steel ships of 9400 tons, Isherwood type, 402.5 by 53 by 34.5; three watertube boilers, 2800-h. p. turbines. For the U. S. Shipping Board.

Hatchie, launched April 26.

Vancouver Shipyards & Engine Works, Ltd., Vancouver, B. C.

Contracts in hand for two wooden vessels.

Wallace Shipyards, Ltd., North Vancouver, B. C.

Purchasing Agent, **Mr. C. Wallace.**

Three steamers, 300 by 45 by 27, single screw, reciprocating engines.

Contracts for four 8,100 dw. steel vessels.

Western Canada Shipyards, Ltd., Vancouver, B. C.

Five 195 by 39.8 by 17 watertube boilers.

Willamette Iron & Steel Works, Portland, Ore.

Purchasing Agent, **Mr. S. F. Woodbury.**

Installing new boilers and breechings in S. S. Oleum, Union Oil Company tanker.

Twenty 13-ft. 9-in. by 11-ft. 3½-in. Scotch marine boilers for Foundation Company, Victoria, B. C.

Three 14-ft. 9-in. by 11-ft. Scotch marine boilers for Ames Shipbuilding Company, Seattle.

Eighty-five 3-furnace Scotch marine boilers for vessels building in Pacific Coast yards for Emergency Fleet Corporation.

Twelve 15-ft. 3-in. by 11-ft. 4-in. 3-furnace Scotch marine boilers.

Wilson Shipbuilding Company, Astoria, Ore.

Purchasing Agent, **W. G. Wray.**

Three wooden vessels, 281.6 by 46 by 26; Ferris type. For Emergency Fleet Corporation. Delivery March 1 to August 1, 1919.

Wilson Shipyards, Inc., Seattle, Wash.

Three building-ways ready for constructing wooden vessels up to 3500 tons.

Wright Shipyards, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. P. Wright.**

Two wooden steamers, "Elissa" and "Endymion," 3500 tons each, length 282 feet, beam 46, depth 26. For U. S. Shipping Board.

Yarrows, Ltd., Esquimalt, B. C.

Two shipways suitable for building vessels up to 350 feet in length.

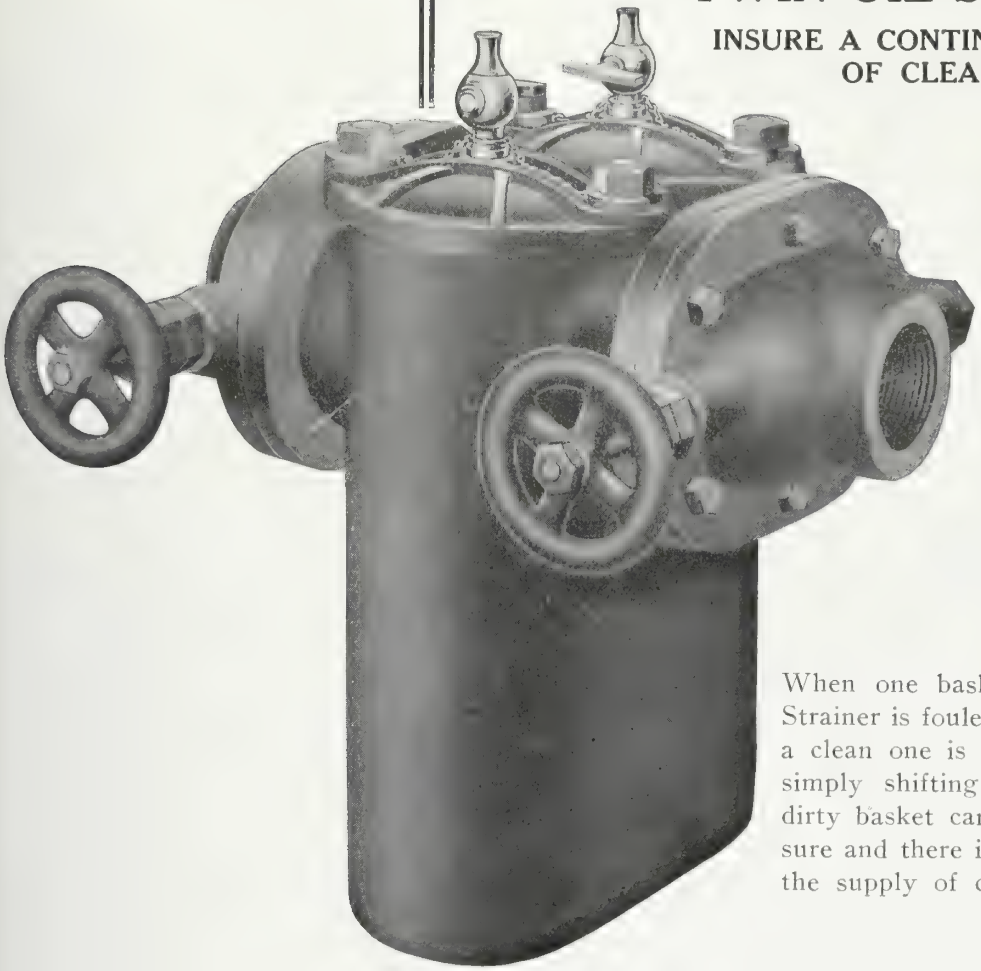
Marine repairs a specialty.

OTHER SHIPBUILDING COMPANIES

American Shipbuilding Company, Warrenton, Ore.
Ballard Marine Railway Company, Seattle, Wash.
Chico Shipbuilding Co., 4185 Arcade Building, Seattle, Wash.
Clapp & Reed Shipbuilding Company, Seattle, Wash.
Columbia River Shipbuilding Co., Vancouver, Wash.
Craig-Wilde Ship Company, Los Angeles, Cal.
Wm. Cryer & Son, Oakland, Cal. W. E. Cryer, Purchasing Agent.
Fellows & Stewart, Inc. V. B. Stewart, Purchasing Agent, Wilmington, Cal.
French-American Shipbuilding Corp., 418-420 Marsh-Strong Bldg., Los Angeles.
Halstrom Shipbuilding Co., Inc., Seattle, Wash.
International Shipbuilding Company, Columbia City, Ore.
King & Winge Shipbuilding Co., C. B. Winge, Purchasing Agent, Seattle, Wash.
Marine Iron Works, Seattle, Wash.
Mare Island Navy Yard, Mare Island, Cal.
Muller Shipbuilding Company, 410 I. N. Van Nuys Building, Los Angeles, Cal.
Oceanic Shipbuilding Co., Milwaukee, Ore.
John E. Price & Company, Hoge Building, Seattle, Wash.
Port Blakeley Shipyard, Port Blakeley, Wash.
Puget Sound Navy Yard, Bremerton, Wash.
T. B. Puck & Co., Honolulu, T. H.
Raymond Shipbuilding Co., Raymond, Wash.
Sehrs Shipyard, Port Townsend, Wash.
South Bend Shipbuilding Co., South Bend., Wash.
Southern California Shipbuilding Corporation, 405 Trust & Savings Bldg., Los Angeles, Cal.
H. D. Stewart Shipbuilding Company, American Bank Building, Seattle, Wash.
Union Timber & Products Co., O. L. Craven, Pres., Port Towsend, Wash.
United Shipbuilding Corporation, Hoge Bldg., Seattle, Wash.
U. S. Steel Shipbuilding Corp., Ltd., Los Angeles, Cal.
Varney Shipbuilding Corporation, Seattle, Wash.
Washington Shipbuilding Corp., C. E. McMasters, Pres., Burke Bldg., Seattle, Wash.
West Coast Shipbuilding Co., H. W. Hellman Bldg., Los Angeles, Cal.

USE TWIN OIL STRAINERS
FOR EITHER FUEL OR LUBRICATING OIL

TWIN OIL STRAINERS
INSURE A CONTINUOUS SUPPLY OF CLEAN OIL



When one basket of a Twin Oil Strainer is fouled with solid matter, a clean one is put into service by simply shifting two valves. The dirty basket can be cleaned at leisure and there is no interruption in the supply of clean oil.

The Twin Oil Strainer

gives the same service as two Single Strainers, but it is more convenient to operate, requires less space for installation and does away with all the extra valves and piping necessary to connect up.

These are the features that led to its being used in Submarines and Destroyers now being built for the United States Navy and in Cargo Boats now being built for the United States Merchant Marine.

Sizes range from 1 to 5 inch. (2½ inch and larger sizes have flanged connections). Basket mesh 1/64 inch or larger.

For detail information ask for Bulletin AA.

ELLIOTT COMPANY
443 Grant St., Pittsburgh, Pa.

ADDRESS BY CHAS. PIEZ

(Continued from page 74)

merchant fleet engaged in the carriage of our foreign business aggregated 1,330,000 gross tons, or approximately 2,000,0000 tons deadweight, and carried about 11 per cent of our water-borne exports, and about 18 per cent of our water-borne imports. With the growth of foreign business, which is bound to result from the elimination of Germany as a competitor, and the greatly improved financial condition of the country, it seems as if, under the Shipping Board's rule, we could employ a fleet of at least 12,000,000 deadweight tons in our foreign commerce.

The total net program of the Emergency Fleet Corporation can, with the sale of some of its smaller vessels and the substitution of larger and faster vessels for those of slower speed not yet too far advanced, be brought within the compass of this figure and will then constitute as fairly balanced a fleet of cargo carriers as any of its competitors. It is true that these vessels will represent very high costs as compared with the pre-war costs of bottoms, but it is also highly probable that future costs will not in many years to come even approach pre-war figures.

From information at our command, it appears as if the cost of constructing the entire tonnage of the Emergency Fleet Corporation program was not more than sixty dollars a deadweight ton in excess of the present cost of constructing vessels of a similar type in English yards, and inasmuch as our tonnage will all be delivered within twelve months, and will therefore be available long before the other maritime nations can replace the tonnage destroyed by the submarines, it is not unlikely that the higher freight rates that will continue for some time will repay, in part at least, the excess of our costs over those of the future.

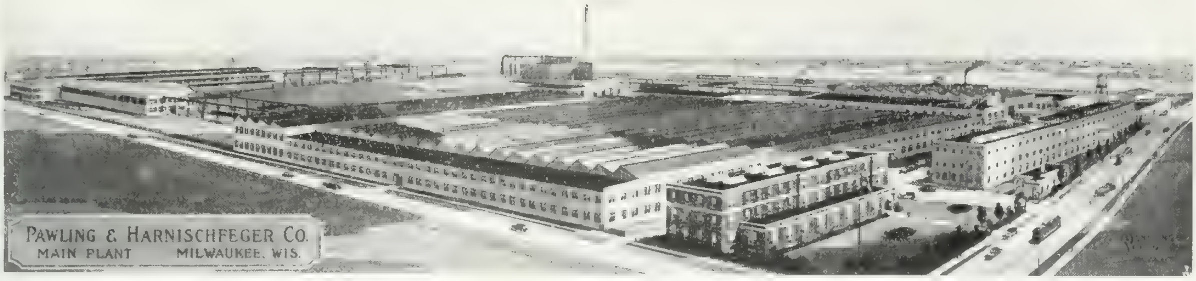
I am very certain that if we have to charge off any part of the cost of our ships to bring them down to current prices for tonnage, the amount will not be nearly so large as is generally supposed. The wood ship was a purely emergency vessel, and while it is hoped that the vessels thus far completed will find a limited market, there can be no hope for any considerable salvage. But even the wood ships proved of service in the war, and the loss on this part of the program was a legitimate and justifiable war expenditure.

If we grant that to serve the needs of national safety and the needs of our foreign commerce it is essential to have an American merchant marine of some size, then we are confronted with the problem of converting the fleet which the necessities of war placed into our hands into a profitable and successful American merchant marine. That is no easy task, for the Shipping Board is much in the position of the corporation which constructed a huge plant for the manufacture of ordnance and now has on its hands buildings and equipment designed for a special purpose that must be altered to suit some new line of effort. The fleet was created purely for the emergency; there was neither time nor opportunity to study our post-war needs and frame our program to suit them. Every ship of every character that our yards could produce was ordered, except that, owing to the inexperience of the men and the managements, the Fleet Corporation confined itself largely to the simpler types of cargo carriers. Modifications of some magnitude have been made since the armistice reduced the pressure on the yards, and a further balancing can be effected by substitutions of more desirable types, a step that has been for some time in contemplation. We can count, therefore, on a fairly well balanced fleet, and it is necessary for us to determine what to do with it.

Mr. Hurley met this situation two months ago by submitting a plan which involves private ownership, private operation and the creation of a fund for the development of new lines; three sound and essential principles. The plan was submitted to provoke discussion and invite suggestion, and it is in that spirit that we can consider it tonight. I may as well confess at the beginning that if I ever had even embryonic leanings toward government ownership or operation, I am completely and permanently cured. I subscribe, therefore, heartily to Mr. Hurley's private ownership and private operation principles. But I am not certain that immediate sale can be effected; for the prompt disposition of the entire fleet can only be made at ruinous sacrifices. And the fleet should be disposed of in toto, for unless that is done, private shippers will buy the cream of the fleet and the government will be left to operate an ill-assorted and unprofitable remainder.

Even if the fleet is entirely sold, it will have to be sold, in part at least, to men lacking in shipping and perhaps business experience; for the fleet we propose to sell is six times the size of the fleet owned and operated by private capital in 1915. And as the sale must in practically every case be made on time payments, it is inevitable that many of the vessels will drift back into the hands of the government through the failure of the purchasers. We will in this respect but reproduce the situation in the shipbuilding industry unless we profit by the experience of the Emergency Fleet Corporation; for it is truly astonishing how many men are willing to assume unknown business risks with the other man's money. The sudden injection into the business of ship operation of men, inexperienced in its opportunities, its processes and its risks, is bound to result in unwise and destructive cutting of rates among our own shippers, a contingency that may, in large measure, prevent the establishment of a really effective American merchant marine. For an American merchant marine can only exist if it successfully meets the competition of foreign fleets, and it can never do this in its earlier existence unless it meets foreign competition as a unit under more or less centralized direction and without the losses resulting from unwise competition within itself. I feel, therefore, that while Mr. Hurley's plan should be the ultimate goal of our efforts, private ownership and private operation will have to be preceded by a period of government ownership and private operation under government direction until the needs of our foreign commerce have been established and the experience and fitness of charterers to own and operate vessels have been demonstrated. New lines helpful to our commerce can be opened up during this period by paying competent operators a fee for their services and giving them a substantial interest in the profits until the advances by the government have been repaid.

It is probable that all of this development expense can be paid out of operating income, just as the establishment of new lines in any business is paid for out of the proceeds of the old.



In the Interest of

Pacific Coast Industry

and to be of greater service to our far-western friends, we are pleased to announce the establishment of offices at 1104 Central Building, Los Angeles, and at 821 Monadnock Building, San Francisco, California. Mr. Walter Harnischfeger, Director and Special Representative, will be in charge, with Mr. Robert M. Taylor, as his co-worker.

These two offices in addition to our office in Pitock Block, Portland, Oregon, under Mr. R. K. Morse will make a strong chain of P. & H. service to the Pacific Coast.

PAWLING & HARNISCHFEGER CO.
MILWAUKEE, WIS.

New York, N. Y.
Philadelphia, Pa.
Pittsburgh, Pa.

New Orleans, La.
Chicago, Ill.
Portland, Ore.

Los Angeles
San Francisco,
California

Manufacturers of

ELECTRIC CRANES, HOISTS, MONORAIL SYSTEMS, DRILLING AND BORING MACHINES, SINGLE LINE GRAB BUCKETS.

QUALITY P&H SERVICE

Kerr Economy Geared Turbine

THE remarkable sea performance of turbine-driven ships during the European war, their speed, maneuvering, endurance and reliability records, have proved the many advantages of turbine-propelled machinery over the reciprocating type. As a natural result, practically all new vessels of the United States Navy and foreign navies are fitted with turbines, mostly of the geared type. Many engineering experts who had criticised adversely the adoption of geared steam-turbines for ship drive, through unfamiliarity with their performance, now are recognizing the merits of steam turbines for marine propulsion.

The marine reciprocatng engine has the advantage of nearly a century of engineering development in arriving at its present state of mechanical perfection, whereas the marine turbine has reached a similar degree of perfection in but a very few years. There is no doubt that the geared marine turbine has been benefited particularly by the hard service that it has been called upon to perform during the war.

The Kerr "Economy" geared marine turbines are built by the Kerr Turbine Company of Wellsville, New York, and combine to the highest degree possible economy of coal and steam consumption, saving of space, reduction of engine room personnel and small spare-part requirements, all of which ultimately mean many dollars' saving.

The Kerr Turbine Company's main works and offices are located in Wellsville, about ninety miles south of the Great Lakes, in western New York State, among the green foothills of the Appalachian Mountains. For fifteen years the Kerr Turbine Company has specialized in the manufacture of highly-reputable Kerr "Economy" turbines and gears, thousands of which now are propelling steamships, driving generators, pumps, blowers, etc.

The Kerr Turbine Company has an aggressive organization and all departmental heads are men who have been associated with the turbine business for a great number of years, many of them being thoroughly familiar with the products of other turbine concerns.

The works of the company consist of several large shops on a site of twenty acres, on the intercommunicating lines of the Erie and Buffalo & Susquehanna Railroads. The main machine shop has a spacious center bay, equipped with several large traveling cranes and having all heavy machinery situated at sides to make handling of parts rapid, and still give clear space for any large part in the center of the bay. A bay each side of the main structure of the large machine shop is fitted with small machine tools, such as milling machines, grinders, screw machines, etc. Among the special machines, of particular interest, is the large three-spindle boring mill, specially designed for boring of bearing sets of marine gear cases. All these seats are bored at the same time, thus insuring absolute accuracy and parallelism, which are very essential to secure quiet and successful operation of the gears.

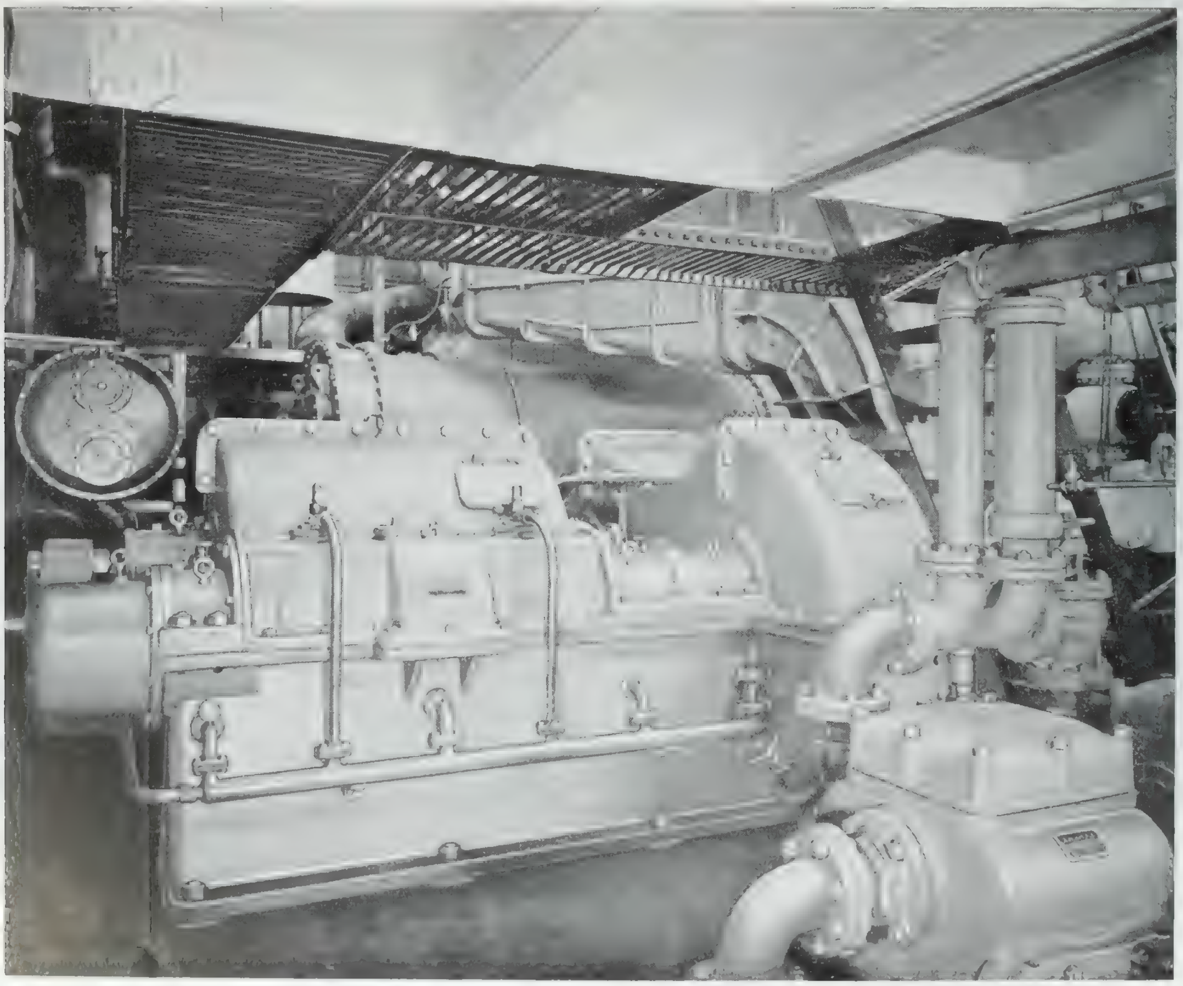
At one end of the main machine shop is a gear hobbing department, consisting of special helical gear-cutting machines capable of cutting gears of twelve-foot diameter and forty-four-inch face. The gears are accurately cut so that no hand finishing and grinding is necessary after they leave the gear hobber.

Another department worth mentioning is the department where buckets are being assembled in the disks and also the department where all rotating parts of both turbine and gear are being carefully balanced.

In other buildings of the Kerr plant joining the main machine shop building are located the offices, pattern shop, an up-to-date turbo-electric power station and storage buildings.

Just off one end of the main building is located a large fireproof pattern-storage building and drop-forge plant. The drop-forge plant is located a considerable distance away from the machine shop so that the

(Section continued on page 180)



Interior of engine room of the Shipping Board steamship Westeward Ho, showing "Kerr Economy" propulsion turbine

GENERAL WELDING & EQUIPMENT CO.
G.W.&E.C.
107 MASS. AVE. BOSTON, MASS.

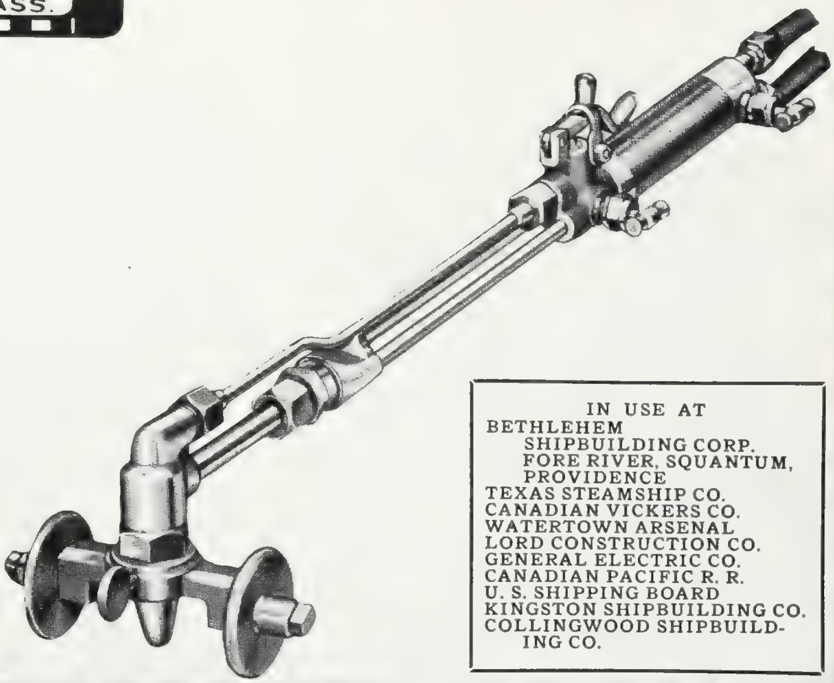
WELDING AND CUTTING EQUIPMENTS

CUTTING TORCH

The construction of a first class tool should combine two essentials: first, efficient and economical work, second easiness of repairs and maintenance, so that the operator can do everything himself, making him independent of the manufacturer.

Both essentials are covered with our Cutting Torches. First they are used by the thousands and by the most prominent concerns, which proves their efficiency. Second, all essential parts are easily accessible and exchangeable and by carrying a few spare parts, even a smashed cutter can be fixed up like new in less than one-half hour by your own man.

Many concerns standardized on our Cutting Torches, impressed by their efficiency and by their marvelous open and simple construction. Why not send in a trial order?



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TEXAS STEAMSHIP CO.
CANADIAN VICKERS CO.
WATERTOWN ARSENAL
LORD CONSTRUCTION CO.
GENERAL ELECTRIC CO.
CANADIAN PACIFIC R. R.
U. S. SHIPPING BOARD
KINGSTON SHIPBUILDING CO.
COLLINGWOOD SHIPBUILDING CO.

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HARDWOOD
LUMBER
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PANELS

FIFTH and BRANNAN STREETS
SAN FRANCISCO, CAL.

THE LARGEST STOCK OF HARDWOODS IN THE WEST

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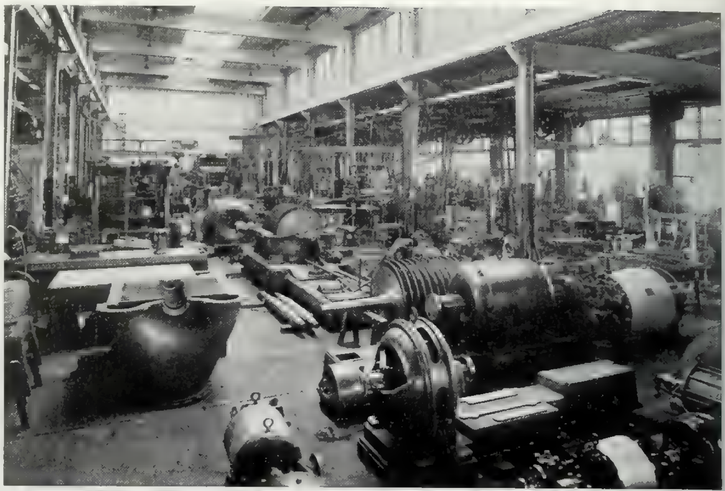
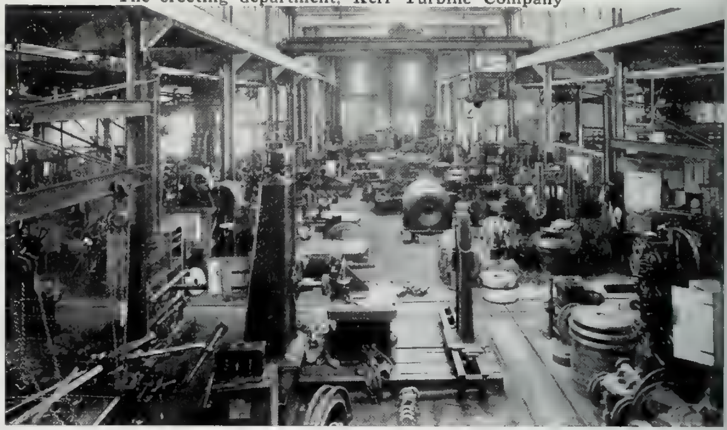
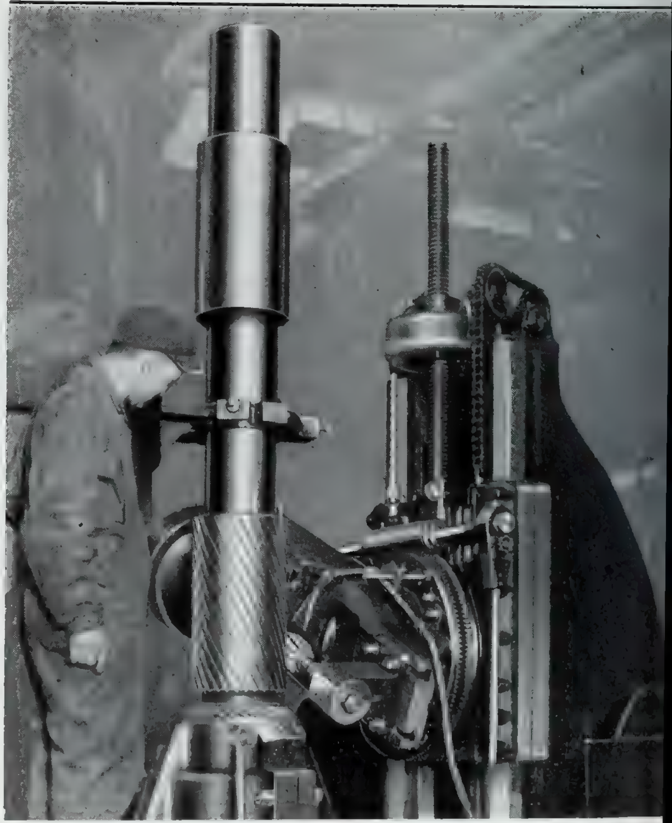

The erecting department, Kerr Turbine Company


A corner of the Kerr Turbine Company's machine shop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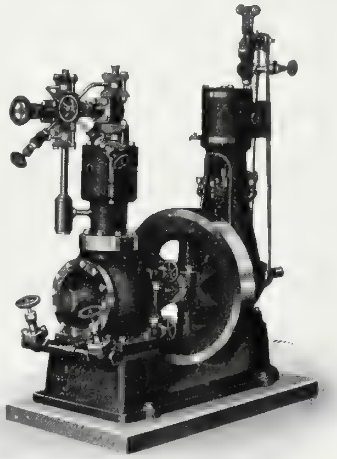

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In the spring of this year Gulowsen Grei Engine Company of Seattle installed on the cannery tender Enos, shown herewith, one of their twenty-two horsepower heavy oil engines in place of the twenty-seven horsepower gasoline engines which had been driving this boat. In trials it has been demonstrated that the new engine will drive the boat at more than seven knots an hour, whereas with the old engine she had never made over six and a half knots. The company recently received the following interesting letter from the chief engineer:

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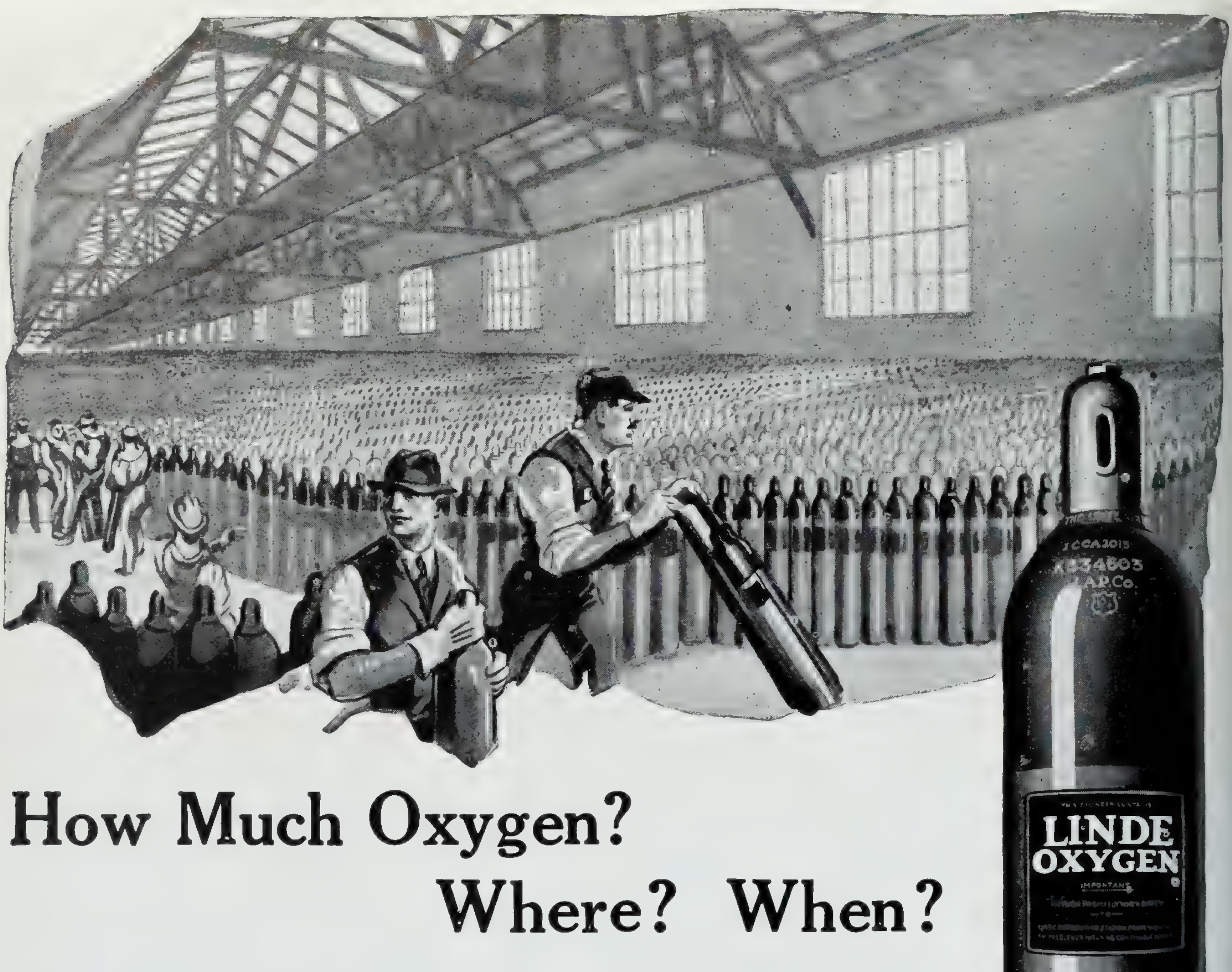
Pacific Marine Review, Vol. 16, No. 7. Published monthly at San Francisco. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. $3.00 a year.



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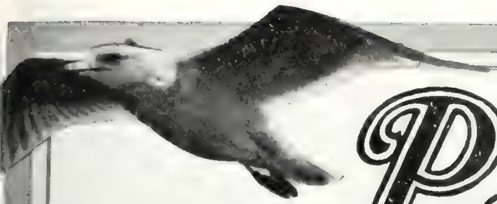

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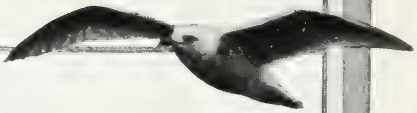

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Pacific Marine Review

The National Magazine of Shipping

July, 1919

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The Ljungstrom System Steam Turbo-Electric Marine Propulsion

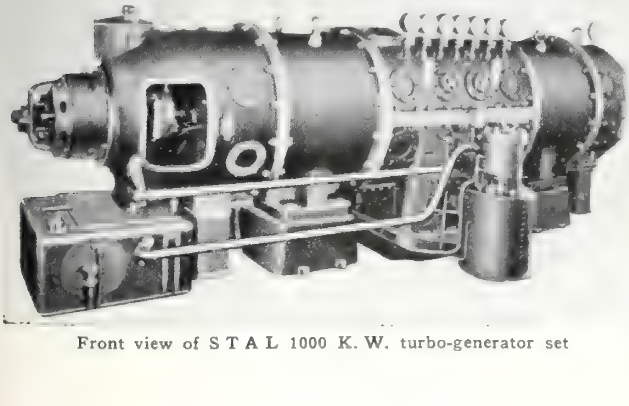
JUST prior to the great war, two Swedish engineers—Messrs. Birger and Fredrik Ljungstrom—had perfected a steam turbine of the radial flow reaction type, which is especially adapted for driving electric generators and which exhibited a very superior economy in steam consumption and reduction in weight and dimensions per unit of power, combined with an increase of working safety. The Swedish Ljungstrom Steam Turbine Company, Ltd., known as the STAL Company, from the initials of the Swedish words in its title, was formed for the purpose of manufacturing these turbines and electric generators. Works at Finspong, Sweden, originally intended for the manufacture of ordnance were purchased by the company and in 1913 the development of this new turbine began on a commercial scale. Almost immediately the question of adapting the Ljungstrom turbine to marine propulsion was brought before the STAL Company.

A Liberal Guarantee

In 1913 the Svea Company, the largest owners of ships in Sweden, wanted two vessels of about 1100 deadweight for their home coasting trade. These ships were to have ordinary triple expansion engines, but the STAL Company proposed to the Svea Company that one be fitted with Ljungstrom electric drive on the following guarantee:

(1) On trial the consumption per I. H. P. per hour of the electrically propelled vessel should not exceed 70 per cent of the consumption per I. H. P. per hour of the standard triple engine of the other vessel under equal conditions, except that the turbo-electrically driven vessel should have the benefit of the reduction in weight of machinery as regards draught.

(2) If during one year's trial the Svea Company had reason to reject the machinery on account of loss of economy or efficiency, the Ljungstrom Company agreed at their expense to remove the turbo-electric machinery and replace same with a set of engines and boilers identical to those fitted in the other vessel. It will be obvious that this was a complete and severe guarantee.



Front view of STAL 1000 K. W. turbo-generator set

The Svea Company accepted this proposal, and the two sister ships were ordered and built at Lindholmens Verkstads Aktiebolaget in Gothenburg. The principal dimensions of the two boats are:

	Mjolner	Mimer
Length p. p.	225′ 0″	225′ 0″
Breadth extreme	36′ 0″	36′ 0″
Depth molded	15′ 6″	15′ 6″
Draught loaded	14′ 9″	14′ 9″
Displacement, tons	2270	2270
Block coeff. at 14′ 9″ draught	0.665	0.665
Gross tonnage	976	975
Net tonnage	376	374

It was decided that the respective powers should be: (1) Mjolner, 900 S. H. P.; Mimer, about 1000 I. H. P. (2) The S. H. P. of the triple machinery was assumed to be 86 per cent of the I. H. P.

The two vessels are classed in Lloyds' Register: No. M. G. F. V. 1344 (Mjolner); No. M. C. N. P. 1206 (Mimer).

The size of engine and boiler room was exactly the same in both cases, in view of the possible contingency in the guarantee given by the Ljungstrom Company.

General Description

The propelling plant consists of two turbo-generators of equal power, delivering their power electrically to two motors; each motor drives a pinion engaging through helical gearing to a common wheel attached to the propeller shaft. The cylindrical turbine casings are mounted direct on the top of the condensers. The air, circulating and feed pumps are of the centrifugal type, independent, and electrically driven from the turbo-generators. The maneuvering gear is fitted at the forward end of the engine room. An enclosed rectangular pillar-shaped box contains the switches and resistances.

The boilers are of the usual cylindrical type, fitted with forced draught, and smoke-tube superheaters. The usual outfit of feed, ballast, bilge and ash ejector pump is supplied. An electric light engine is installed for use in port, also winch condenser, feed filter, etc. These are of the ordinary type and do not affect the relative economy of the two vessels.

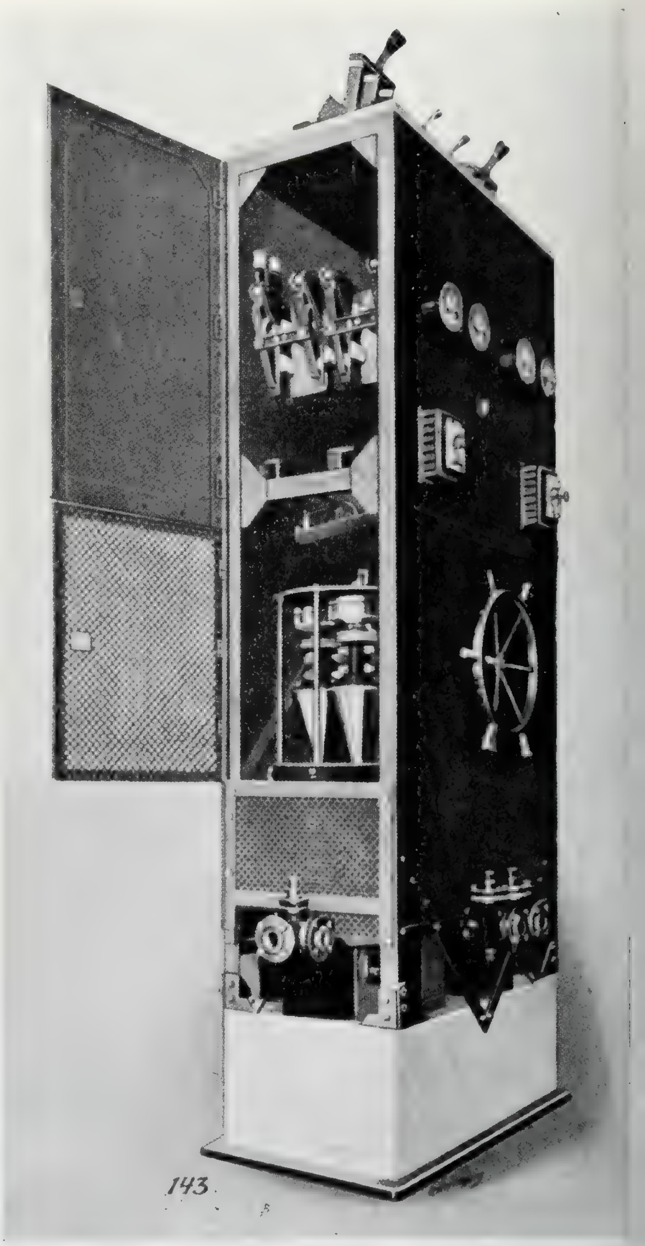
The generators are designed to run at a speed of 3600 revolutions per minute and give three-phase alternating current of 500 volts at 120 alternations per second; the maximum load is approximately 400 kw. per unit, i. e., 800 kw. for the complete installation. The generating plant has been designed so as to avoid any possible trouble from salt or dust deposited on stator or rotor. The rotor contains no air ducts. The stator air ducts are straight and consequently easily swept without removing or dismantling any other portion of the plant. The rotor is adequately cooled by the draught through the air-gap, such draught being efficiently provided through circulating the air from a fan fixed on each rotor shaft.

This ventilating air having absorbed the heat from the generator is taken direct to the furnaces by means of ducts and enters the Howden preheaters fitted in the smoke box.

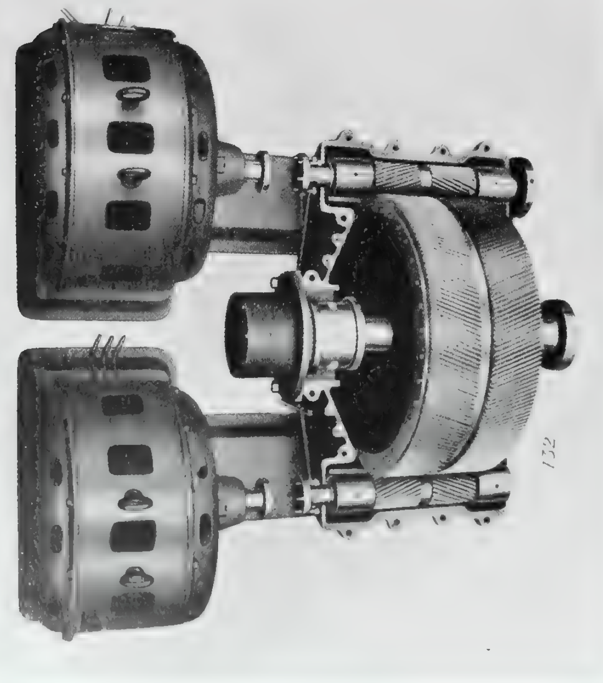
The condensers are of a modified "Contraflo" type. The generators are entirely supported by the upper casing of the condensers which are designed with the necessary stability and rigidity. The plant runs without a trace of vibration.

The condenser has ample cooling surface and can easily maintain a vacuum of 97½ per cent in service. This high vacuum is in part due to the efficiency of the air-pump plant, and in part to the care which has been exercised in obtaining an air-tight condenser. No auxiliary engine exhausts are led into the main condensers, and where outlets are unavoidable water locks have been fitted to exclude the entry of outside air. An electrically driven vertical centrifugal pump draws the condensed water from the bottom of the condensers into the kinetic tank.

Electrical Control

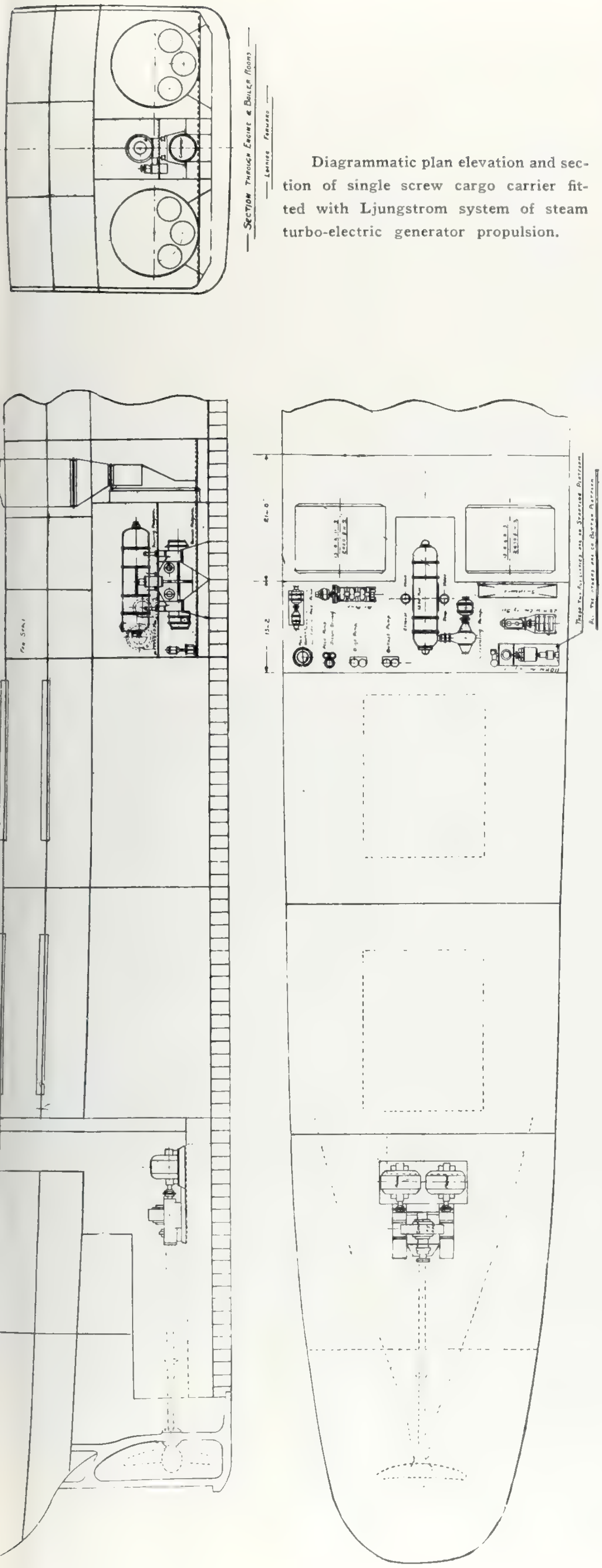


Controlling mechanism in rectangular pillar box



Plan view of twin motors and helical reduction gear with reduction gear cover removed

The maneuvering is effected by the hand-wheel shown on the forward side of the rectangular pillar-shaped switch box. If the hand-wheel be moved from central stop or mid position in one direction, the propeller turns in a similar direction, its speed corresponding to the angle through which the wheel has been turned. About 120 degrees represents full power ahead and 120 degrees in the other direction represents full power astern. The regulations of the speed of the motors when starting and stopping are effected by inserting the rotors of the motors in series with resistances of the liquid type. These resistances consist of two sets of cones, of which the lower ones are stationary and filled with a saline solution, while the upper cones are mounted on vertical spindles, which spindles are raised or lowered into the lower cones by the hand-wheel, thereby inserting a greater or lesser resistance in the circuit. In mid or stop position, the upper cones are lifted entirely out of the liquid in lower cones, thereby the current is broken and the motors come to rest. At full speed the two cones come nearly into contact, the resistances simultaneously being cut out through a short circuiting switch.



Diagrammatic plan elevation and section of single screw cargo carrier fitted with Ljungstrom system of steam turbo-electric generator propulsion.

Reversal is effected with the wheel in mid or stop position—that is, when the rotor is open circuited—and is simply accomplished by the change over switch which reverses the phases in the main or stator current. The saline solution used in the resistance is dilute potash. This solution is circulated and cooled by a small centrifugal pump which is mounted on the same spindle as the circulating pump. The cones are made of nickel plate, and thus non-corrosive, and are counterbalanced, so that the power required to turn the hand-wheel is nominal. The switches are of the ordinary open type, the tension in the rotor current of the generator being lowered automatically before the circuit is broken; they are found to work perfectly satisfactorily. For larger powers oil switches will be used. The elasticity of the control is very great, the speed of the propeller ranging from about twelve revolutions per minute to ninety revolutions per minute at full speed. The total time of propeller reversal from full ahead to full astern was carefully tested on the trial trip of the Mjolner and averaged twelve seconds.

Driving Motors

The motors are of the standard commercial type of three-phase induction motors with slip-rings, designed for 120 periods. They run at about 900 revolutions per minute, 500 volts.

The motors are connected with the driving pinions by means of slipping clutches of a novel design which are constructed to prevent breakage of propeller blade, propeller shaft, or any portion of helical gearing in the event of the propeller fouling block ice or similar obstacle. These clutches are so designed that the torque necessary for slipping is independent of the friction between the gripping surfaces. This has the advantage of preventing the clutch becoming inoperative on account of possible corrosion, due to the ship having been laid up for a lengthy period, or not being in use for any other reason.

The gear is of the well-known helical type. The pinions are made of chrome nickel steel, and the wheel of forged carbon steel. The shafts carrying the pinions run in fixed bearings of the same type as the rotor bearings—that is, they are designed for minute adjustment—while at the same time they possess great rigidity.

Owing to the motors and gearing being on a common bed-plate, the plant as a whole is self-contained, and all adjustments can be made at the works of the manufacturer, thus eliminating any extra work on board ship. The lubrication of the gearing is effected by a separate oil-pump delivering the oil to the bearings and to the teeth under pressure. Means have been provided for cooling the oil, but practice has shown this to be unnecessary, as the gearing runs perfectly cool without utilizing any special device. The speed of the teeth is low—that is, about twenty-seven lineal feet per second. A ball thrust bearing is mounted on the forward side of the gear casing. A thrust bearing of the usual horse-shoe type is fitted in the recess, but this is normally out of action and intended only as a stand by.

Steam is supplied from two cylindrical boilers, each having an overall external diameter of 10 feet 10 inches and an overall length of 10 feet 9 inches, the total combined heating surface being 2140 square feet, and total grate surface being 50 square feet; working pressure 220 pounds. Each boiler has two Morison's furnaces, 35-inch internal diameter. The boilers are supplied with Howden's forced draught, but it should be noted that no separate fan engine is supplied, the air pressure being obtained, as hereinbefore mentioned, from the ventilation fan fitted on the generator shaft. This air, which is previously heated in its passage from the generator air-gap and the stator ducts, is led direct to the furnaces through the Howden preheater. Schmidt's patent smoke-tube superheaters are fitted. They are designed to give the steam a maximum total temperature of 662 degrees Fahr. Owing, however, to the liberal amount of boiler heating surface, the temperature in the smoke tubes is not sufficient to obtain a higher total temperature than about 594 degrees Fahr., and consequently this temperature, corresponding to only about 195 to 200 degrees Fahr. of superheat, is the average superheat at sea under ordinary circumstances. Each boiler is fitted with a Diamond blower, one to each furnace. Special attention has been given to the insulation of the boilers. The top, sides and backs of boilers are covered with Newall's magnesia composition, two inches thick, and the bottoms are covered with two-inch thick magnesia blocks. The main steam pipes and valves are all made of steel.

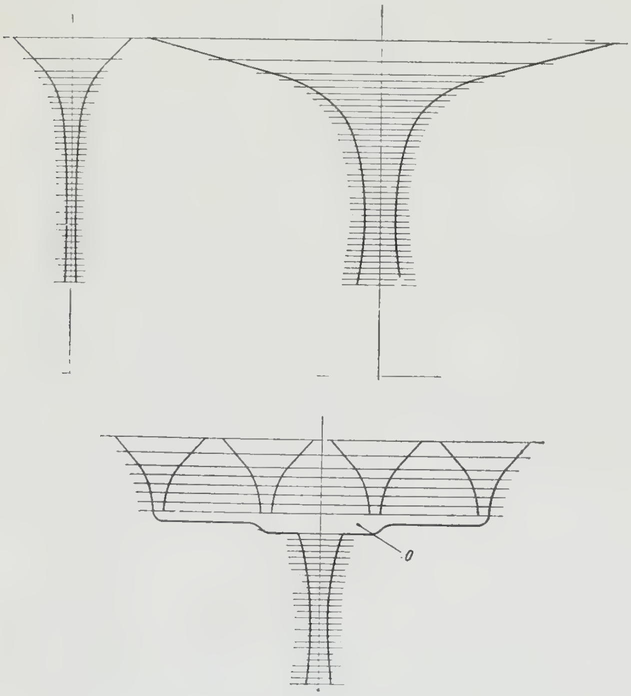


Figure 1

Economy Trials

The trial of the steamship Mjolner was run on December 21, 1914, and the tabulated results compared with the results of the steamship Mimer is given herewith:

	Mimer	Mjolner
Mean draught	11′ 9″	11′ 5½″
Displacement, tons	1698	1648
Duration of trial, minutes	251	176
I. H. P.	849	981
S. H. P.	730	843
Propeller revolutions	87	88
Coal consumed per hour, pounds	1313	873
Coal consumed per I. H. P. per hour, pounds	1.545	0.890
Coal consumed per S. H. P. per hour, pounds	1.798	1.036
Calorific value of coal, B. T. U.	13,498	13,485
Percentage of moisture in coals	4.1	2.2
Percentage of ash in coals	3.6	5.0
Speed in knots	11.3	11.8
Vacuum (bar 30-inch), inches	26	29
Boiler pressure	183	220
Feed temperature, degrees Fahr.	180	220

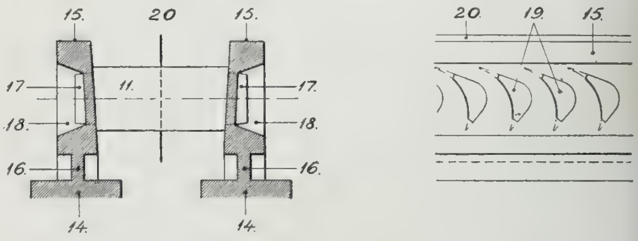


Figure 2

The consumption per I. H. P. per hour in the steamship Mjolner was thus ascertained to be 57.7 per cent of that of the steamship Mimer, or the consumption of Mjolner 42.3 per cent less than that of the Mimer.

The steamship Mjolner was put into service in December, 1914, and has since been employed in the coasting trade, principally between Stockholm and Gothenburg, alternating with the steamship Mimer. The speed of the two boats naturally depends on weather and cargo, but has averaged about eleven knots in each ship. The relative saving of coal of the Mjolner as compared with the Mimer is certified by the following letter from the owners, which covers a period of four months, running under similar conditions, for each ship:

"The difference between the coal consumption of the steamship Mimer and the steamship Mjolner is extracted from the engine-room reports as follows:

"For the steamship Mimer: From January 20, 1915, to May 3, 1915, 4450 nautical miles have been covered and during the same period 361,000 kg. coal has been burned.

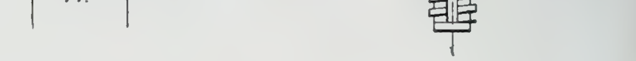


Figure 3

$$\frac{361{,}000}{4450} = 81.1 \text{ kg. coal per nautical mile.}$$

"For the steamship Mjolner: From January 31, 1915, to April 28, 1915, 6378 nautical miles have been covered and during the same period 319,780 kg. coal has been burned.

$$\frac{319{,}780}{6378} = 50.14 \text{ kg. coal per nautical mile.}$$

$$\frac{50.14}{81.1} = 0.618 = 32.2\% \text{ less coal on Mjolner than on Mimer.}$$

"Both vessels have during the said period been running in coasting trade and under alike conditions. (Signed) Edward Forsberg."

More Recent Installations

The obvious advantages to be gained in clear hold space by placing the generating machinery and boilers amidships and the motors aft, have led to different arrangements of machinery in the later ships. One of these, the steamship Aquilla, of 4600 tons deadweight, on 19 feet 9 inches draft, has just completed her maiden voyage. She is 300 feet long, 47 feet beam and makes 10 knots on 1200 I. H. P. This ship is fitted with two boilers, 11 feet by 11 feet, working under forced draft with 220 pounds steam pressure, and superheaters fitted to give 620 degrees Fahr. at the turbine top valve. The boilers are placed amidships, on each side of the center line of ship, with a turbo-generator between the boiler and the ship's side. This arrangement adds ten feet to the clear after hold space. The coal consumption on trial was .45 kilograms per horsepower hour. On larger units the space and deadweight gain over other methods of propulsion are even more favorable, and with crude oil fuel there is every reason to believe that the overall economy of ships driven by the Ljungstrom system will compare very favorably with the best results obtained from internal combustion engines.

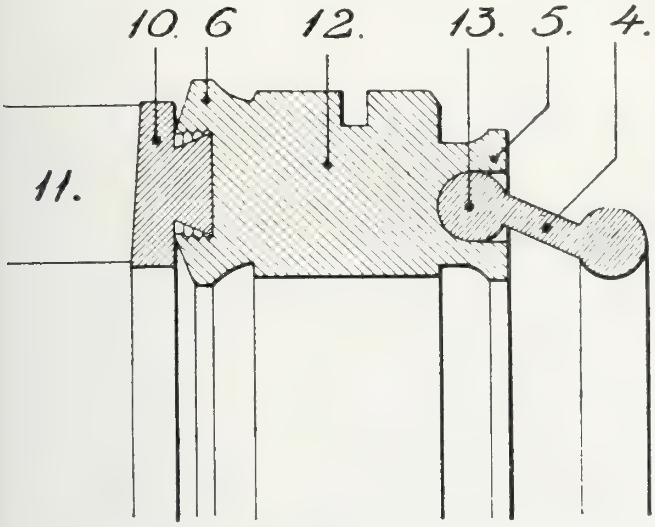


Figure 4

Installations aggregating over 100,000 horsepower of Ljungstrom turbines ranging in capacity from 1000 to 6000 shaft horsepower, are now on contract for forty-five merchant ships, and the interest taken by shipowners in this machinery is growing very rapidly.

Construction of Turbine

The ingenious methods used in the construction of these turbines are largely responsible for the efficiency of their operation and for the economy in fuel consumption. The following description is taken from a catalog published by the STAL Company:

The Ljungstrom turbine consists of a number of blade-rings concentrically arranged and fixed on two turbine-discs. The live steam enters at the center of the turbine inside of the innermost blade-ring, and from thence passes through the blade-rings outwards in a radial direction. While flowing through the turbine, the steam gradually expands, and the heat thus liberated becomes transformed into mechanical or kinetic energy which is transmitted to the turbine by means of the blading.

The blade-rings in one disc run between the blade-rings in the other. The two discs run with the same number of revolutions but in opposite directions. The blades in one disc act as guide-blades for directing the steam jets blowing against the blades in the other disc. The relative velocity between blades and guide-blades is consequently twice as high as would be the case if the latter were stationary. Hence the transmission of energy in each blade-ring at a given speed of the blades is four times greater, and due to the arrangement of moving guide-blades, this turbine system enables the extraction of mechanical work from the steam with only one-fourth the number of blade-rings otherwise necessary. Partly for this reason, and partly owing to other constructive features, this turbine requires considerably less space than other turbines built with stationary guide-blades.

In the system of double rotation, introduced by Messrs. Ljungstrom, the guide blade-rings are similar in design to the blade-rings, and the two turbine-discs are practically identical, one with the other.

The live steam enters at the center of each turbine-disc inside of the innermost blade-ring through a number of holes in the hub of the disc which is specially shaped for this reason (see Figure —). As the steam expands, the length of the turbine-blades must be proportioned to suit the increased volume of the steam, so that the cross-section of a pair of turbine-discs with blade-rings presents the appearance as schematically shown at left of Figure 1.

Blade-Rings

The length of the blades in the widest ring, however, must not exceed a certain limit which is determined by the tensile stresses in the material, produced by the centrifugal force acting on the quickly rotating blade-rings. Another important point is the slanting-off angle at the ends of the blades, which must not exceed a certain limit. In turbines for great powers, i. e., considerable quantities of steam, such unsuitable designs would be required as those shown at right of Figure 1.

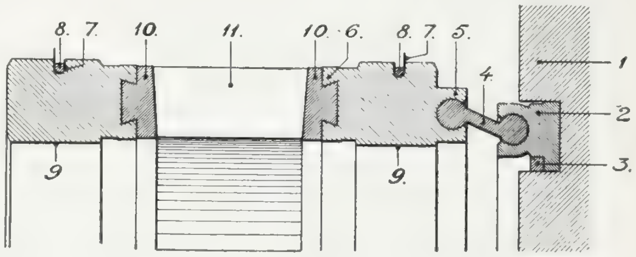


Figure 5

In order to avoid this difficulty, the widest blade-rings are divided into ring-sections, as illustrated at bottom of Figure 1.

The art of manufacturing these parts has been worked out to a very high degree of perfection. A turbine of 1000 K. W. has about forty blade-rings.

The manner of securing the blades to the rings and the insertion of the latter in the turbine-discs is evident from Figures 2 - 5, the latter of which illustrates the construction of the following elements:

Turbine-disc	1
Seating-ring	2
Caulking-strip	3
Expansion-ring	4

Rolling-ridges	5 and 6
Tightening-strips	7
Caulking-strips	8
Strengthening-rings	9
Dove-tail profile	10
Turbine-blades	11

The way of manufacturing the blade-rings is the following: The blades are cut off from profiled bars in fixed lengths, whereupon the ends are given a suitable shape (17) (see Figure 2). In the discs (14) having the welding-profile, channel-shaped grooves (18) are turned, in which a number of slots are punched. The central part of the discs (14) supports, as shown by the figures, the welding-profile by means of a narrow web (16).

The ends of the blades are inserted into the punched slots, and then welded to the disc by autogenous welding. By this means the channels (18) in the disc are filled in order to give to the disc a cross section, as indicated by the outline at the left of Figure 3 (21). During the welding process, the discs are mounted on a mandrel (23)—seen at the right in Figure 3. The narrow web (16) of the disc diminishes the transmission of heat during the welding, thus protecting the center of the disc from too intense or irregular heating and consequent alteration of shape.

The turbine-blades are retained in their positions by means of thin sheet-iron strips (20) (see Figure 8), in which are punched holes of the same cross-section as the blades and at a distance corresponding to the pitch or spacing of the blades. The said strips are applied in their places simultaneously with the assembling of the blades and welding-discs, the angles of the blades being thus properly adjusted, and the blades prevented from being wrung out of place during the welding operation.

On the completion of the welding, the sheet-iron strips are cut away, and the welding-discs turned off so as to produce the profile (22) of Figure 3, or profile (10) of Figure 5. The turbine-blades (11) will thus be located between two rings of this cross-section, being welded together with them into a firm, rigid system.

Expansion-Rings

The strengthening-rings which are first given the profile (12) shown in Figure 4 are fixed to these dovetail-rings by rolling, the projecting ridges (6) being rolled down against the dovetailed rim of the ring (10). The expansion-ring (4) is likewise firmly secured by rolling down the ridges (5) on the outer side of the strengthening-ring, being for this purpose provided with bulbed ridges (13) of accurately circular section. The seating-ring (2) is rolled on to the outer bulbed ridge of the expansion-ring (see Figure 5). Finally, the tightening-strips (7) are placed in their grooves, and caulked by means of the caulking-strips (8), the blade-ring now in its complete shape having assumed the cross-section shown in Figure 5. The inner and outer diameters of the ring are adjusted after assembling by finishing off the tightening-surfaces (9), and the outer edges of the strips (7).

The blade-rings, on being inserted in their corresponding grooves in the turbine-disc (1) and tightly secured there by means of the caulking-strips (3), will possess sufficient rigidity to exclude all risk of their changing their circular shape.

The object of the expansion-ring (4) is to transmit the heat between the turbine-wheel and the blade-ring, and prevent such increase of temperature as would produce detrimental stresses in the blades and influence the ring-diameters and clearances. For instance, if the blade-ring have a higher temperature than the turbine-disc, the edge of the

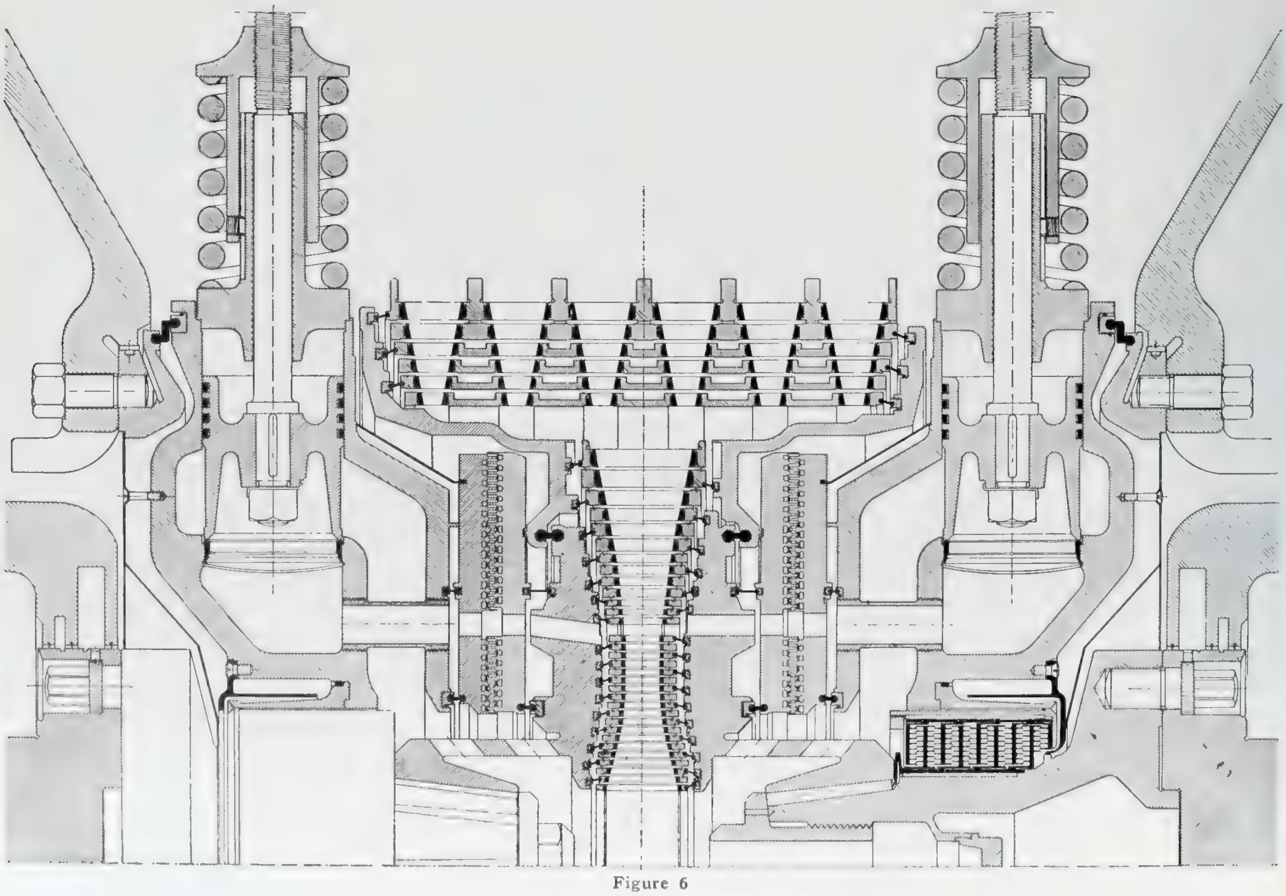


Figure 6

expansion-ring (4) which is fixed in the strengthening-ring (9) will be hotter than the other edge. In the narrow intermediate part (4) of the expansion-ring, the temperature will continuously drop from the higher to the lower temperature, the result being that the conicity of the ring will change, but its circular shape will be retained. The variation of diameter of the ring at each edge will be the same as the variation of diameter of the rings, in which the expansion-ring is secured, and stresses in the material of the rings will therefore be completely avoided.

The transmission of heat from the blade-ring to the turbine-disc is smaller than the case would be if the strengthening-ring (9) were inserted directly into the turbine-wheel without the intermediate expansion-ring, the sectional area of which is far smaller.

Figure 6 shows longitudinal section of a comparatively large steam-turbine with turbine-wheels and other internal parts. As will be seen from this illustration, the outer blade-rings are of larger cross-sections than the inner rings in order to resist the higher stresses produced in the former by the centrifugal force. The six outer blade-rings are divided into six sections with intermediate strengthening-rings.

The great quantity of steam here requires low-pressure blades of such a length that the bending stresses would be too high, if the blades of the blade-rings were made in one single length.

Figure 7 shows a cross-section of a turbine-disc divided into several sections (compound-discs), in order to avoid the stresses and alterations in shape which would arise in a solid disc subjected to the influence of varying and irregularly-distributed temperatures.

The ring-sections shown in Figure 7 are joined by means of expansion-rings (1) allowing of expansion and contraction under the influence of varying temperatures, without detrimental internal stresses or distortions being caused.

For admitting steam to the blade-system, a number of holes are provided in the hub of the turbine-disc. With a view to admit overloading the turbine, a series of holes (3) is also arranged farther out in the disc, so that full-pressure steam can be admitted directly into a blade-ring situated at a distance from the center, and thus a larger quantity of steam per unit of time be passed through the turbine.

Connection to Generator

The turbine-disc is directly coupled to an electric generator, being mounted on the overhanging end of the shaft. The center-hole is tapering, and the hub is secured to the shaft by means of a number of round keys which are in their turn retained by a locking-device screwed into the end of the shaft.

The part of the shaft situated within the turbine-casing, and subjected to heating by the steam, is made hollow, the object of this arrangement being to accelerate the heating so as to make the fluctuations of temperature in shaft and hub follow one another, and thus avoid play between the hub and the shaft.

Axial Balancing

The axial balancing, or counteracting of the steam-pressure axially on the inner side of the turbine-wheel, is accomplished by the aid of two dummy-discs provided with a number of concentric labyrinth-packings, one of the said discs being located at the back of the turbine-wheel, and the other being attached to the stationary steam-chests or "slide-discs" of the turbine. Steam is admitted between these discs from the center of the turbine. In the inner labyrinth-packings, accordingly, the full steam-pressure prevails, while in the remainder of the packings the pressure gradually decreases in proportion to the distance of the packing from the center, until it finally drops to that of the condenser outside of the outermost labyrinth-packing. The labyrinth-packings are divided into one inner and one outer section. The difference in the arrangement of these two sections is evident from Fig. 8. Any axial motion of the rotating wheel affects the clearances in these two sections differently, a movement in one direction increasing the passages in the outer section but not in the inner one, while a shifting in the other direction enlarges the inner passages but not the outer ones. By this means the entrance and discharge of the steam, and at the same time also the steam-pressure on the labyrinth-discs, is varied in such a manner that the labyrinth-disc fixed on the turbine-wheel will **quite automatically** occupy the axial position required for making the steam-pressure on the entire dummy-disc fixed to the turbine-wheel exactly equal to the steam-pressure on that side of the turbine-disc, to which the blade-rings are fastened. As this position is very distinct, and practically remains constant at all steam-pressures, no thrust-bearing is required in the Ljungstrom turbine for fixing the axial position of the rotors.

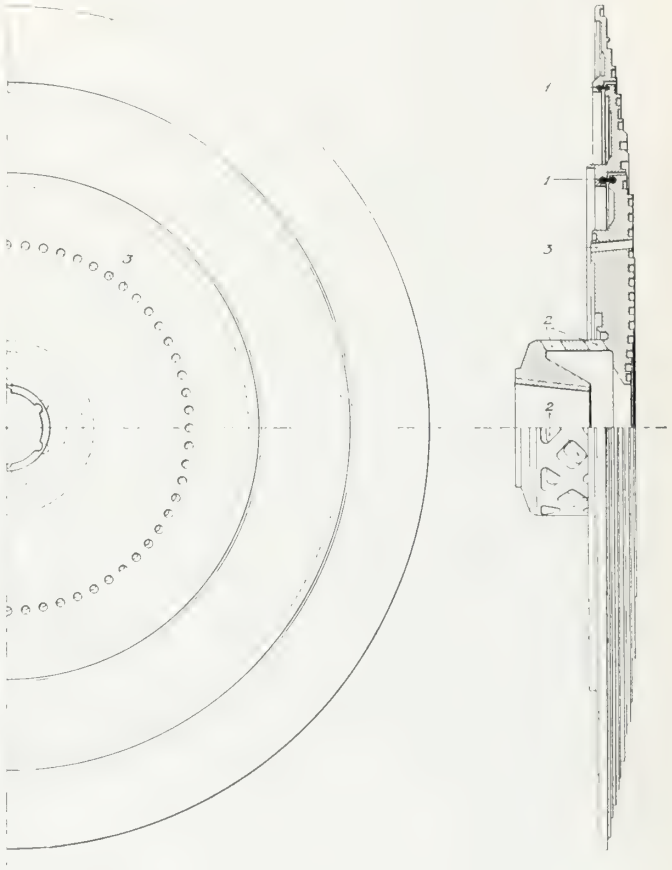


Figure 7

The construction of the labyrinth-packings is shown in Figure 8.

The labyrinth-discs (3 and 4) are secured to the turbine-wheel and the stationary steam-chest by means of expansion-rings in order to avoid heat-stresses and consequent alteration of shape.

The tightening-strips (7) are caulked to the annular projections (8) on the labyrinth-disc (3). These projections fit with a suitable clearance in the corresponding grooves (9) on the labyrinth-disc (4).

The thicknesses of metal in the two labyrinth-discs facing each other are so proportioned that any variations in the temperature of the steam will be transmitted as quickly to one disc as to the other. The clearances, therefore, in the labyrinth-packings will be subjected to no changes by sudden fluctuations in temperature caused by variations in load, or the admission of steam in starting.

Shaft-Packings

The packings around the shafts for excluding the atmosphere from the interior of the turbine are composed of labyrinth-rings, the design of which is evident from Figure 9. Every other ring is fixed on the shaft, and the intermediate rings are secured to the surrounding stationary packing-box. Twisting of the rings is prevented by the feathers (6) and (7). A very large number of labyrinth-packings can be contained in a small space. Thus, for instance, the design shown in Figure 9 contains 106 throttling-edges for the steam in an axial space of only 2.-9/16 inches.

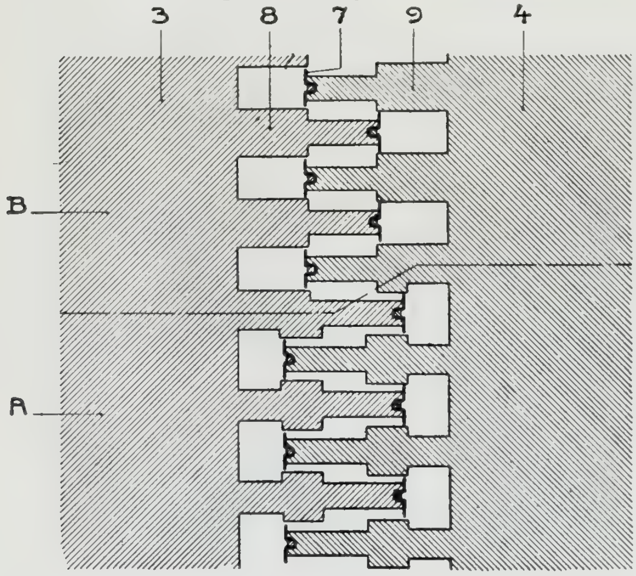


Figure 8

The packing-edges of these rings are very much thinned off, and are inclined at an angle of 45 degrees (see Figure 9). In case these edges during the running of the turbine should get into contact with the ribs of the adjoining ring, they will simply wear off until the contact ceases. There is no possibility of their running hot and melting together, since the metal of the rings is so thin that the heat generated by any arising friction can immediately be diverted by the metal without any detrimental rise of the temperature.

All the labyrinth-rings are of the same thickness. When the steam passes through, therefore, they will all be heated equally, and as a consequence the clearances between the ribs will be the same in both hot and cold state. Accordingly, the clearances will be comparatively small, and the steam quantity transmitted per unit of time will be unimportant. The leaking steam is discharged by special pipes from the shaft-packings to a feed-water heater for the boiler, the said steam being thus utilized, so that practically the flow of steam through the packing-boxes involves no loss of heat nor increased fuel-consumption.

Admission and Discharge of the Steam

The admission-valve with its strainer is located outside the turbine-casing (see Figure 10). The high-pressure steam passes from it horizontally through the steam-inlet passage of the turbine-casing, the said passage being situated within the steam-discharge. The former passage here branches off into two pipes which are in communication with the chambers of the steam-chests in the turbine-casing. From the latter steam is admitted to the center of the turbine-wheels. By means of special overload-valves, the stems of which are accessible from the outside of the turbine-casing, steam can be admitted, when required, into the overload-channels of the turbine-wheels. These overload-valves are constructed to act automatically, should the conditions so demand.

The exhaust-steam passes from the outermost blade-ring through the annular space between the said blade-ring and the turbine-casing, and finally flows into the condenser through the discharge below.

Special discharge-pipes are provided for conveying the leakage-steam from the shaft-packings to the feed-water heater.

The entire steam-turbine is in reality located in the exhaust-passage for the steam. As a consequence, the outer parts of the turbine-casing are kept at a low temperature, and require no heat-insulation.

The only parts which need insulation are the admission-valve with strainer, the pipes conducting the high-pressure steam through the exhaust passage to the center of the turbine-wheel, and the annular steam-chests of small dimensions located in the turbine-casing at the outer sides of the turbine-wheels. Transmission of heat through conduction from the internal parts of the turbine to the outer ones is impeded on account of the small cross-sectional areas to be found in the expansion-rings, by means of which the different parts of the construction are joined together. The turbine-shafts are hollow, the thickness of metal being quite small, so that only a small amount of heat is transmitted from the turbine to the generators through the tubular sections of the shafts. This minor quantity is absorbed by the cool lubricant circulating in the bearings.

Bearings

Figure 11 shows a cross-section of a bearing with its adjusting-screws (1).

Of these adjusting-screws—four in number for each bearing—two are screwed into the bottom part (2) of the casing, and two into the upper bearing-case (3). The bolts (4) are tapered and fit accurately in reamed holes, thus at the same time serving as dowels for the cap (3). The adjusting-screws are provided with spherical heads (5) at their inner ends.

The journal-bearing consists of two halves (6) and (7) resting against the heads of the adjusting-screws by means of the washers (8). The adjusting- screws are locked by small set-screws (9) screwed into the locking-washer (10), in the square hole of which a square on the adjusting screw fits accurately. This washer is provided with twelve holes, while only eleven holes are drilled in the bearing-surfaces on which it rests. The washer, together with the adjusting-screw, accordingly can be locked in 132 different positions for every revolution, a very accurate adjustment of the bearing being thus made possible without necessitating too fine a threading of the adjusting-screws.

After adjustment, the bearing-boxes will retain a very accurate position, even if the turbine has been repeatedly taken apart and put together. This adjustment is made when erecting the turbine in the work-shop, and never needs to be changed afterwards. The bearing is locked axially and against torsion by means of the adjusting-screw (21), fitting with its spherical end (22) in a corresponding recess in the upper half (6) of the bearing. The ball (22) is turned eccentrical to the axis of the adjusting-screw, and as a result the bearing can be shifted slightly axially by turning the screw which is subsequently locked by a washer in the same manner as the adjusting-screw (1).

Lubricating-Devices

While the turbine is running, the lubricating oil is kept in circulation by means of a rotary cogwheel pump of the type usually employed as oil-pump in large steam-turbine plants. This oil-pump is driven by means of screw-gearing from the vertical governor-shaft, and is mounted in the oil-tank together with an oil-cooler and a hand oil-pump.

The oil-cooler contains a spiral-pipe, through which the oil circulates. The spiral is cooled from the outside by water, which is allowed to circulate around it in the cylindrical shell of the cooler.

The ample cross-section of the oil-passages of the bearings prevents their being clogged up by impurities in the oil. As an additional safeguard, the waste-oil from the boxes is passed through an oil-strainer arranged on the suction-pipe of the oil-pump. The heat generated by the bearing-friction is absorbed by the oil, which in its turn gives it off to the water in the oil-cooler. Water-cooling for the boxes is thus made unnecessary.

The quantity of oil circulating through each box per second amounts—in a 1000 K. W. turbine, for instance—to about 0.11 gallons. The oil-pump of this machine has a capacity of about 0.45 gallons of oil per second under a pressure of about thirty-five pounds per square inch, one-half of which only is required for overcoming the frictional resistances of piping, oil-cooler, and bearings.

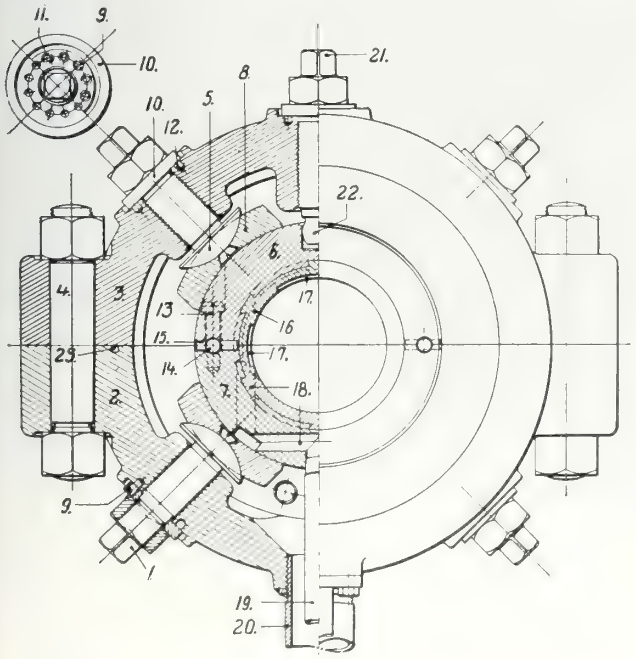


Figure 11

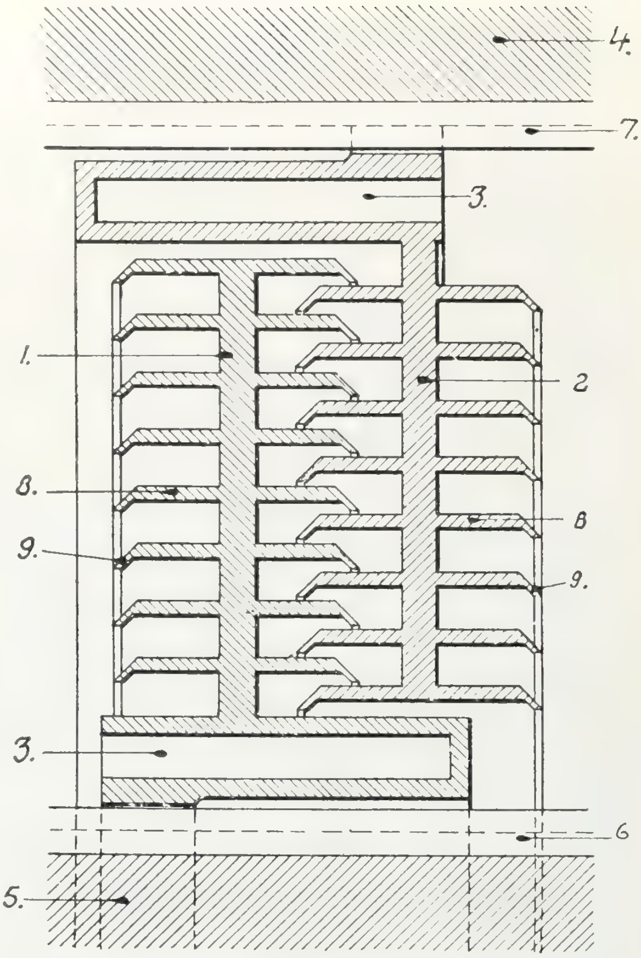


Figure 9

The object of this higher pressure is to enable the throttle-valve of the turbine being operated by the oil.

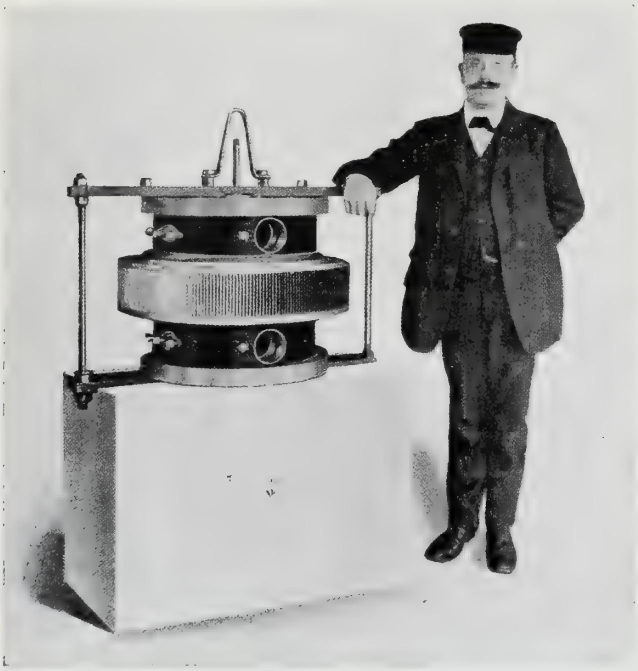
Speed-Regulation

The centrifugal governor is mounted on the same vertical shaft as the oil-pump. As mentioned above, the shaft is driven from the steam-turbine shaft by screw-gearing. The motion of the governor-sleeve is transmitted by means of a lever to the link, reaching down to the oil-reservoir, and being there joined to a small slide-valve, by means of which the oil-pressure is controlled.

From this control-valve the oil is carried through a pipe to an oil-cylinder arranged on the throttle-valve. The oil-pressure acts on the bottom side of the piston in the cylinder, the piston-rod of which is connected to the spindle of the throttle-valve. The top side of the piston is acted on by a powerful spring. Underneath the valve-chamber a water-separator and a steam-strainer are arranged.

The control-valve is opened by the oil-pressure below the piston, and is closed by the spiral-spring as soon as the oil-pressure drops below a certain limit. The position of the slide-valve in the oil-reservoir, which valve is directly actuated by the governor, determines the oil-pressure in the cylinder on the throttle-valve, and thus also the position of the pressure-piston and valve-spindle. The valve-spindle is connected to levers and to the shaft, whereby return motion is given to a sliding-sleeve surrounding the slide-valve in the oil-tank, so that the motion of the throttle-valve spindle corresponds to that of the governor-sleeve.

The force available through this return motion for operating the throttle-valve amounts , in a 1000 K. W. turbine, for instance, to 340-400 pounds, even for a minimum of movement of the governor-sleeve. The spiral-spring above the oil-pressure piston of the throttle-valve is adjusted so as to have a tension of about double the force just mentioned, or 600-800 pounds. The latter force, therefore, is available for closing the valve, provided that the oil-pressure underneath the piston drops to zero. This will occur, when the emergency-governor is brought into action, or if the oil-pressure is released by hand, when the turbine is to be stopped.



Rotor discs, blade rings and steam chests of 1000 K. W. Ljungstrom turbines removed from casing for inspection

For changing the medium speed of the turbine-generator while running, the auxiliary spring of the centrifugal governor is compressed or slackened either by hand or by means of a small electric motor which, for instance, can be operated from the switchboard.

An emergency-governor is applied to each of the main shafts of the turbine outside of the bearing-boxes. This emergency-governor acts by means of a releasing-device or trigger on a slide-valve, which cuts off the oil-pressure from the oil-cylinder of the governor-valve, should the speed increase too much. At the same time, both ends of the oil-pressure cylinder are brought into communication with each other, so that the oil-pressure ceases below the piston, and the governor-valve is immediately closed by the spiral-spring above the piston.

An operating-wheel is provided for raising and lowering the stop-valve, which is mounted on the same spindle as the throttle-valve. Previous to starting the turbine, the operating-wheel is unscrewed a couple of turns, the stop-valve being thereby enabled to open just enough to admit the steam-quantity required for heating the turbine. When the heating has been continued for a few minutes, oil is forced in below the oil-pressure piston of the throttle and stop-valve by a few strokes of the hand oil-pump, the valve-spindle being thus elevated and the turbine started. The hand oil-pump supplies oil also to the bearings. The lubrication of the latter, accordingly, begins immediately, before the turbine has had time to start running. As soon as the starting has taken place, the bearings will obtain oil from the rotary oil-pump, which at the same time takes charge of the automatic operation of the throttle-valve.

Erection of the Steam-Turbine and Coupling to the Electric Generators and Condenser

The stators of the generators with their cylindrical casings are by means of heavy ring-flanges attached to the turbine-casing and to the cylindrical frames containing the bearing-boxes. The flange-bolts uniting the different parts of the plant are tapered and made to fit accurately in the reamed tapered holes, the bolts thus at the same time serving as dowels.

The entire machinery thus constitutes a very rigidly built-up cylinder, in which the rotary parts are accurately centered in their carefully adjusted bearings—an alignment which is not disturbed by repeated dismantling and assembling of the structure.

Owing to its powerful build and comparatively light weight, the Stal-turbine can simply be placed together with its generators directly on the surface-condenser, if such is employed.

The generators are of a very compact design. Efficient air-circulation is provided in order to keep the rise in temperature within proper limits during the normal running of the turbine.

The cooling-air is drawn in by means of a fan arranged at the rotor-end, through an air-intake which is provided with a damper. To increase the efficiency of the fan, it is fitted with a diffuser, from which the compressed air is conducted through the passages of the stator, the passages of the rotor, and through the air-gap to the air-outlet.

The air-cooling is effected in a very efficient manner with but little consumption of power, and the electric losses are small.

The iron-core of the rotor is solid, and provided with milled grooves for the coils. The distance between the two bearings is reduced to a minimum. In this way it has been possible to obtain such a rigid construction of the rotor that any settling of the coils in the running will not perceptibly influence the balancing. This is a matter of very great importance to the satisfactory action of the labyrinth-packings in the steam-turbine and to safe running.

The exciter is mounted on the end-casing of one of the generators, and is secured to it by a flange-joint. The tension of the exciter-current is adapted for connecting the rotors of both generators in series.

Assembling and Dismantling

The working-parts of the Stal-turbine are comparatively small and of light weight. No insulating-jackets need be removed to make bolts and nuts accessible. The internal parts of the turbine are made accessible by lifting off the cap-part of the turbine-casing. The couplings between the generator-shafts and the turbine-wheels are then unscrewed, whereupon a fixture is applied to the steam-chests, and they are lifted together with the turbine-wheels, thus making the details of the turbine accessible for inspection.

Shipyard Costs and Ship Wages—A Comparison

By Winthrop L. Marvin

CHAIRMAN HURLEY'S request to Congress for $673,000,000 to defray the cost of a renewed shipbuilding program brings new hope to our American yards that have had contracts cancelled or suspended, and stirs a lively interest as to the prices that the yards will make for new peace-time construction. At this present writing no American shipbuilder has come forward to duplicate the proposal of the Submarine Boat Corporation of Newark, New Jersey, to construct a fleet of eight large steel freighters of 12,000 tons deadweight capacity at a price of $149 a deadweight ton, without any guarantee from the government on either labor or material. This bid, it will be recalled, was based on the new "American type" of ships evolved by the New York designers and architects, Cary, Smith & Ferris, " as embodying the greatest possible efficiency and economy in the operation of merchant craft."

The new ships were designed on the transverse system of construction, 473 feet long between perpendiculars, with a molded beam of 62 feet, a draft of 28 feet 6 inches, and either reciprocating engines of 5000 indicated horsepower or geared turbines—and with Scotch boilers, oil burning. With this power equipment a sustained sea speed of twelve knots loaded would be guaranteed. The designers of these important new ships are Theodore E. Ferris and Frank E. Kirby. These ships were to have the unusual steaming radius of 13,000 miles.

It is understood that the Submarine Boat proposal created a sensation abroad—and well it may have done so. It also created a sensation in the United States. Since President Sutphen of the Submarine Boat Corporation made his announcement early in April last, the impression has gained currency that about $180 would be a fair price for a large ship of a similar type in either Pacific or Atlantic shipyards. This at least is the conclusion to be drawn from personal inquiries of many representative American shipbuilders.

A Word Direct from Scotland

If American prices for seagoing steel ships range from $149 to $180, a very lively zest is given to the problem of comparative prices in the crowded yards of the United Kingdom. A letter from a particularly alert and well-informed shipyard official states that the other day a shipbuilder from the Clyde, who had left the other side only about two weeks before, was in his office. Of course, the immediate theme of conversation was the relative prices of shipbuilding on the two sides of the Atlantic. For one thing, the visitor from Scotland made the point that America was enjoying a wide advantage in the cost of ship steel. And the letter adds:

> "Our Clyde friend also gave me a confirmation of your prices of $125 to $150 per ton, but added significantly that there was a string to these prices, inasmuch as the buyer has to stand a rising scale in prices of labor and materials. He further stated that at the present time there is no yard in Great Britain that is not full up for two and one-half to three years to come; therefore, the British market is practically closed to the world as far as any reasonable deliveries are concerned. You will recall that this was my forecast to you when last talking to me: that the only available market in due course of time would be the shipbuilding market of the United States. That time has now arrived."

Making due allowance for the "rising scale" of wages and materials in Great Britain at the present time, it is manifest that at either $149 or $180 a deadweight ton the yards of the United States are now closer to a competitive basis with the yards of the United Kingdom than they have been since the dawn of metal shipbuilding.

Shipyard wages have risen 131 per cent in England, Scotland and Ireland, and working hours have been reduced to forty-seven a week, while a forty-four-hour week is being demanded by the Federation of Engineering and Shipbuilding Trades. Premier Lloyd George, in a letter to the provisional joint committee of the National Industrial Council, has pledged his government to a recognition of a maximum forty-eight-hour week and of a minimum wage standard. Women who responded in the war emergency will, it is declared, be taken off all engineering work formerly done by men in British shipyards. Skilled Scotch workers who were once content with the British equivalent of $10 or $11 a week are now earning $25.

Nor is this the entire story. Many British shipyards have been hotbeds of industrial discontent since the armistice was signed, and old British builders complain that the ancient morale has forever departed. All the shipbuilding crafts are far more completely and tensely organized in the United Kingdom than in the United States, and the sophism that the longer the work requires the more there will be to do are potent factors in the uplifting of British ship prices, even higher than $125 and $150 a deadweight ton.

Though we have our troubles in America, there is no such pessimism here as is visible around the coasts of the British isles. One of the famous house of Yarrow, on a recent visit to this country, declared that he found a totally different spirit among shipyard workers here, and that one skilled hand in an old-established American yard handled twice as much material as a British worker of the same occupation. There may be such instances, it is true, but this statement looks like a far too sweeping generalization. There was certainly no such contrast in individual production before the war, though our yards had by far the better of it, as a rule, in their equipment of labor-saving machinery.

What Mr. Isherwood Says

Perhaps the most authoritative comparison of spirit and efficiency now manifest in American and British yards is that of Mr. J. W. Isherwood, inventor of the Isherwood system—a gentleman who has had remarkable opportunities for observation in this country and abroad. Mr. Isherwood, just returned from a visit to America, told his people that they must face the fact that the United States "may become the greatest factor in the world's shipbuilding," and he added:

> "I had occasion to visit most of the old and new shipyards. With the former I had been

conversant for years, but I observed great changes. Old plants had been scrapped, more intensive methods for organization introduced, and labor-saving appliances were being adopted without raising the prejudice of the workmen. I came away from the new shipyards greatly, very greatly, indeed, impressed not only with the magnitude but with the astonishing standard of efficiency which has been attained for turning out tonnage with rapidity, and eventually, beyond all doubt, with cheapness."

Mr. Isherwood further told his countrymen that they must not be deceived by apparent existing high costs in the United States:

> "My own conclusion is that America will become our greatest and keenest competitor. It is perfectly true that the costs at the present time are very high, but this is not to be wondered at when it is remembered what a tremendous shipbuilding program was decided upon for war purposes and that this program in the course of a few months multiplied several fold the shipbuilding facilities of the country. I assure you that the one and only object of the American people at that time was to build great numbers of ships in the quickest possible time, no matter what the cost, so as to win the war.
>
> "Today a different method is in progress. All the facilities which have been created are to be devoted to competitive shipbuilding on lines which will have a far-reaching effect upon the future shipping of the world. I saw everywhere evidence of pronounced competency, energy and enterprise, coupled with commercial organization for developing orders. Already, as yards are relinquished from government control, I found production costs coming down very rapidly."

Moreover, Mr. Isherwood did not regard the higher American wages as an obstacle to active competition:

> "If our shipyard workers would respond to the magnificent enterprise of our shipbuilders, one could forecast a brighter era than seems to stand out. Those who predict that America will not win in the race for turning out in the next three years the tonnage that will be required because she is paying higher wages are, in my opinion, mistaken. Those higher wages are being paid on a basis of results, not only in ordinary manual labor, but in the handling of labor-saving devices, and in this respect higher wages will mean cheapness."

President Farrell's Statement

These views are worth citing and remembering, not because they leave nothing more to say, but because they are substantially free from prejudice and because Mr. Isherwood is one of those men who have steadily come into close touch with actual working conditions in this country and overseas. One factor of large consequence in the making of competitive prices is the ability of American steel works to produce materials at lower costs. James A. Farrell, president of the United States Steel Corporation, speaking recently before the National Foreign Trade Council in a notable address of confident patriotism, pointed out the fact that "in England ship plates are selling at $67 per ton, shipbuilding plates at $66 per ton; whereas in the United States they are $53 and $49 respectively." It will come as a surprise to many Americans, even to men in the shipbuilding industry, to learn that American ship steel is available at a lower price than British ship steel—and, in fact, that this condition is not new, but characteristic of at least an eight-year period.

As far back as 1911 ship plates were lower in the United States than they were in the United Kingdom. In January, 1914, before the great war began to exert its influence, there was a difference in our favor of almost $5 a ton, which in January, 1915, with British steel works feeling the strain of the war, had increased to more than $13 a ton. Here are the current official quotations from 1911 to 1916, inclusive:

Price of Steel Ship Plates in United States and Great Britain

Month	United States	Great Britain
1911—January	$31.36	$32.85
July	29.57	32.85
1912—January	25.85	35.04
July	29.12	37.96
1913—January	32.48	40.15
July	32.48	40.15
1914—January	26.88	31.63
July	25.09	29.20
1915—January	24.64	37.96
July	28.67	47.45
1916—January	42.76	55.96
July	64.96	69.35

These were the market prices of steel ship plates free on board at Pittsburgh in the United States and free on board at Middlesbrough in England. To the American price must, of course, be added the cost of transportation to New England, the Delaware River and Chesapeake Bay, and nearly 3000 miles overland or 6000 miles by sea to the Pacific Coast. From 1911 to 1914 the fact that American ship plates were substantially cheaper than British ship plates failed of itself to give any new breath of life to American shipbuilding. The great vitalizing force has come from the emergency of war.

No "Taxed" Materials

So much has carelessly been said about the protective tariff as a burden upon the American merchant marine that it is a distinct shock to the average inlander to learn that for many years materials for shipping for the overseas trade have been exempt from tariff taxation in this country. A deliberate National policy of freeing from duties all materials for ocean shipbuilding was initiated in the tariff act of June 6, 1872, and was broadened in all subsequent tariff legislation. Finally the policy was fully proclaimed in the Panama Canal act of August 24, 1912, as follows:

> "All materials of foreign production which may be necessary for the construction or repair of vessels built in the United States, and all such materials necessary for the building or repair of their machinery, and all articles necessary for their outfit and equipment, may be imported into the United States free of duty under such regulations as the Secretary of the Treasury may prescribe."

Existing law in the Simmons-Underwood tariff act of October 3, 1913, is as follows:

> "J. Subsection 5. That all materials of foreign production which may be necessary for the construction of naval vessels or other vessels of the United States, vessels built in the

United States for foreign account and ownership, or for the purpose of being employed in the foreign or domestic trade, and all such materials necessary for the building of their machinery, and all articles necessary for their outfit and equipment, may be imported in bond under such regulations as the Secretary of the Treasury may prescribe; and upon proof that such materials have been used for such purposes, no duties shall be paid thereon.

"J. Subsection 6. That all articles for foreign production needed for the repair of naval vessels of, or other vessels owned or used by, the United States, and vessels now or hereafter registered under the laws of the United States, may be withdrawn from bonded warehouses free of duty, under such regulations as the Secretary of the Treasury may prescribe."

Well does the United States Commissioner of Navigation say that "So far as freedom to purchase materials in the cheapest market is concerned, American shipbuilders since 1912 have been virtually on the same plane as British builders." Even before 1912 America itself was the cheapest market for steel and timber.

America's hope of shipbuilding prosperity rests on a broad natural foundation in the relatively low cost of the vital materials; but, as experience has demonstrated, low cost of materials of itself may not suffice. In past years American shipbuilders have usually estimated that on the average, taking type by type, the cost of "assembling" the completed ship embodied at least one-half or more than one-half of the total cost of the completed vessel. It is conceivable that lower-priced materials may be offset by lower foreign wages—and this, apparently, was the actual condition before the great war in 1914. In any consideration of shipbuilding, it is essential to remember that in a broad sense the ship is the tool or the machinery of the shipowner, who must secure his machinery at a fair competitive cost and be able to man and operate it at a fair competitive cost, in order to earn a profit for himself or acquire the ability to contract for further machinery and to pay for it.

American and British Ship Wages

An elaborate report of the Shipping Board, the substance of which was presented and commented on a month ago, went to show that at least, in regard to vessels operating out of the port of New York, American ship wages were now substantially on a par with British and Scandinavian wages. In fact, this proposition was broadly advanced on Shipping Board authority. But there is evidence to the contrary in some careful figures that have come to hand through the American Steamship Association. This association has made a study of the comparative wages paid aboard American and British steamers of analogous type and tonnage, in the month of March last, when American seamen's and firemen's wages had been established at the standard rate of $75 a month and a bonus was still being paid to British seamen and firemen.

These data of the American Steamship Association are valuable because they represent typical groups of modern cargo steamers ranging in size from 3500 to 12,000 tons deadweight capacity—and thus representing exactly the typical steel freighters now largely engaged in the overseas carrying trade. The following figures are based upon actual pay-rolls of steamships whose entire complements of officers and crews are white men:

		Vessels 3500-4000 Tons D. W.		
		British Scale		American Scale
Captain	(1)	$ 152.32	(1)	$ 300.00
Chief engineer	(1)	138.04	(1)	212.50
First officer	(1)	109.48	(1)	181.25
First assistant engineer	(1)	109.48	(1)	181.25
Second officer	(1)	95.20	(1)	162.50
Second assistant engineer	(1)	95.20	(1)	162.50
Third officer	(1)	80.92	(1)	143.75
Third assistant engineer	......	......	(1)	143.75
Deck engineer	......	......	......	......
Quartermasters	(3)	171.36	......	......
Sailors	(6)	295.12	(6)	450.00
Chief steward	(1)	76.16	(1)	120.00
Assistant steward	......	......	......	......
Chief cook	(1)	71.40	(1)	100.00
Second cook	(1)	52.36	......	......
Third cook	......	......	(1)	60.00
Messmen	(2)	95.20	(2)	120.00
Messboys	......	......	(1)	55.00
Carpenter	(1)	66.64	(1)	90.00
Boatswain	(1)	61.88	(1)	85.00
Firemen	(6)	342.72	(6)	450.00
Oilers	......	......	(3)	240.00
Coal-passers	(2)	109.48	(3)	195.00
Donkeymen	......	......	......	......
	(31)	$2122.96	(34)	$3452.50
Bonus		428.36		
		$2551.36		

American scale 25 per cent higher than British scale.

		Vessels 5650 Tons D. W.		
		British Scale		American Scale
Captain	(1)	$ 157.08	(1)	$ 300.00
Chief engineer	(1)	142.80	(1)	212.50
First officer	(1)	114.24	(1)	181.25
First assistant engineer	(1)	114.24	(1)	181.25
Second officer	(1)	95.20	(1)	162.50
Second assistant engineer	(1)	95.20	(1)	162.50
Third officer	(1)	80.92	(1)	143.75
Third assistant engineer	(1)	80.92	(1)	143.75
Deck engineer	......	....	(1)	70.00
Quartermasters	(3)	171.36	......	....
Sailors	(6)	295.12	(8)	560.00
Chief steward	(1)	76.16	(1)	120.00
Assistant steward	(1)	51.10	......	....
Chief cook	(1)	71.40	(1)	100.00
Second cook	(1)	52.36	(1)	60.00
Second cook and baker	......	....	(1)	90.00
Messmen	(2)	95.20	(3)	180.00
Messboys	......	....	(2)	110.00
Carpenter	(1)	66.64	(1)	90.00
Boatswain	(1)	61.88	(1)	85.00
Firemen	(6)	342.72	(6)	450.00
Oilers	......	....	(3)	240.00
Coal-passers	(3)	109.48	(3)	195.00
Donkeymen	......	....	......	....
	(34)	$2274.02	(40)	$3837.50
Bonus		514.08		
		$2788.10		

American scale 37 per cent higher than British scale.

		Vessels 7500 Tons D. W.		
		British Scale		American Scale
Captain	(1)	$ 157.08	(1)	$ 312.50
Chief engineer	(1)	142.80	(1)	231.25
First officer	(1)	114.24	(1)	187.50
First assistant engineer	(1)	114.24	(1)	187.50
Second officer	(1)	95.20	(1)	168.75
Second assistant engineer	(1)	95.20	(1)	168.75
Third officer	(1)	80.92	(1)	150.00
Third assistant engineer	(1)	80.92	(1)	150.00
Deck engineer	......	....	(1)	70.00
Quartermasters	(4)	228.48	......	....
Sailors	(8)	352.24	(8)	560.00
Chief steward	(1)	76.16	(1)	120.00
Assistant steward	(1)	51.10	......	....
Chief cook	(1)	71.40	(1)	100.00
Second cook	(1)	52.36	(1)	60.00
Second cook and baker	......	....	(1)	90.00
Messmen	(3)	142.80	(3)	180.00
Messboys	......	....	(2)	110.00
Carpenter	(1)	66.64	(1)	90.00
Boatswain	(1)	61.88	(1)	85.00
Firemen	(9)	514.08	(9)	675.00
Oilers	(3)	178.50	(3)	240.00
Coal-passers	(4)	218.96	(6)	390.00
Donkeymen	......	....	......	....
Storekeeper		....	(1)	80.00
	(45)	$2895.20	(46)	$4406.25
Bonus		628.32		
		$3523.52		

American scale 25 per cent higher than British scale.

	Vessels 8800 Tons D. W.	British Scale		American Scale
Captain	(1)	$ 157.08	(1)	$ 325.00
Chief engineer	(1)	142.80	(1)	231.25
First officer	(1)	114.24	(1)	193.75
First assistant engineer	(1)	114.24	(1)	193.75
Second officer	(1)	95.20	(1)	175.00
Second assistant engineer	(1)	95.20	(1)	175.00
Third officer	(1)	80.92	(1)	156.25
Third assistant engineer	(1)	80.92	(1)	156.25
Deck engineer			(1)	70.00
Quartermasters	(4)	228.48		
Sailors	(8)	352.24	(10)	690.00
Chief steward	(1)	76.16	(1)	120.00
Assistant steward	(1)	51.10		
Chief cook	(1)	71.40	(1)	100.00
Second cook	(1)	52.36	(1)	60.00
Second cook and baker			(1)	90.00
Messmen	(3)	142.80	(3)	180.00
Messboys			(2)	110.00
Carpenter	(1)	66.64	(1)	90.00
Boatswain	(1)	61.88	(1)	85.00
Firemen	(9)	514.08	(9)	675.00
Oilers	(3)	178.50	(3)	240.00
Coal-passers	(4)	218.96	(6)	390.00
Donkeymen				
Storekeeper			(1)	80.00
	(45)	$2895.20	(49)	$4586.25
Bonus		628.32		
		$3523.52		

American Scale 30 per cent higher than British scale.

	Vessels 12,000 Tons D. W.	British Scale		American Scale
Captain	(1)	$ 166.60	(1)	$ 325.00
Chief engineer	(1)	152.32	(1)	250.00
First officer	(1)	123.76	(1)	193.75
First assistant engineer	(1)	123.76	(1)	193.75
Second officer	(1)	99.96	(1)	175.00
Second assistant engineer	(1)	99.96	(1)	175.00
Third officer	(1)	80.92	(1)	156.25
Third assistant engineer	(1)	80.92	(1)	156.25
Deck engineer			(1)	70.00
Quartermasters	(4)	228.48		
Sailors	(8)	352.24	(10)	690.00
Chief steward	(1)	76.16	(1)	120.00
Assistant steward	(1)	51.10		
Chief cook	(1)	71.40	(1)	100.00
Second cook	(1)	52.36	(1)	60.00
Second cook and baker			(1)	90.00
Messmen	(3)	142.80	(4)	240.00
Messboys			(2)	110.00
Carpenter	(1)	66.64	(1)	90.00
Boatswain	(1)	61.88	(1)	85.00
Firemen	(9)	514.08	(9)	675.00
Oilers	(3)	178.50	(3)	240.00
Coal-passers	(4)	218.96	(6)	390.00
Donkeymen				
Storekeeper			(1)	80.00
Water-tenders			(3)	240.00
	(45)	$2942.80	(53)	$4905.00
Bonus		628.32		
		$3571.12		

American scale 37 per cent higher than British scale.

One significant fact standing out of each of these comparisons is that the British crew contains fewer men than the American crew—three fewer in the ships of 3500 to 4000 tons, six fewer in the ships of 5650 tons, one fewer in the ships of 7500 tons, four fewer in the case of ships of 8800 tons, and eight fewer in the case of ships of 12,000 tons. British vessels of the smallest class carry no third engineers, for example, and the British ships of all classes carry no deck engineer, an occupation found on every American crew list. Moreover, there are no oilers on the smaller British steamers, while American vessels of all classes carry three. No quartermasters are classified on any of the American vessels, though this rating was long familiar in our service. The American ships in all but one class carry more sailors, however, than the British ships. The number of firemen is the same on American and British vessels in all classes, but in several cases the American ships are credited with a larger number of coal passers.

Other Factors Than Wages

It used to be asserted that the pay-roll of an American steamship was, roundly, double the pay-roll of a British steamship of the same size and character. This was only exceptionally true in the past; it is not at all true in the present—the American total pay-roll, as exemplified above, ranging from 25 per cent to 37 per cent above the British pay-roll. This is a substantial difference, but it should be remembered that the cost of officers and crew is, after all, only one factor in the cost of maintenance—and that the cost of coal or oil as fuel, of lubricating oil, of other supplies and of ship stores in general, is on the average about the same in American and in British ocean-going steamers. The cost of the American food scale has generally been a higher one, but this of itself is not a factor of large importance.

It would not be prudent to fail to give frank consideration to these significant comparative figures of the American Steamship Association. They show that implicit acceptance of the Shipping Board generalizations of equal crew cost is not justified by present circumstances. But against this difference may be set the practical judgment of Mr. J. H. Rosseter, a Pacific Coast man who has justified himself as director of operations of the Shipping Board:

> "The amount of wages paid is properly to be measured by accomplishment. It is true that we have a larger number of officers and men on a ship than is required under foreign flags, and that we pay higher wages and provide better food, all of which cost more than our competitors are paying. That is not to be contradicted, and for my part not to be changed, confidently expecting, as my own experience has proved, that we get better and more efficient service from men who are well paid and well fed."

And as Mr. Rosseter further says:

> "The prejudice of higher costs of manning, by which I mean larger crews at higher pay and extra cost of victualing, can be fairly stated as amounting to less than 2 per cent of the total operating expense. This can be entirely offset, and more, by a reasonable increase in the speed of our ships and by improving loading and discharging equipment, thus reducing the time in port as well as on the voyage."

This is optimism of a kind that encourages because it is optimism based on experience and knowledge, and therefore cannot easily be gainsaid. Generally speaking, a spirit of intelligent, reasonable optimism characterizes the leading men of our American maritime industry, East and West. They come of a courageous race which from pioneer days on has never been in the habit of magnifying difficulties or exaggerating dangers. But all agree on one thing, and that is that the time has come when the government of the United States owes it to its shipbuilders, shipowners and seamen to make a clear-cut definition of National policy. That is what the American merchant marine and the American people must demand from the lawmakers who have recently met anew in Washington.

Alaska Packers' Association bark Star of Scotland

American Boys for American Ships

United States Shipping Board cadets furling sail on the bark Moshulu

Work of the Sea-Training Bureau of the United States Shipping Board

By Henry Avila

Supervisor of the Bureau at San Francisco

EVERY mariner, using the mathematics of navigation, appreciates the significance and the truth of numbers. He uses them in his calculations with a deep sense of the perils that await him should his figures prove wrong. Therefore, in this recapitulation of the work of the Sea-Training Bureau of the United States Shipping Board, actual figures showing what the bureau has accomplished will be most convincing.

I will state, parenthetically, that this is the first time this statistical information has been made public in this district, which includes California, Arizona, Colorado, Nevada, New Mexico and Utah.

The task of organizing the Sea-Training Bureau paralleled the major task of building and equipping the ships of the American merchant marine. The country was at war when the Sea-Training Bureau began its work, and even the tools had to be constructed and the plans prepared for the molding of the plastic human material into American seamen.

It is not the purpose of this article to set forth how that task was successfully performed in this district under the direction of Captain I. N. Hibberd, who is now the national supervisor of the Sea-Training Bureaus. Rather, I will show the results of the work after the task of organizing the workshop had been finished.

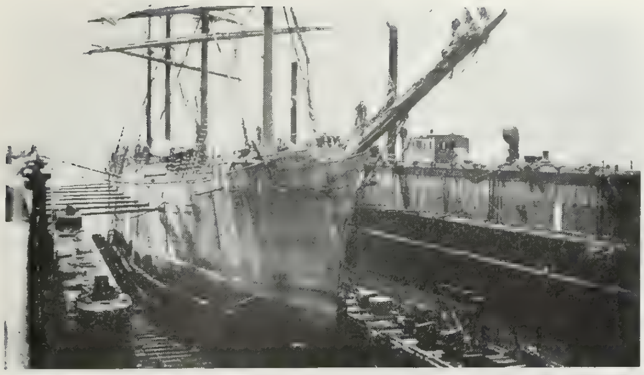
First, a word as to the national results achieved. Recently Henry Howard, director of the Shipping Board's recruiting service, issued a report in which he stated that in the month of March, 1919, there were placed on American ships 6985 men, 50 per cent of whom were young Americans fitting themselves for the vocation of mariners. He added that 90 per cent of the nation's merchant officers are now Americans. These figures tell their own story of the rapid Americanization of our crews.

The Howard report showed that the Shipping Board schools for navigation and marine engineering were started in June, 1917. By April 1, 1919, these schools had graduated 8107 officers to billets in the merchant marine. These graduates were men who had had two years' deck experience at sea to qualify for deck licenses and who had sufficient mechanical knowledge to secure engineer licenses.

The first training ships were established in the East in January, 1918. By April 1, 1919, the number of American youths graduated into the merchant marine as sailors, firemen and stewards reached a total of 22,573.

Now let us review the part borne by the California district in this great work. The account of the glorious record of this district is the best tribute that could be accorded Captain Hibberd, on whose shoulders fell the heaviest part of the work.

On June 9, 1919, the records of the local district of the Sea-Training Bureau showed that 2629 apprentices had been graduated from the bureau's training ships and assigned to duty with American merchant vessels. Of this number, 211 boys received their training aboard Yankee sailing ships



Moshulu in dry dock

which supplemented the work of the bureau's training ship, the steamer Iris, during the war-time rush. The remaining 2418 lads were placed aboard the receiving ship Ocean Wave for a brief preliminary training by Captain John N. Ansell and were then transferred to the Iris for instruction at sea under Captain Ryland Drennan, who, when summoned to duty in Washington, was succeeded in the training ship by Captain James McAvoy.

The Iris went into commission on July 2, 1918, and her first class was graduated on August 20, after a six weeks' cruise. So that from August 20, 1918, to June 9, 1919, the records show that an average of 321 apprentices were graduated every month to the Shipping Board fleet. In other words, the assimilation of fresh young American blood by the nation's growing merchant marine was at the rate of eighty boys a day from this district alone.

In order to obtain this result, 4889 youths were enrolled in the district, of whom 2048 failed to report for training and 212 were rejected because of physical disability.

The record for the six states in the district follows:

State	Recruits Enrolled	Recruits Accepted	Recruits Rejected	Recruits Not Responded
Arizona	73	36	3	34
California	4655	2529	203	1923
Colorado	86	33	6	47
Nevada	17	7	......	10
New Mexico	32	13	......	19
Utah	26	11	......	15
Totals	4889	2629	212	2048

It can be seen that California supplied 4655 of the total enrollments, 2529 of the graduated apprentices, 203 of the rejects, and 1923 of those who failed to report for duty.

California graduated 54 per cent of her total enrollments as compared with 43 per cent for the other five states in the district. Her percentage of rejected men was 4-1/3 per cent as compared with 3.8 per cent in the other states. In California 41 per cent of the men enrolled failed to respond; 53 per cent of the registrants in the inland states failed to report.

A fresh wind and a fair sea

The figures might lead to interesting speculations and deductions as to the "appeal of the sea" upon the people of the inland states.

The placing of these boys was under the supervision of Captain John Leale, head of the Sea-Service Bureau in this district. His task also includes the placement of experienced seafaring men who apply to the bureau for work.

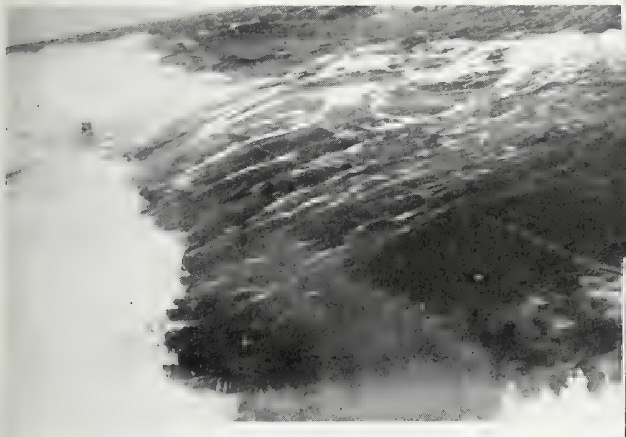
A smart spread of canvas pulling strong

The youths first graduated were, for a time, put aboard privately-owned vessels, but as the new ships began to be launched by the Emergency Fleet Corporation, all apprentices were placed aboard Shipping Board ships.

Records in this district for the period April 27, 1918, to May 24, 1919, show 4499 men placed aboard American ships. Of this number 2629 were graduated from the Iris and the supplementary sailing ships. Of this latter number 1420 reshipped after their first and subsequent voyages. Of the remainder, an indeterminably small percentage refused to reship, the majority of the apprentices being still out on their first long cruise. The number of reshipments indicates that the graduated

AMERICAN BOYS FOR AMERICAN SHIPS

Here's to the lad with his kodak; on his first
trip out was he
And his ship War Knight in a terrible plight,
as you can plainly see.



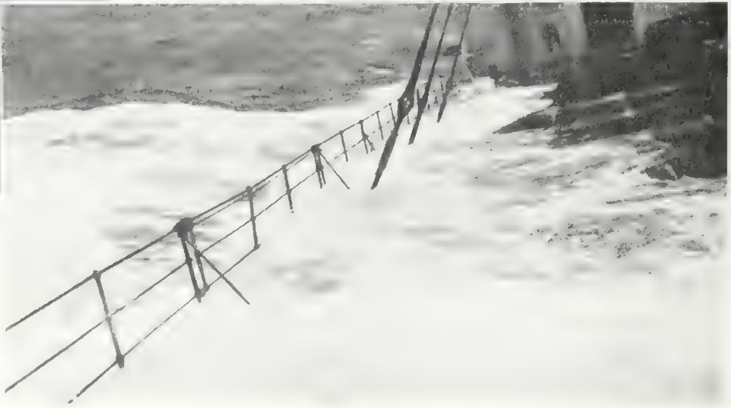
With twenty feet in her after holds on her
beam ends wallowed she
Or careened about like a crazy thing in the
trough of a monster sea.

But our bold lad clings to the weather shrouds
and whistles merrily
As he defies the howling gale and "snaps" the
waves coming over the rail
Just to show to you and me.

Yes, to show to me and you, my mates—to
show to you and me
That American boys should man our ships,
for American boys can be

Depended on to show brave hearts in any
emergency.

Note.—The illustrations are made from kodak pictures taken by a cadet on his first ocean trip, showing S. S. War Knight bucking through a big south-easter off Cape Flattery with twenty to twenty-four feet of water in her after holds.



apprentices are honestly anxious to follow the sea and do not regard their work as a temporary makeshift.

The detailed record of the men placed aboard ships by the Sea-Service Bureau, under Captain Leale, in the period from April 27, 1918, to May 24, 1919, follows:

Rating	Number Placed	Percentage of Apprentices
Masters	85	
First mates	102	
Second mates	103	
Third mates	112	
Reserve deck officers	124	
Boatswains	41	
Quartermasters	30	95%
Able seamen	222	
Ordinary seamen	1259	66%
Carpenters	63	5%
Stewards and cooks	679	66%
Chief engineers	72	
First assistant engineers	60	
Second ass't engineers	52	
Third ass't engineers	68	
Deck engineers	21	
Junior engineers	6	
Reserve engineers	225	
Oilers	210	15%
Watertenders	74	10%
Firemen	493	75%
Coalpassers	398	80%
Total	4499	

It must be borne in mind that the apprentices have not yet had sufficient sea duty to permit them to apply for deck or engineer officers' licenses. They must have had at least one year's actual service at sea before being eligible to go up to the Federal steamboat inspectors for their papers. The first class graduated in August, 1918. The time at sea is actual time, so that, allowing for deductions of periods spent ashore between cruises, it is not likely that the apprentices will be able to take the license examinations before January next.

The apprentice ranks contain 33 per cent high school graduates and several college men, so I am confident that these ranks will produce a high percentage of the finest officers any maritime nation ever had.

When the boys shall have finished their required actual year at sea, they will find that the Shipping Board has foreseen their need for instruction in navigation by the establishment of schools for navigation and for marine engineering. Captain Charles W. Sanders, port superintendent of the Matson Navigation Company, is the supervisor of the Shipping Board schools in this district. Lew A. Spalding is instructor of navigation, and Professor David W. Dickie, instructor of marine engineering. A short term in these schools, measured by the mental capabilities of the students, will fit them to go up for their examinations before the local Federal inspectors.

A romantic feature of the war emergency service was the supplemental training given some of the apprentices aboard the sailing ships.

The four-masted ship Monongahela carried thirty-six of the boys on a cruise to Manila and return; the ship Arapahoe took out thirty to Manila; the steel bark Star of Iceland carried seventy-five boys to Honolulu; the ship Star of Lapland took twenty to New Zealand; the bark Star of Holland took fifteen to Alaska. The vessels of the Star fleet of the Alaska Packers Association were placed at the disposal of the Sea-Training Bureau for training purposes by Henry F. Fortmann, president of the company.

Nor must the bark Moshulu be forgotten, which took thirty-five boys on a joyous nine months' cruise to Manila, five months of which were spent at the island ports. Aboard the Moshulu the boys were given their greatest opportunity to learn the life of the sea and the added advantage of the coveted sea-experience needed to make them eligible for their license examinations. So smart did they become at handling canvas and sheets that the Moshulu made the return voyage from Manila in the remarkably short time of forty-six days.

These offshore voyages gave the lads a chance to learn much concerning foreign trade requirements and customs, foreign exchange, customs tariffs and the loading and stowage of cargo.

The health record of the bureau has been wonderful. There have been but two deaths, both from natural causes, since the bureau was started. At one time 175 of the boys were stricken with Spanish influenza, but the prompt measures of Dr. David I. Stafford, of the Sea-Training Bureau, and the kindness of the United States Public Health Service in permitting the lads to be transferred to Angel Island for treatment, aided in preventing any fatalities.

I have not been unmindful of the great work of the Northwestern Bureau at Seattle, where W. J. Grambs is supervisor. He, with Captain O. Beaton of the training ship Iroquois and Captain J. S. Cameron of the training ship Chippewa—vessels which together have apprentice accommodations equivalent to the Iris—has done wonderful work for the boys there. It is for them to tell their own story.

Nor can I detail here the comforts and care with which the boys are surrounded; their life in barracks, receiving ships and afloat; the rates of pay while learning and while rising through the ratings to master mariner. I would like to describe the bill that we hope will become a California law to enable boards of education to establish courses in geography, history and commerce for the boys of the merchant fleet. I would like to tell of the great ships on which these boys will serve and the thought given to their comfort and contentment while afloat. All these things go toward the pre-eminence of the American merchant marine—the things that will hold virile American youths to the life which the Sea-Training Bureau fits them to enter.

The McMyler Interstate Company of Cleveland, Ohio, specializing in car dumpers, locomotive cranes, ore and coal handling machinery, orange-peel, clam shell and scraper buckets and railroad equipment, have opened an office in Seattle, Washington. This office is in charge of W. R. Hendrey, Hoge building. The territory covered by this office includes the states of Washington and Oregon, and the northern part of Idaho.

Successful Operation of American Ships

By the Traffic Manager

ON April 26, 1919, Mr. J. H. Rosseter, director of operations, Emergency Fleet Corporation, Washington, D. C., wrote a very interesting letter to Mr. E. N. Hurley, chairman of the United States Shipping Board (which Mr. Hurley published broadcast), giving a brief statement of his views on the question of the successful operation of ships under the American flag in foreign trade. Mr. Rosseter comes out in a frank, straightforward manner in the firm belief that our ships can compete with other nations (he does not say **all** nations). His frankness is to be commended, and the experienced shipowners, who form the real class of doubters, sincerely hope that his belief may prove true.

Again assuming that the shipping authorities in Washington are seeking data and suggestions on this great, burning question of American ship operation, and without the least thought of criticism (as we are all working for a great American merchant marine, though we may approach it from different angles), the following comments on his letter may lead to some further investigation and research, to the end that actual shipping data and facts may be established as quickly as possible for the guidance of our legislators. In this article the essential points of Mr. Rosseter's letter are first quoted, then commented upon:

Mr. Rosseter:

"At the outset I wish to state with **utmost emphasis and firm conviction** that there are no insuperable obstacles to our success in competition with other nations. Against this you hear men of experience in shipping assert with equal emphasis that our disabilities, particularly the higher cost of manning, are such as to place American ships at a hopeless disadvantage. Such adverse statements given wide publicity naturally confuse the public mind, causing a feeling of uncertainty and hesitation very prejudicial to our aspirations. As often happens in large questions, the controlling factors are overlooked or neglected. It is true we have a larger number of officers and men on a ship than required under foreign flags, and that we pay higher wages and provide better food, all of which cost more than our competitors are paying. That is not to be contradicted, and for my part it is not to be changed, confidently expecting, as my own experience has proved, that we get better and more efficient service from men who are well paid and well fed. The prejudice of higher costs of manning, by which I mean larger crews at higher pay, and extra cost of victualing, can be fairly stated as amounting to less than 2 per cent of the total operating expense."

Comments:

In the foregoing Mr. Rosseter sets forth but three of the handicaps under which American ships labor in the foreign trade—namely, larger crews, higher wages, and higher provisioning costs—stating that they amount to but 2 per cent of a vessel's total operating cost. No figures are presented to show how this 2 per cent is arrived at, and 2 per cent seems very small to the layman, but taking the yearly estimated cost of operation of a 12,000-ton deadweight steel ship, as published in a pamphlet issued by the Division of Planning and Statistics No. 418, it shows an annual operating cost of $733,000. This 2 per cent, therefore, means an annual handicap of $14,660. Before investing in American ships for the foreign trade, the experienced shipping man will seek more enlightenment on some of the following points:

1. What percentage of handicap will a prospective American shipowner labor under due to the higher initial cost of his vessel? In the past, tonnage has been produced, and to this day is being produced, cheaper in other countries.
2. What is the percentage of handicap due to greater depreciation on a higher initial investment?
3. What is the percentage of handicap due to greater insurance cost to protect the higher initial investment?
4. What is the percentage of handicap due to our burdensome and expensive inspection laws?
5. What is the percentage of handicap due to our (quoting Mr. Rosseter) "stupid and

Steamship Golden Gate

needless regulations in the form of tonnage measurement and the resultant greater port charges and canal dues"?

6. What is the percentage of handicap due to the now granted eight-hour day at sea as well as in port, which has resulted in large overtime pay and larger personnel?

7. What is the percentage of handicap due to the higher repair cost in our American yards?

8. What is the percentage of handicap due to the subsidies granted by many foreign flags to their ships?

9. What is the percentage of handicap due to the Seamen's Bill, with which competing flags are not burdened?

In the minds of the experienced shipping men these established handicaps are not easily disposed of, and, if they do not exist, reliable statistics should be forthcoming from Washington to dispute them. There is certainly excuse for skepticism on the part of the shipowner, as it has been difficult for him to prove some of the statements in literature published and sent broadcast by the Shipping Board.

Quoting Mr. Rosseter in an address delivered by him before the American Manufacturers' Export Association, New York, March 4:

"Needless to say, we must have good service for good wages; also we must avoid the evil of overtime at sea which has unhappily grown to be an abuse and a menace. A generous scale of wages, if it be stable and not disturbed by the uncertain and destructive elements of overtime, does not figure so large as many people believe. You might be surprised to learn that it is barely more than 7 per cent of the total operating expenses under conditions prevailing at this time. Thus, you see, it is not threatening."

Comments:

Many shipping interests have been struggling with that statement. It may be true, and if so, the Shipping Board is showing a wonderfully low wage cost. The percentage of wages, as well as fuel (which may be of interest), to the total operating costs of a Pacific 12,000-ton deadweight steamer, a 9000-ton deadweight steamer, and a 6000-ton deadweight steamer for the year 1918, taken from actual operating costs of the three vessels quoted, show the following results:

	12,000 Tons	9000 Tons	6000 Tons
Percentage of wages to total operating costs......	14.82	15.75	17.22
Percentage of fuel (oil-burners) to total operating costs	20.45	21.77	24.54

(Note.—These operating costs include 7½ per cent depreciation, insurance, and 5 per cent on the investment.)

Personnel and Wages

Quoting Mr. Rosseter:

"It is true, we have a larger number of officers and men on a ship than required under foreign flags, and that we pay higher wages and provide better food, all of which cost more than our competitors are paying. That is not to be contradicted, and for my part it is not to be changed, confidently expecting, as my own experience has proved, that we get better and more efficient service from men who are well paid and well fed."

Comments:

It is very difficult for a shipowner to hold the same opinion on this question of ship personnel, for if we pay higher wages and serve better food, and the men are more efficient, why do we require a greater number of men to make up the crew of a ship So far as trans-Pacific trade is concerned, the following remarks taken from Masters' reports may prove of interest to the general public:

Class of Men Available for Service

The coastwise trade is generally preferred by the seamen on the Pacific Coast and the best men are in that service, leaving mostly men addicted to drink and physically imperfect to man the ships in the off-shore trade. There is seldom a voyage that a ship does not have trouble leaving San Francisco. When the crew is arranged for, some do not appear at the time of signing articles, and some, after signing articles, do not put in an appearance at sailing time. The ship is then held up and obliged at the last moment to take such riff-raff as the maritime unions may be able to send along on short notice in order to get the vessel off without further delay. The maritime unions' business agents are not to blame, as, owing to the scarcity of men, they have no choice, but nevertheless such are the **seamen's ways** at the present time, and they will continue so until the supply exceeds the demand; then there will be no place for the shirker, drinker, or physically unfit on an American vessel. Let us hope that Uncle Sam will increase the number of training ships for turning out the American youth to man our merchant marine.

General Conduct of Crew in the Orient

While in the Orient a large percentage of the men go ashore without permission and stay ashore until the vessel is ready to leave, and frequently, when they do come back, they are so weakened from liquor and dissipation that they are unfit for duty. A few extracts from a steamer's log book may prove of interest:

"Calcutta, India, 1917: Ship delayed for several hours account of trouble between junior engineer and first assistant engineer as result of drunkenness."

"Hong Kong, China, 1917: Vessel delayed about three days account same trouble as at Calcutta. One man left in hospital with venereal disease. Two quartermasters laid up from Calcutta to San Francisco as result of venereal disease."

"Taku Bar, China, April 19, 1917: Order was given to crew not to go ashore account long distance to Tientsin (fifty miles), but against all orders several men from deck, engine and steward departments went ashore one evening and did not return for three days."

"Hong Kong, China, April, 1917: Obliged to wait for cook several hours. Had to send chief steward ashore to round him up."

"Yokohama, Japan, November, 1917: Master, chief officer and chief steward ashore for six hours in middle of night rounding up crew so ship would be able to proceed to sea at daylight. Several of crew had been ashore for three days and it was therefore impossible to communicate to them the sailing hour beforehand."

> "Iloilo, Philippine Islands, February, 1918: Left one man in hospital with venereal disease. Nine more sick and attended by doctor at that place for same trouble. After leaving Manila, myself and first officer treated sixteen men at sea for venereal disease. Several of these men were laid up and were unfit for duty most of the voyage to San Francisco."

These citations do not by any means exhaust the records, and many more are available; so the experienced shipowner has reasonable grounds to disagree with Mr. Rosseter. At the present time we are not getting great efficiency, in spite of high wages, plenty of overtime pay, and although good food is being served. For the good of our merchant marine it is hoped that the youth now training will come up to Mr. Rosseter's expectations.

Going back again to Mr. Rosseter's letter: He has a solution for the handicaps as he sees them, and, quoting his own words:

> "These can be entirely offset, and more, by a reasonable increase in the speed of our ships and by improving loading and discharging equipment, thus reducing the time in port as well as on the voyage. Again there is the problem of improving the method of propulsion by utilizing the great natural advantage we hold in our supply of oil fuel. As you know, even with the ordinary reciprocating type of engine, we get one-third greater distance from a ton of oil than from a ton of coal, besides doing away with the so-called 'black squad,' which means a reduction of at least six men in the engine room. So great are the possibilities in the field of propulsion that I will not venture even a surmise as to what may be accomplished in that respect."

Comments:

The solution outlined by Mr. Rosseter is very good, provided our competitors will remain inactive while we are accomplishing these great results. The question of speed and improved loading and discharging equipment is also being given attention by our competitors. While it is true that our reciprocating type of engine will give one-third greater distance on a ton of oil fuel as against a ton of coal, the Diesel-engined vessel of our competitors can travel twice the distance on one ton of oil fuel than our reciprocating-engined vessel on one ton of oil fuel. Unfortunately, the oil supply of the world is not limited to the United States and cheap oil fuel is available to our competitors. especially in Mexico. Our around-the-world tramps can start out with cheap fuel from an American port, but its nexe fueling port may prove disastrous, for the United States is not blossed with fueling stations around the world.

Firmly convinced, with Mr. Rosseter, that the prize of a great merchant marine for our country is worth our every effort and national co-operation, if only for our national security, the writer is convinced at this time, and until the building program of our Shipping Board is completed, that government ownership should prevail with private operation until building and operating costs have been firmly established and our government has experienced foreign competition. The people are paying the bill and the people must be shown. If the government can demonstrate successful operation in competition, with reasonable profit, then the ships should not be sacrificed at low prices to private owners, and the people's investment will have been safeguarded. If, on the other hand, government operation in competition proves unsuccessful with the resultant enormous losses, then the people will be convinced, and will be satisfied to dispose of an unprofitable investment to the highest American bidder daring to take up the burden.

BRITISH CITY TO HAVE TRADE LIBRARY

A COMMERCIAL library will shortly be opened in the Royal Exchange Building at Manchester, England, which intends to collect both the enduring and the ephemeral literature of commerce. The library will keep up to date with information on customs and excise and the commercial side of means of communication by land and sea and air; will know all that can be known of harbors and ports; will keep abreast of commercial travel and supply geographical data for assistance of commerce; will give instruction in botany to textile traders on the character of the raw materials which make up their finished goods, and in chemistry to describe the processes through which they pass; will keep in touch with banking and finance, bookkeeping, accounting and commercial law; will search the daily press for the latest facts and opinions and probe into technical and scientific works to extract the kernel that will help to feed the commerce of the country; will amass information on business organization and management and show its appreciation of the importance of advertising in the development of business enterprises.

Trade papers, catalogs, consular reports from every quarter of the globe, home and foreign directories, telephonic and telegraphic codes will be daily selected, classified and revised. Large-scale maps and atlases will be a special feature; the maps will be kept rolled up in cylindrical holders and stacked upright in a sort of umbrella stand, from which they can be taken and unfolded upon tables as required.

Pacific Marine Review
The National Magazine of Shipping

576 Sacramento Street
SAN FRANCISCO, CALIFORNIA U. S. A.

Official Organ of the Shipowners Association of the Pacific Coast

Subscription Price, per year (Domestic) $3.00
(Foreign) $3.50
Single Copies . . . . 25 cts

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30 Church Street
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560-561 Empire Building
Seattle, Wash.
J. A. KENNEDY, Mgr.

Pacific Marine Review is sold at all leading News Stands
Entered as second class mail matter at Postoffice
San Francisco, California

Published on the First of Each Month. Copyright
1919 in the United States by J. S. HINES

AT WASHINGTON

SINCE the middle of May there has been conference after conference at Washington over shipping and shipbuilding methods. Mr. Hurley has been writing many letters and making many speeches, and our good shipbuilders and ship operators have been busy pulling wires and comparing notes. The Farmers' National Council, the American Federation of Labor, the National Foreign Trade Council, the Marine Underwriters, the Atlantic Carriers, and the Chambers of Commerce, etc., ad infinitum, have severally and individually advocated this and opposed that.

The first conference was on shipping policy. For two days the discussion flowed back and forth, pro and con, between government and private ownership; net result at end of second day, a rising vote of thanks to Chairman Hurley and the Shipping Board.

A few days later came the conference with shipbuilders as to cancellation of contracts, compensation, etc. In this, Pacific Coast shipbuilders were especially interested and were well represented by many executives of California, Oregon and Washington shipbuilding plants. The first day's sessions brought the very cheerful assurance from the chairman that contracts would be reinstated and that the Pacific Coast yards would be kept busy. The next day, however, developed a changed attitude, and at the present writing there is no settlement of the cancellation question and many of the Pacific Coast yards are very dubious about the future.

On the 4th and 5th of June an ocean marine conference was assembled for the purpose of establishing machinery through which disputes between shipowners and marine workers might be adjusted. In the first morning session the Seamen's Union representative insisted that no action be taken to form an industrial marine commission until the shipowners and the Shipping Board announced their purpose of giving preference to union labor. This produced a deadlock, and a resolution was finally adopted that all present demands of organized labor be submitted to shipowners and that committees of Atlantic Coast shipowners meet with representatives of the unions and of the Shipping Board on June 23. The net result, therefore, is the name as if the conference had not been held.

The dock and harbor conference, held at the same time as the ocean marine conference, was rather hampered by the failure of the latter to function as planned. However, they drew up a tentative draft on an agreement to govern industrial relations in the longshore industry, the main feature of which is the formation of a national dock industrial council composed of two members chosen by employers and employes, respectively, representing the following interests: Pacific coastwise; Pacific deepsea; North Atlantic coastwise; North Atlantic deepsea; South Atlantic coastwise; South Atlantic deepsea; Gulf coastwise; Gulf deepsea; and Great Lakes.

In the meantime Congress had convened, and realizing that there is little hope of obtaining any worthwhile advice from the Shipping Board, they have directed the committee on merchant marine and fisheries to begin at once collection of data as a basis on which to form permanent shipping legislation.

The full membership of the standing committees which will frame shipping legislation as made up for the new Congress is as follows:

Senate Committee on Commerce

Republicans—Wesley L. Jones, of Washington, chairman; Knite Nelson, Minnesota; Lawrence Y. Sherman, Illinois; Warren G. Harding, Ohio; Bert M. Fernald, Maine; William M. Calder, New York; Irvine L. Lenroot, Wisconsin; LeBaron B. Colt, Rhode Island; Charles L. McNary, Oregon; L. Heisler Ball, Delaware; Walter E. Edge, of New Jersey.

Democrats—Duncan F. Fletcher, Florida; Geo. E. Chamberlain, Oregon; Jos. E. Ransdell, Louisiana; Morris Sheppard, Texas; Thomas S. Martin, Virginia; Jos. H. Bankhead, Alabama; Furnifold McL. Simmons, North Carolina; James A. Reed, Missouri; William F. Kirby, Arkansas.

House Committee on Merchant Marine and Fisheries

Republicans—William S. Greene, chairman, Massachusetts; George W. Edmonds, Pennsylvania; Frederick W. Rowe, New York; Frank D. Scott, Michigan; Wallace H. White, Jr., Maine; Frederick R. Lehlbach, New Jersey; Sherman E. Burroughs, New Hampshire; Charles F. Curry, California; Edwin D. Ricketts, Ohio; Carl R. Chindblom, Illinois; Frank Crowther, New York; Clifford E. Randall, Wisconsin; William N. Andrews, Maryland.

Democrats—Joshua W. Alexander, Missouri; Rufus Hardy, Texas; Edward W. Saunders, Virginia; Peter J. Dooling, New York; Ledislee Lazare, Louisiana; David H. Kincheloe, Kentucky; William B. Bankhead, Alabama; William C. Wright, Georgia.

Senator Jones is keenly alive to the difficulties of the situation and has asked for suggestions from practical men and there is every indication that advice sent direct to him will be carefully considered and given due weight in forming a shipping policy.

The demands of labor presented through the Shipping Board to the Steamship Association and other shipowners indicate that there will be considerable increase in the cost of operating and that very wise, careful planning is necessary to prevent swamping the ship.

Many bills affecting marine matters have been presented in Congress, but as yet nothing has resulted that makes any material difference to the handicaps under which our merchant marine is forced to work in competing for the business of carrying freight overseas.

THE SHIPBUILDING SITUATION

CHAIRMAN HURLEY of the United States Shipping Board has recently sent to James W. Good, chairman of the House Committee on Appropriations, a very remarkable and interesting letter, presenting the request of the board for funds to carry on the ship construction program. Reports from Washington indicate that this request has been granted, and that the funds will be appropriated. Some of the figures quoted in this letter of Mr. Hurley's seem to us to need explanation. He writes:

> "Some shipbuilders have paid into the United States treasury income and excess profit taxes aggregating $40 a deadweight ton on the vessels they have constructed. Others have paid the equivalent of $30 a ton. It is estimated that at least $25 a deadweight ton has been returned to the treasury in this manner by all shipbuilders. This does not include any taxes paid by the hundreds of sub-contractors who manufactured the steel, the boilers, the machinery and the many other things which go into the ships; but when multiplied by 13,885,106 deadweight tons it indicates a rebate of $347,127,650, which, when subtracted from $2,861,756,570, leaves $2,514,527,920, or $180 a deadweight ton as the actual cost to the government of the fleet which played an essential part in the winning of the war, and which is now a permanent commercial asset of the American people."

This is a most peculiar statement to come from a man at the head of the Shipping Board. He maintains that on contracts calling for the expenditure of $205 a ton deadweight on an average $25 represents the income and excess profits tax collected on the net earnings of those contracts. In other words, on contracts where the net allowable profit was about $18.75 a deadweight ton, the real profit was so great that $25 a deadweight ton represents only the percentage collected for tax. This is of course absurd, and we only call attention to it as rather characteristic of Shipping Board figures.

Shipbuilding cost is a very elusive quantity. Whether a ship is cheaper at $125 or $200 or even $300 a ton depends altogether on the specifications on which she is built, and the use for which she is designed. Some of the ships built in the hurry and stress of war emergency and costing $210 a deadweight ton may cost their owners another $50 a deadweight ton before they have been in use a year.

The entire question of cost is a comparative question. It seems reasonably certain that $170 to $180 a ton is at present the American basic cost price for freighters of around 7000 to 10,000 deadweight tons and ten knots speed, with deck and housing equipment up to the ordinary modern standards. It is also certain that four years of war have caused a tendency toward equalization of labor costs in America and Europe, and, to a limited extent, all over the world. Reports from England indicate work ahead in all yards for over two years. In Spain, Italy, Norway, Sweden and Denmark the yards are all full, and many fine ships, particularly motorships, are under construction. Many American yards will soon be empty unless the shipbuilding industry of America is set free from red tape.

The yards are supposed to be free to take foreign and private contracts, but in reality they are only free to take up such work as in each case is permitted by the Shipping Board. All of their relations to their patrons as builder and owner are under supervision of the Shipping Board, and any real freedom of business under such conditions is impossible. If, as our Washington correspondence indicates, Congress finds it impossible to learn anything definite from the Shipping Board; if, as our marine insurance correspondence indicates, the supervision of the Shipping Board is a hindrance to operation; if, as the "Traffic Manager" indicates, the operating division of the board is unable to see the real relation of labor costs to operating costs; and if, as is indicated by its action in Washington recently, the board has become the ally of one privileged class rather than the servant of the whole people, who through their representatives created it, then it is high time that Congress should unship this Shipping Board, and begin to give us some real working basis for the successful operation of our merchant marine and the stabilizing of our shipbuilding industry.

We do not think that under the circumstances of the war emergency any body of men anywhere could have shown better results in tonnage delivered than has the Shipping Board and its Emergency Fleet Corporation. We do not think the war cost of the tonnage delivered has been excessive; in fact, we think that the tonnage as it now stands will show the American people more actual sale value than will the results of the operations of any other department of the war activities of our government. We do not think that there has been any graft in connection with the construction of either ships or shipbuilding yards. But we **know** that, if the present burdensome, regulatory control by the Shipping Board is continued, there is very little hope for American ships maintaining their place as a carrying factor in the world's commerce.

SOME COMPARISONS

We wish to call the attention of our readers especially to two articles in this issue of Pacific Marine Review. The first, an article on Shipyard Costs and Ship Wages, comparing American conditions with those in Great Britain. It will be noted that the author of this article, Mr. Winthrop L. Marvin, is in very marked disagreement with the literature on the subject published by the United States Shipping Board, and a careful analysis of his figures should be made by anyone interested in the operation of ships.

The other article to which we desire to call attention is that of the "Traffic Manager," who undertakes to show how the boasted super-efficiency of the present-day American sailor man is working out under actual conditions in Pacific Ocean service. In figuring the overall economy of any workman, either on sea or land, there are a great many items other than wages which must be considered if we are to get a dependable result.

During the last two years the United States Shipping Board has had charge of the operation of a large number of freight steamers. These two years have seen the highest freight rates and charter values that have existed for many generations. Under private operation during these two years many ships have paid for themselves. There should therefore be on the books of the Shipping Board a very considerable credit to the operating of these vessels, and this credit could certainly be written off the costs in order to find out at what price the American people can afford to sell their marine property. It is true that the majority of these ships have most of the time been operated by the Army and Navy departments for carrying supplies to Europe, but the figures on the cost of operation should be available, and certainly there ought to be a large difference between this cost and the charter rate on these ships. This difference should appear on the credit side of the ledger. If the Shipping Board can give to the shipping men of America exact figures on these operations, they will go a long way toward clearing up a very difficult situation.

As we go to press the following word comes from our Washington correspondent: "The Senate Committee on Commerce has been going into the questions of cancellations by the Emergency Fleet Corporation, and the action of the Shipping Board in refusing American yards to take on contracts for building for foreign account. Mr. Hurley and Mr. Ackerson, vice-president of the Fleet Corporation, have been the principal witnesses. The committee displayed a decided disposition towards permitting builders to proceed and informed Mr. Hurley that a bill was in process of enactment to authorize them to do so. It was finally admitted by Mr. Hurley that the board had no real authority to hold them up this way, but that their purpose in requiring them to seek permission from the board was to try to arrange for the disposal of a lot of material which the government had on hand and wanted to salve. Mr. Hurley agreed to issue instructions that would permit the builders to accept contracts for foreign account.

Sundry representatives of shipbuilders presented their views as to cancellations and it appears that they are now negotiating with the board with a prospect of making reasonably satisfactory arrangements to tide the yards over the reconstruction period.

Mr. Rosseter was a witness before the committee during the discussion of cancellations and announced that he was not blocking the transaction as had been credited to him by some. He was, however, in favor of more speed and a larger type of ship.

Mr. Rosseter, before the Commerce Committee in executive session, furnished information as to the cost of operating ships. Just why this should have been an executive session is not clear, but I think we will be able to get Rosseter's statement later.

In due course the shipowners and operators will be called before the committee for information.

Mr. Hurley is certainly a master hand at assumption. Having agreed that he has no authority to prevent, he immediately assumes authority to permit. Of course the real issue lies in the control of the ship steel output by the Shipping Board, and in the use of the Shipping Board by the administration as one of its greatest political assets. We live in the hope of obtaining "Mr. Rosseter's statement later." It certainly should prove interesting reading.

United States Shipping Board steamship Yosemite at the Bush Terminals, New York. This steamer is fitted with Westinghouse reduction gearing

An Incident in the History of Marine Reduction Gear Design

TROUBLES are part of the daily life of a manufacturer of machinery. The human brain is not great enough to grasp all the factors that will be encountered in a novel situation, and it therefore rarely happens that a newly designed machine, or an old machine applied under new conditions, will operate perfectly when first tried out. In consequence, the discovery of defects and their elimination by engineering analysis and experiment form regular steps in the routine of production.

It is human nature, and likewise a good rule of life, to forget as soon as possible difficulties that have been overcome and dwell exclusively on the final successful result, which after all is the only thing that counts. But sometimes troubles, commonplace in themselves, develop under such dramatic circumstances that their importance becomes magnified a thousandfold and it is then desirable to discuss them in full so as to make clear their true character.

An instance of this kind occurred in the case of certain gears which were furnished last fall by the Westinghouse Electric & Manufacturing Company for use in turbine-driven ships being built for the Emergency Fleet Corporation and which developed defects during the ships' trials.

In the course of ordinary events, an incident of this kind would have attracted no more attention than the breaking of the crankshaft of a reciprocating engine. But these particular ships were wanted more urgently than perhaps any ships ever were before, and the delay in their completion took on the proportions of a national calamity. Moreover, the apparatus involved formed a comparatively new type of drive, and though this drive had amply proved its reliability in service, a large number of marine men were unfamiliar with its record. As a result of this combination of circumstances, not only did the fact of the trouble become known to practically everyone interested in ships and shipping, but the impression went abroad that geared-turbines were an unsatisfactory drive for ships. As the persistence of this impression would be injurious to the progress of American marine engineering, it is believed that a frank statement of the facts of the incident is advisable in order to dissipate it.

The Westinghouse Electric & Manufacturing Company has been building geared-turbines since 1909, and, when the United States declared war, had installations in over 200 land power houses and on several ships. All of these equipments were operating satisfactorily, so that when war was declared the government asked the Westinghouse Company to furnish geared-turbines for 300 ships to be built under its shipping program. This the company agreed to do and proceeded to erect within a year a twelve-million dollar plant for this purpose.

In the meantime it built many geared-turbines at its East Pittsburgh plant, and by the fall of 1918 there were at sea over thirty ships, of all kinds and types, propelled by these geared-turbines. The operation of these equipments has been entirely satisfactory. Troubles there have been on a few ships, as is natural with new machinery in the hands of a crew inexperienced in its care and operation, but in all cases the cause has been removed and today all of these ships (except two that have been sunk) are performing exceptionally well and have traveled many hundreds of thousands of miles with repair and maintenance records that compare favorably with those of ships with any other type of drive. In other words, the reliability of these equipments is beyond question.

In the fall of 1918 the first of the gears that gave trouble were completed. These differed from those in practically all of the ships previously mentioned chiefly in the design of the pinion. In the earlier gears, the pinion had teeth of the true involute form, but the teeth of the new pinions were of a special form known as the "long addendum" type. This pinion had been designed some years previously and had the special advantage that, due to the smaller number of teeth, the root of each tooth was thicker, and therefore stronger, than that of the standard tooth. It had already been used for the equipments for five ships and twenty land power plants, and though troubles had been experienced in two or three cases, they were corrected without difficulty. As a matter of fact, the service record of this type of pinion was excellent, and since it possessed desirable theoretical advantages it was selected for use in the equipments for certain of the new ships.

It may be permissible to state here that it is a fixed policy of the Westinghouse Company never to put out a new machine until it has been thoroughly tested and has proved its fitness for the work in hand. But in this instance such tests were impossible owing to the necessity of saving every possible minute of time. In consequence, the pinions were placed under full load for the first time after being installed in the ships, and they scored badly. The only thing to be done after this mishap was of course to remedy the trouble as quickly as possible. That, however, was not an easy matter. Indeed, one inexperienced with machine design would be surprised to find how difficult it is to lay one's finger on the true cause of an apparently simple trouble. In this particular case, there were a number of factors that might be responsible, and experiments had to be carried out on each one separately before the right one could be located.

The engineers wrestled with this problem day and night for several weeks, and finally discovered that the form of the pinion tooth was responsible. The top of the tooth was thicker than it should be, which resulted in interference, while the long sliding surface of the lengthened addendum made lubrication at this point very difficult.

This being known, the rest was simple. The teeth of the pinions of the first ship, the Agawam, were cut down to proper dimensions, and she has since then made a trip to Europe and return. Some of the pinions on the other ships were treated in a similar manner, others have been replaced, while the pinions now being made are of the standard involute type.

European Marine Developments

Exclusive Correspondence of Pacific Marine Review

London.

BRITISH shipowners' and shipbuilders' impression of the shipping terms in the peace treaty on the whole is that they are not unsatisfactory from our point of view. The right of the Allies to "ton for ton and class for class of all merchant ships and fishing boats lost or damaged owing to the war" is asserted; and, in order to meet the bill, as American readers will know, Germany is called upon to deliver up all her merchant ships of 1600 tons gross and upwards, half of her ships between 1600 and 1000 tons gross, and a quarter of her steam trawlers and other fishing vessels. In addition, she is, within the next five years, to build 1,000,000 tons gross of shipping for the Allies at the rate of 200,000 tons a year. The cream of the German mercantile marine is covered by the obligation to deliver up all its units of over 1600 tons gross, including vessels like the Hamburg-American liners Imperator and Bismarck, the North-German-Lloyd liners Columbus and Hindenburg, and the Hamburg-South American liners Cap Finisterre and Cap Polonis.

Considering that we have lost the Lusitania and the Britannic, this country's claim to the Imperator and the Bismarck is strong, although the point is one upon which British shipbuilders may not unreasonably have something to say. From the same quarter objections may be heard to the placing upon Germany of an obligation to build for the Allies. At first sight it looks as if the effect will be to divert work away from the British industry. But until all the facts are available, it will obviously be unwise to draw definite conclusions on the subject. Vessels of the Allies are to enjoy both national and most-favored-nation treatment in Germany for at least five years, and the concession is to apply to fishing and coastal vessels as well as to ocean-going ships.

The Future of Shipbuilding

Just how far all this will weaken or strengthen some of the pessimistic views about the future of British shipbuilding remains to be seen. On May 1 there were some remarkable figures published by Lloyds' Register of Shipping which seem to show clearly that if Great Britain does not make greater efforts than it has been making for several years past to encourage its mercantile shipbuilding industry, there is a danger that predominance in shipbuilding may pass permanently to the other side of the Atlantic. An expert, discussing the question, while agreeing that it is true, no doubt, that American costs are higher than those in the United Kingdom, and that many of the vessels at present on hand in America are of kinds which will not compete seriously in the overseas trade of the world, points out at the same time that costs in the United Kingdom are increasing steadily, while those of America are being reduced, not by decreases in wages or in prices of materials, but by the utilization of plant and machine tools to the best possible advantage, by the organization of works on quantity-production lines, by the abolition of all demarcation distinctions between the different classes of workers, and by the organization generally of labor and yard facilities for the one purpose of obtaining a large output of tonnage.

There are other important figures also which shipbuilders on this side agree cannot be explained away. They are much too substantial, and they represent too obviously the awakening of a great nation to its own industrial possibilities. In all probability there will be a falling off as wooden shipbuilding decreases and fabricated construction finds its true place, but, says the expert I am quoting, America has not been planning only for the period of the war. There are many yard extensions yet to come, and though some of the undertakings organized during the past year or two may go under in the severity of the competition they will have to face, the figures now available are a fair measure of the future berthage capacity of American shipyards. Apart from prices and questions of economics, that amount of tonnage at least can be laid down at one time, whereas the present United Kingdom total (not necessarily the yard capacity) is lower by nearly two million tons.

But it is not only from the United States that there come stories of progress and development. In every other country in the world in which vessels are constructed—with the solitary, and easily understood, exception of France—there is far more tonnage under construction than there was in the summer of 1914. In Italy the advance has been very marked. In Japan it has been even more so; in Sweden it has been much greater than in Japan; Spain has come to the front to a most surprising extent; Portugal is, for the first time for many years, a shipbuilding country, while the British overseas dominions (in this matter mainly Canada) have almost multiplied their tonnage on hand by nine. In these circumstances it is quite clear that the United Kingdom will have to fight strenuously for the preservation of its shipbuilding, and very soon will have to reach a higher level of production than is represented by the total of 205,316 tons launched in the first quarter of this year. There is, however, one encouraging feature in the situation. During April—since Lloyds' figures were compiled — the Clyde (Scotland) shipyards have turned out the large total of 85,800 tons, and thus made records for the month and the four months well up to the averages of pre-war years. If this indicates the long-looked-for turning point in the industry generally, there is still room for optimism, for if the stocks are cleared there are plenty of additional vessels to lay down. The solution of the problem is to be found in the cordial co-operation of all concerned in rapid production. Producing capacity will tell in the long run, rather than tonnage under construction on the berths.

Another authority writing in the London Times proffers interesting views on the slackness of our output of new ships. He puts it down partly to the slackness of the process of changing over from naval work to mercantile. Naval vessels which were partially constructed when the armistice was signed have to be completed, if only to get them out of the way of new merchant ships, and this handicaps the industry greatly in the attempt to increase the production of mercantile tonnage. One result of the pre-occupation of the yards with war vessels and auxiliary naval craft is that, although there has been plenty of merchant work in the market, and a large amount has been entered in the books of the builders, only a comparatively small proportion has yet found its way to the construction berths.

For the restoration of the British mercantile marine to its pre-war strength, there would require to be not only still more work on the stocks, but a much higher rate of production than has been ruling in the past, or is ruling now—that is, production of purely mercantile tonnage. An output of a little over 200,000 tons in three months represents a twelve-months' total of only 800,000 tons, which is totally inadequate in the circumstances in which the country is now placed. Even before the armistice was signed, the total "completions" for twelve months, according to Admiralty figures, was 1,582,053 tons, and the production of the quarter ended October, 1918, was 405,547 tons. There has been a great falling off, instead of the speeding up which was anticipated, and the shipyards of the United Kingdom are not now producing so much merchant tonnage as they were under the pressure of war conditions.

Big Second-Hand Shipping Prices

Foreign buying has become quite a feature of the shipping sales at the Baltic Exchange in London lately. At these sales of second-hand British steamers, neutrals are allowed to bid in the case of vessels over fifteen years old. Two vessels were bought for Spanish account at the last sales. One was the Huayna, formerly known as the Hildebrand. She realized $255,000, which sum represents more than $100 per ton deadweight, a distinctly high price for a steamer twenty-six years old. Another Spanish purchase was the Agenoria. She had been damaged in a torpedo attack and was bought for $270,000, her deadweight capacity being 5200 tons. The British steamer Royal was sold for Norwegian account for $677,500, which represents $107.50 per ton deadweight. Also sold for foreign account was the Glenearn, interned in Germany during the war and just released. Built in 1914, she realized a price that represents precisely $105 per ton deadweight. The Dacar was a curious sale. This vessel lies damaged at Liverpool. She was on fire off the Nigerian Coast, was scuttled, and salved by the Nigerian government and sent to this country laden. She was sold with a guarantee of freedom from requisition and realized $22.50 per ton deadweight.

Liners and Luxury

The assumption that all the liners, large or little, which are to be built during the next few years are to have severely simple accommodation for saloon passengers, has, I am told, very little to justify it. The ships which have been ordered, as well as those which are definitely projected but not yet given out, are certainly to be noteworthy in respect to their large cargo-carrying capacity. It is also the case that their saloon accommodation will not reach even the level of luxury attained by the bigger North Atlantic intermediate liners of pre-war days. But they will, nevertheless, be tastefully decorated and elegantly furnished vessels, with at any rate some of the luxurious features of other days. "We cannot afford to have plain ships," a well-known shipping man said the other day. That is, of course, the position in a nutshell, for voyagers obviously like plain ships as little as they like plain hotels and restaurants, and signify the same by avoiding them wherever possible.

African Shipping Company Scheme

Bullard, King & Company, whose business, it is now officially indicated, is to become allied to the Union Castle Mail Steamship Company, is of very high standing and includes ownership of the Natal Direct Line of steamers, consisting of ten moderate-sized steamers trading between the United Kingdom and South Africa. The connection is indicated by the fact that A. Hunt, who becomes one of the directors of a new limited company to be formed with a capital of $5,000,000, is a general manager of the Union Castle Mail Steamship Company, while Sir Owen Philipps, who is to be chairman of the new company, is of course chairman of the Union Castle, Royal Mail, and other shipping companies. The new arrangement is in full accordance with the principle whereby smaller undertakings tend to become allied with great concerns engaged in similar businesses.

South America's Shipping Services

The South American Republics are looking forward with much satisfaction to the prospect of increased transport facilities. According to information which has been received from the Pan-American Union, many new and revised steamship services are under consideration. It is proposed to re-establish the service between Brazil and Rumania on a much larger scale. Ten vessels of 6500 tons each will be employed, and they will run from the Rumanian port of Braila, on the Black Sea, to Brazil and Argentina, calling among other places at Odessa, Trebizond, Constantinople, Salonica, Athens and Alexandria. It is anticipated that the inauguration of this service will be especially beneficial to Brazil. Large quantities of Brazilian coffee are consumed in Rumania and Bessarabia, and the growers are hoping that the new service will ensure a reduction of freight rates to those countries. Three other new steamship lines serving South American ports are also in contemplation. One, planned by the Royal Mail Steam Packet Company, is designed to run between this country, Spain, the United States, and Cuba; another will link up New York with the Pacific Coast ports of South America, via the Panama Canal; and a third is intended to run between China and the Central and South American Pacific ports.

KAWASAKI DOCKYARD CHANGES

Mr. I. Abe, the New York representative for the Kawasaki Dockyard Company, Ltd., has left New York, traveling south to Seattle, Washington, en route for Japan, where he will remain for an indefinite period owing to ill health.

Mr. Abe has been very energetic for the past three years, especially during the last year and a half, during which time he had many transactions with the large steel corporations and the United States Shipping Board, in order to get the material shipped to Kobe, Japan, where the Kawasaki Drydock Company is located.

Mr. Y. Ogisaka has arrived in New York from Seattle to assume the former activities of Mr. Abe. We all wish him the greatest success, and hope that Mr. Abe will soon regain his usual health and be enabled to return to New York .

More Power to You

By John Norman McMath

WHO shall survive?

Here on the Pacific Coast, during war stress and coast carelessness, we have written much that is new into the history of shipbuilding. But are we going to survive in peacetime competition?

Mr. Charles Piez, vice-president of the Emergency Fleet Corporation, when he was about to return to the East after visiting the Pacific Coast, issued a statement, part of which was quoted in the Pacific Marine Review of September, 1918. Hidden amidst the enthusiastic praise with which he so generously complimented our achievements was a warning. He said: "In justice to the Eastern and Southern yards it must be said that the West owes its present supremacy not so much to the climate and the enterprise and energy of its people as it does to the fact that a considerable number of its yards were established, going concerns when the Fleet Corporation began operations. * * * When these (Eastern and Southern) yards get into full swing, * * * then the question of whether Western climate and energy can surpass the resources of the East will be given a fair test." This means simply that the West must continue to surpass the East in perfection of organization if we would survive.

There is, therefore, a real and immediate necessity for the most painstaking kind of readjustment and reorganization of our man power and equipment to an economical, peace-time, paying basis. The fact is patent to every one. Where is there a single Pacific Coast business man who has not that very thought uppermost in his own mind? And there is scarcely a single problem over which the man-who-would-survive can more profitably spend his time right now than in earnest consideration of more economical use of fuel oil.

In spite of the energetic campaign for conservation waged by the Fuel Administration, there is now a really deplorable amount of fuel money being thrown away every day. The war-time demand for speed and quantity production excused many extravagances. It permitted a whole catalog of wasteful or makeshift fuel oil equipment to be installed for the sake of expediency. In justice to the operators of this faulty equipment, it is only fair to state that probably in the large majority of the cases the shortcomings of this equipment are a matter about which the operator is entirely ignorant. He very probably installed it in good faith that it would function as efficiently as any.

But peace-time competition in this industry out here won't stand for continued ignorance of the way to economize fuel money. And it particularly won't stand for conscious and continued acquiescence in wasting this fuel money by continuing in service a single piece of faulty, unscientific fuel oil-burning equipment.

It is the purpose of the following to set forth a few facts concerning the economy of the proper use of fuel oil and the waste and losses inseparable from the use of improper equipment. We are indebted to Tate-Jones & Company, Inc., makers of fuel oil equipment at Pittsburgh, Pennsylvania, for the very valuable data on fuel oil and its use to which we had access in preparing this article.

For complete combustion of oil the air must be intimately mixed with the fuel, there must be a sufficient supply of air and the gases must be kept at the ignition temperature long enough to insure their burning. This last is very important, for the first effect of the heat on the oil entering the combustion chamber is to dissociate the carbon and hydrogen. The carbon then is carried along in a current of gases; and unless it has sufficient time at the proper temperature to ignite with oxygen, it is going to be left as soot or carried along with the air. It should have united with this air before being cooled below the temperature of ignition. This unignited carbon forms smoke, and is wasted.

The importance of complete combustion cannot be too strongly emphasized, as it has a direct bearing on the efficient use of your fuel. As indicated above, carbon is the heat of your fuel. One pound of carbon burned to CO_2 liberates 14,600 b.t.u.; whereas one pound of carbon burned to CO liberates only 4450 b.t.u.! Therefore, for every pound of carbon which is only burned to CO there is a direct loss of 10,150 b.t.u. This is shown in the increased oil consumption on a small rivet furnace which worked under the same conditions of temperature, etc., first with poor combustion, second with complete combustion. In test No. 1 an apparently efficient but actually faulty burner was purposely used. Notice in this test the amount of CO in the gases, also the increase in oil used.

Test No.	CO_2	CO	O_2	Gal. per Hr.
1	12.1	3.2	0	1.1
2	14.3	0	0	.86

Thus Test No. 1 indicated a 28 per cent fuel loss, meaning that $28 was thrown away from every $100 spent for fuel oil. We say "thrown away" because, as shown by Test No. 2, complete combustion is possible with proper, and only with proper, equipment. We wish to emphasize that the above is by no means an exaggerated or extreme example of the waste inevitable with apparently correct but actually incorrect fuel oil-burner equipment.

The economical use of fuel oil depends almost entirely upon the burner. A properly constructed burner must break up the oil into a large number of very small particles and blow it into the furnace as a very fine mist, practically a gas, ready for immediate and complete combustion.

Unfortunately, there are a number of burners which have been introduced into this region which operate successfully with light oils, but which are out of the question for getting maximum results from the rich and heavy oils of California, Texas and Mexico.

The only way in which our heavier oils may be properly burned is by means of a high-pressure burner requiring compressed air at from fifteen to twenty pounds for its operation. This air is required both for atomization and combustion.

When properly designed, such a burner will atomize and burn oil perfectly, but in so doing will require a very large amount of compressed air, necessitating a large investment for the air-compressing plant and a considerable outlay for operating expenses. In fact, the operation of such a system involves an expense which makes it prohibitive for general use, to say nothing of the very objectionable noise incident to its operation.

The difficulties arising from trying to operate efficiently a low-pressure burner on heavy oils or tar led to the first development of the Tate-Jones combination high and low-pressure type burner. This burner uses compressed air or steam for atomization and low-pressure air for combustion, and operates with maximum efficiency on both heavy and light oil or tar, making it possible to standardize equipment, no matter what oil is used.

Its advantages arise from the small quantity of compressed air or steam used. With this type burner, where you no longer depend on injector effect of atomized oil to draw in air for combustion, only the required amount of air is used to break up the oil and atomize it. This burner is in use on every one of the large number of Tate-Jones installations in government service, from those at the Boston navy yard to the Pearl Harbor naval station at Hawaii, and the Balboa shops at the Panama Canal.

Then again, too little attention has been paid out here to the correct feeding of fuel oil to the burner. Variations in oil pressure will cause inefficient atomization and imperfect combustion. Also, in order to obtain the best results, the oil must be preheated not to exceed its flash point. Conclusion No. 7 from the report of the Naval Fuel Board covers the question of preheating in this manner. "In order to provide a uniform supply of oil to the burners, the oil should be heated by some simple means. It can be expected that the burners will be operated with much more satisfaction when the oil is thus heated."

Therefore, a correctly designed pumping, heating and regulating system designed to bring the oil from the tanks and furnish it to the burners at the proper pressure and in the right condition, is entirely necessary, and a profitable investment.

In the case of oils as heavy as 10 to 12 degrees Baume or lower, a separate heater should be used, as live steam, in addition to exhaust steam from the pumps, will be necessary for the heating work.

One more definite thought will serve the Pacific Coast shipbuilding industry well if it serves to turn the attention of the users of fuel oil to this very likely place to start a regular war-on-waste. To design and make a correct, highly-efficient fuel oil burner requires as highly trained, as specialized an organization of scientists as to make a high-grade carburetor. And you would far better think of using a home-made carburetor on your car than a home-made or a faulty oil burner in your plant. We who are boosting for the continued supremacy of the West earnestly hope that you will take measures to provide the most economical equipment at once. We are sure you join with us in our endeavor to make the most of our geographical advantage in the availability of fuel oil.

More power to you.

Color-Blindness

THE United States Public Health Service announces that color-blindness occurs in 8.6 per cent of men and 2.2 per cent of women in every-day life among healthy individuals in America. Color-blindness of a degree dangerous in occupations requiring recognition of colored signal lights occurs in 3.1 per cent of the men and 0.7 per cent of the women.

After a comprehensive study of the situation the Public Health Service has reached the conclusion that certain commonly used tests for detection are faulty, that they result in the rejection of many useful men and the acceptance of quite a few with dangerous defects of vision, resulting in serious railway and steamship accidents.

With a view of remedying this, a bulletin has just been published for wide distribution among railroads and steamship lines, setting forth the results of the investigations and recommending several important changes in methods of examination now employed.

Color-blindness is best detected by testing with colored lights of known spectral composition.

It is of great importance to divide the color-blind into the dangerously color-blind and the harmlessly color-blind. This may be done satisfactorily and expeditiously with the Edridge-Green lantern after gaining an understanding of the principles of the test employed.

The Jennings test results in the rejection of a large percentage of subjects who should be accepted, especially among the more intelligent, but it possesses certain practical features which render it superior to other tests in certain lines of examination where great accuracy and classification of color defects are not essential. It should not be used for testing sailors or trainmen.

Among refractive conditions of the eye, color-blindness occurs least frequently in eyes apparently without demonstrable refractive error; it occurs most frequently in eyes showing mixed astigmatism.

In this connection it may be said that the following classes of color-blind should not be permitted to be sailors or trainmen: (1) Those possessing a color perception containing three or less units; (2) those possessing a greater number of units than three who have the red end of the spectrum so shortened as to prevent the recognition of red light at a distance of two miles; and (3) those with a central scotoma for red and green.

Owing to the alarming number of disasters at sea and on railroads in which it has been proved that the cause of the accident was a confusion of signal lights, the belief has for many years been gaining ground that the tests for color-blindness commonly employed have proved unsatisfactory.

It is not difficult to bring forth objections to the commonly used test with Holmgren's colored yarns; but so much has been written on the subject that many of these objections will only be briefly mentioned here. This test depends upon the fact that when sunlight is broken up by the spectroscope into a series of pure colors, the normal eye is enabled to differentiate these colors into a series from red to orange, yellow, green, blue and violet.

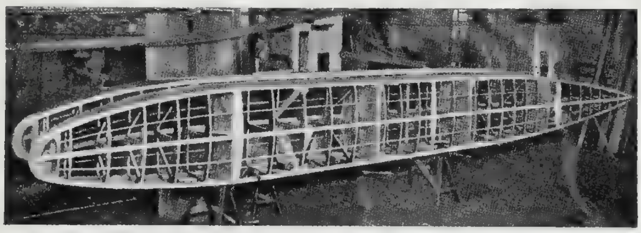
To the person with abnormal sense for red or green, that part of the spectrum normally included in the red, orange, yellow and green, appears yellow; then comes a neutral band where the normal eye would see a bluish green. Thus: Red, orange, yellow, green (neutral band), blue, violet.

The Lightest Known Wood

MANY years ago, while sailing in the tropics, Captain A. P. Lundin noticed that the rafts used by natives of Ecuador showed a wonderful buoyancy, and on inquiry found that these rafts were built with the logs of a tree known as balsa (Spanish for raft), which tree was one of the commonest second-growth trees in the South and Central American jungles. Captain Lundin made mental note of this remarkable wood, and also of the fact that it rotted very quickly and could not be protected from decay by painting or any of the methods then in use.

In 1906 Captain Lundin gave up his seafaring life and devoted his attention exclusively to marine life-saving equipment. He formed a connection with Mr. Axel Welin, and they organized the Welin Marine Equipment Company, which concern handled the Welin quadrant davit and other life-saving devices.

Remembering his experience with the rafts on the Ecuador Coast, he obtained a quantity of the balsa wood and experimented with it, but with very unsatisfactory results. Finally a method of permanently waterproofing timber invented by Colonel R. A. Marr was tried and, after some development by the Welin Company's engineers, found to be successful.



Hydroplane pontoon. Balsa construction

Balsa wood treated by this process was approved after exhaustive tests by the United States Board of Steamboat Inspectors. The Lundin Company was then formed to develop balsa products and a little later this company merged with the American Encysting Company to form the American Balsa Corporation. They built up an immense business in A-B-C rafts, which are elliptical rings of balsa wood made in sizes to nest, and ranging in capacity to float from fourteen to sixty persons.

The scientific name of balsa is ochroma lagopus and it much resembles the cottonwood. In young plants the leaves are very large, but in the older trees they are smaller. Midsummer of its third year the tree blossoms from upright, candle-like, bright green buds about six inches long, the petals of the flower being light yellow or white, according to variety. When the petals fall, the pod enlarges to about one inch in diameter, and six to eight inches in length. This pod breaks in five sectional rings, releasing large quantities of golden brown, cottony fiber, a single pod sometimes filling a bushel basket. This fiber is like kapoc and carries the seeds. The natives use it for stuffing pillows and mattresses, and as it is often easier to cut down a tree than to climb to its outer branches, they frequently use this destructive method of harvesting. Balsa logs show no annular rings, as the growth is continuous and very rapid. The United States Fruit Company has records showing a growth from the seed to a tree thirty-six feet high in one year. Professor Rowlee has made many measurements which show an increase in diameter of five inches a year.

When dry, balsa weighs 7.3 pounds per cubic foot. Cork weighs 13.7 pounds per cubic foot, and spruce weighs 27 pounds per cubic foot. The strength of balsa is fully one-half that of spruce.

During the war balsa has been used to a considerable extent in the construction of airplanes and hydro-airplanes. Wingbraces of this wood, veneered on both sides with one-thirty-second-inch fiber wood and cut out to form a lattice web, have been built up into I beams by straps of spruce an inch wide and one-quarter inch thick. These beams, weighing only one and a half pounds, will stand up under a concentrated load of 750 pounds in the center of a five-foot span. The ordinary braces of veneered spruce, much heavier, will, under similar conditions, support only 500 pounds. Balsa is also very valuable in the construction of pontoons for hydro-airplanes such as are shown in the illustration.

The most valuable use for this wood under normal peace conditions will lie in the application of its insulation properties in refrigerative engineering. Tests show that its power in this connection is higher than the best materials now in commercial use. This quality in a material of such low specific gravity and such comparatively high structural strength should make its use very general.

Steamship Maui in New York harbor. Note Balsa life rafts

The Simplification of Merchant Ship Construction

By Sir Eustace Tennyson d'Eyncourt, K. C. B., and Thomas Graham Esq., B. Sc.

(Read before the Institution of Naval Architects)

IN the spring of 1917 the depredations wrought by enemy submarines attained to alarming proportions, and it became apparent that in order to combat the menace successfully the naval campaign against it would have to be supplemented by a steady flow of additional tonnage from the merchant shipbuilding yards.

Such a supplement, however, especially in view of the restriction of output of merchant tonnage during the two previous years, involved comprehensive considerations. Most of the yards, besides being extensively depleted of skilled labor, had assumed heavy obligations with regard to Admiralty construction; and simultaneous demands with a common objective, for more patrols to maintain naval aggression and more merchant ships to maintain adequate supplies, created not only a scientific but an economic problem requiring for its solution a complete revision of policy.

Recognizing this, the government founded a new central organization with the necessary associated departments to arrange, expedite and control the merchant shipbuilding of the country; and as it was anticipated that so sudden a resumption of mercantile construction on an extensive scale might render it essential to supplement the existing yard resources, it was proposed to obtain assistance from some of the steel-making, bridge-building and structural establishments other than shipyards.

It was this necessity of widening the basis of production by utilizing every possible source of structural activity throughout the country for the building of ships that gave rise to the conception, and eventually the reality, of a "manufactured vessel," and it is to be hoped that at some future time an idea of the great amount of technical and organizing work which has been carried out by the department of the controller of merchant shipbuilding in this connection may be made public.

While the new organization was being set up, it appeared to the writers that with a complete revision of policy as regards procedure, the time was opportune for introducing a new type of cargo vessel, simple in construction, which would utilize as far as possible the only available means that existed for accelerating output. These embraced, among others, the following proposals:

(1) Employment of labor unaccustomed to shipbuilding.

(2) A simple construction which would fully avail itself of such labor.

(3) A process of obtaining parts of the ship from various sources of supply and subsequently assembling such parts at the building berths.

A design to fulfill these conditions was put forward, and the form evolved has now come to be commonly referred to as the "straight-frame form." Somewhat unorthodox in transverse section, this type provoked considerable suspicion when first proposed, but the large amount of investigation and experiment with satisfactory results which have since been devoted to it has removed much of the early misgiving, so far as speed and power are concerned, and in building all their "National" standard ships to this design, the government has developed the type on a very extensive scale.

The proposal also provided a simple and satisfactory form for the concrete vessels which the government subsequently laid down; the straight frame lines facilitating the "shuttering" arrangements in connection with the process of pouring and holding the concrete.

For electric arc welding also, the form possesses many advantages, and in the proposed double-bottom construction, which is fully dealt with in another part of the paper, opportunity is provided for an economical employment of the process.

It might be interesting to point out incidentally that one of the incentives which promoted the exploitation of the designs of ships of this kind was the proposal to fit a "bulge" or anti-torpedo protection on the ship's side. The construction, attachment to, and subsequent removal of such an appendage from the hull would have been very simple in a straight-frame form, but for various reasons the bulge was never adopted in the standard vessels.

Form

The salient feature of the straight-frame vessel is that in each transverse section the sides and bottom run in straight lines, forming an angular chamfered or rounded bilge. The trace of the angular bilge is termed the "chine" line, which rises gradually towards the forward and after ends to heights depending upon the form and speed of the vessel. The importance of the actual adjustment of the "chine" line has been prominently brought out in practically all the model experiments, and is one of the determining features in the success of a form of this kind. From structural considerations it was proposed to have a constant nonrising "chine," obtained by extending all the side transverse frame lines down to the midship rise of floor, but the resistance entailed with a model of the kind was over 60 per cent in excess of

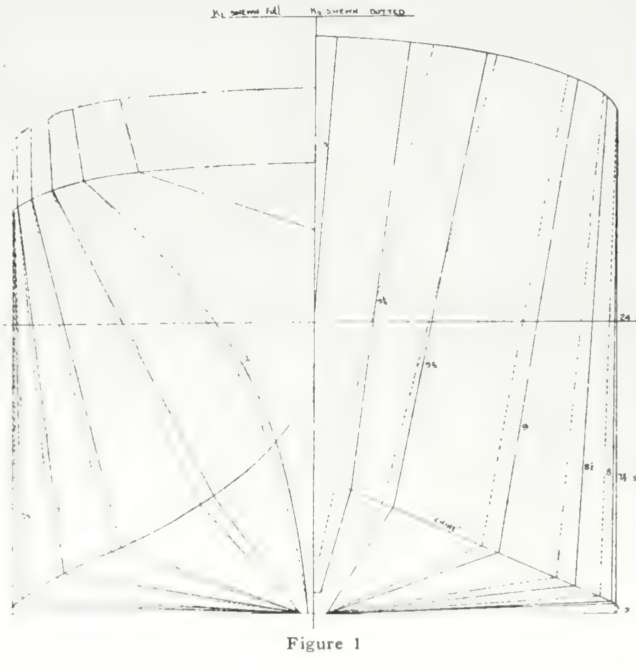


Figure 1

that obtained for the same form with rising "chine," and the proposal, therefore, was never proceeded with.

When it was decided after experiments to abandon consideration of the bulge for merchant vessels, the form "C" and its series of variations were discarded and a new form was evolved to the same dimensions, but having a block coefficient of just under .77. Two variations, "K_1" and "K_2," of this new form were tried, having practically the same lengths of "entrance," "run" and "parallel middle body," but the center of buoyancy in the former was eight feet and in the latter five feet, forward of the center between perpendiculars. The draught and displacement in both cases were the same, viz., 24 feet 10½ inches and 11,360 tons respectively.

The body plans for "K_1" and "K_2" are shown superimposed on each other in Figure 1, and the E. H. P. curves on Figure 2, and it will be noticed that "K_1" gives a better performance at low speeds than "K_2," although the difference is very small. Both curves will compare favorably with the best [illegible] obtained for vessels of similar dimensions, [illegible] on orthodox lines.

[illegible] experiments comprise the investigations [illegible]ratory to the government proceeding [illegible] [illegible]sed program of "National" and "fabricated" vessels, and as a final investigation it was decided to have a larger vessel designed on the "straight-frame" principle, and if this proved satisfactory the new design would in all probability become the parent "National" form. A new form was consequently evolved to the larger dimensions, viz., 411 feet 6 inches by 55 feet 6 inches by 28 feet draught, which when experimented upon again demonstrated the possibility of obtaining a good form having transverse straightness of lines in association with the usual curvature fore and aft.

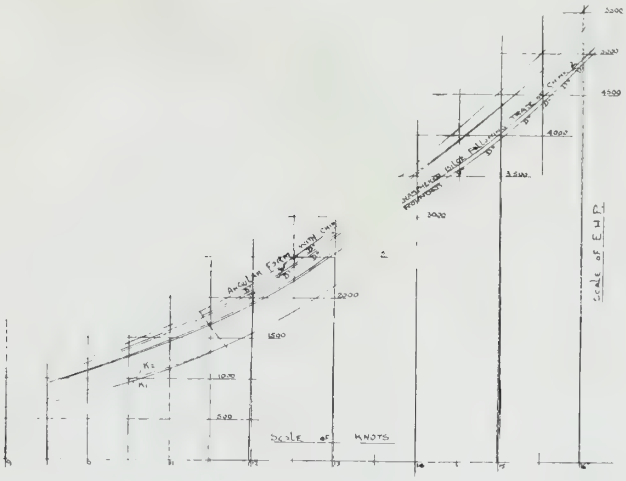


Figure 2

This original "N" form, the body plan of which is reproduced in Figure 3, was, with subsequent modifications, including a forward movement of the center of buoyancy, adopted for the N-type standard vessels, the actual dimensions of which are now 411 feet 6 inches by 55 feet 5½ inches by 38 feet 1½ inches to upper deck.

An important modification, but one which is primarily of practical significance, has been the chamfering off of the angular bilge, as shown dotted on Figure 3. This was done as a result of the belief expressed by many authorities that the retention of an absolutely sharp corner would have augmented the cost of maintenance.

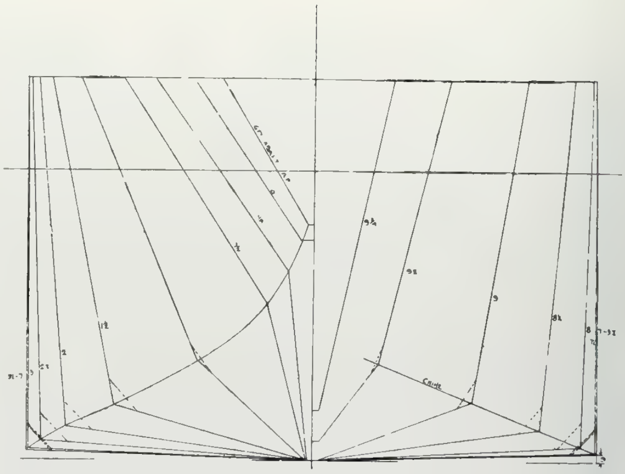


Figure 3

Reviewing the results of the few experiments just enumerated, their chief significance consists in a modest corroboration of the conclusions of recent research, viz., that in full cargo vessels the "run" is of considerably greater importance than the "entrance." In other words, a return to the blunt fore-end in association with a fine after-end appears, within limits, to be the directing principle towards an efficient form. From this arises the question as to the most suitable disposition of buoyancy in a fore-and-aft direction, which in turn depends upon such practical considerations as the desired arrangement of cargo holds and bunkers. It might be advanced, however, as a general statement that in vessels having the usual holds forward and aft with machinery between, a longitudinal position of the center of buoyancy of 1½ per cent of the vessel's length forward of the center between perpendiculars would make a good average position. If the vessel were designed with the three main holds in sequence forward and one aft—an arrangement which has many advantages—the position of the center of buoyancy might be taken as 2 per cent of the length forward of midships. These general references to the allocation of buoyancy are made because of the significance they bear in relation to the design of single-screw straight-frame vessels. Owing to the necessity of liberal deck space aft and a fine water-line (fine as compared with the deck-line), the ship's side falls in so rapidly that in maintaining straightness of

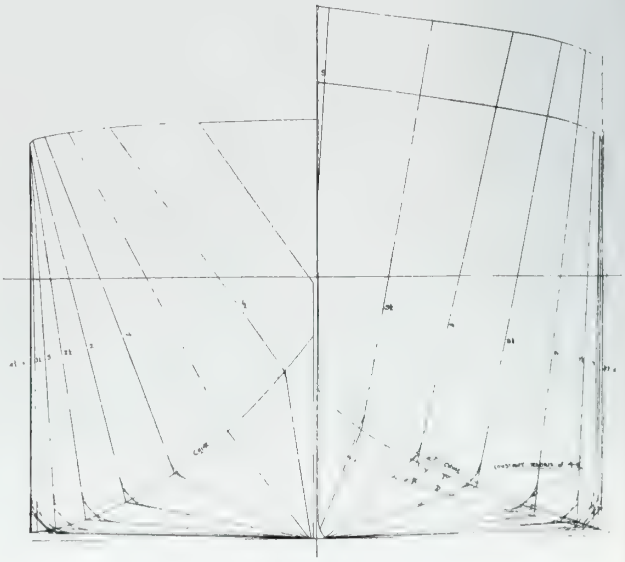


Figure 4

frames right aft, some difficulty may be found in obtaining a full immersed area at the after-end, and consequently the longitudinal position of the center of buoyancy in this class of vessel falls what might be called "naturally" well forward of the center between perpendiculars—a tendency that harmonizes with the conclusions already stated.

In order to determine the limit beyond which the straight-frame form would not hold out prospects of performance satisfactorily comparable with those of an ordinary vessel, research was continued and extended to vessels of the intermediate type up to sixteen knots and to high-power war vessels up to thirty-two and forty knots.

With regard to the latter, comparative experiments were made with straight and ordinary forms for a fast light cruiser and a torpedoboat destroyer, but the series for both classes of vessel produced results from which it is difficult to derive definite conclusions.

In the case of the light cruiser, the difference in power between the two types of form is inappreciable below twenty knots. Above that speed the straight-frame form, having angular bilge, becomes more resistful to the extent of 2 per cent at twenty and 8 per cent at thirty-two knots. Two per cent of this extra resistance is due to greater wetted surface, thus leaving 6 per cent at full speed, attributable to residual resistance due to form.

The destroyer forms showed considerably less difference in power. Below twenty knots the difference is again inappreciable. At twenty knots the angular form is 2 per cent, at thirty knots 3 per cent, and at forty knots 4½ per cent more resistful than the equivalent ordinary form.

The only inference to be drawn from these results which present so marked a relative difference in performance is that the straight-frame cruiser form was a less appropriate one for that class of vessel than was the destroyer form for its class, due probably to an unsuitable adjustment of "chine" line. But it should be stated that the ordinary form in each of these cases was a highly specialized development, whereas the straight-frame forms got out for comparison, while conforming to the same prismatic curves, may have been inappropriate as regards the vertical allocation of buoyancy, and if so, some proportion of the deficiency may have proceeded from this cause.

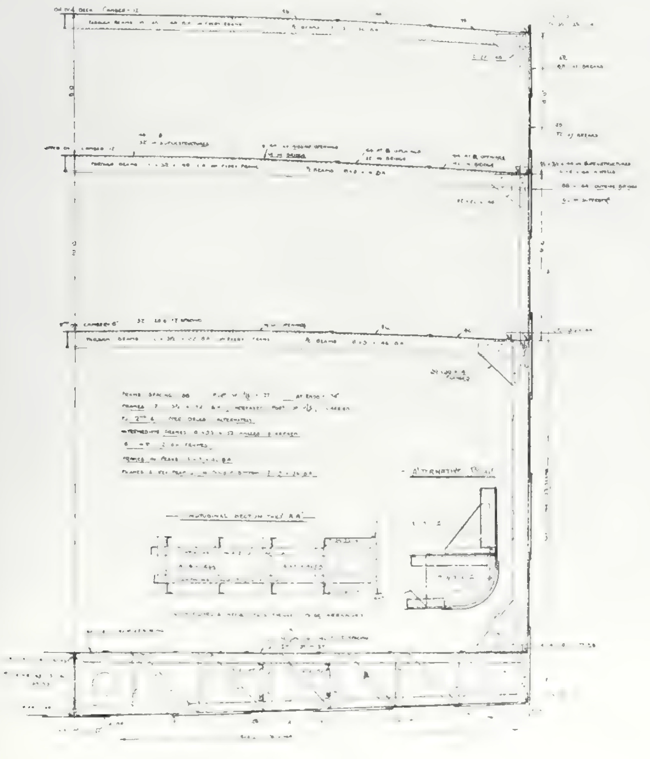


Figure 5

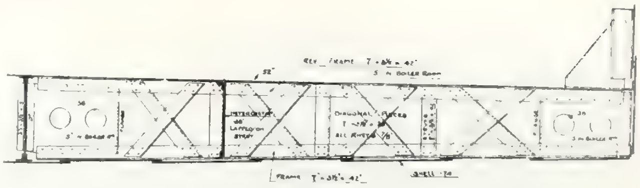


Figure 6

Figure 4 illustrates a body plan for an intermediate vessel 500 feet W. L. (490 B. P.) by 62 feet by 28 feet draught, having a mean prismatic coefficient of .72 and the center of buoyancy 2.24 feet aft of the center between perpendiculars.

Experiments on this form were made under the following conditions:

(1) Angular bilge with lower "chine" "X."
(2) Angular bilge with middle "chine" "Y."
(3) Angular bilge with upper "chine" [illegible]
(4) Chamfered bilge with trace of [illegible] following "Z" "chine" line.
(5) Rounded bilge of constant [illegible] of bilge following "Z" "chine"

The draught was kept [illegible] ty-eight feet in each case, a[illegible] displacements represented [illegible] the models were:

Model with a[illegible] bilge "Z," 17,475 tons.
Model with c[illegible] d bilge, 17,440 tons.
Model with r[illegible] bilge, 17,435 tons.

The E. H. P. r[illegible] of these investigations are shown in Figur[illegible]

With regard [illegible] onditions (1), (2) and (3), it will be noticed that a gradual improvement is seen in the performance curve, as the "chine" line forward is raised from the position "X" to the position "Z," amounting to 6 per cent of the power; but the difference between the powers obtained from the model having the "chine" at "Y" and the "chine" at "Z" is very small, and a slightly higher elevation still would provide an insignificant reduction of power, but the position "Z" probably represents the most appropriate adjustment of the "chine" for this particular form and speed. Care has to be exercised in not going too high with the "chine," even although a very slight improvement in performance on a trial run might be anticipated, for in a seaway too high a "chine" would at intervals cross the water-line of flotation and involve "impulses" of resistance.

Conditions (4) and (5) provide results almost identical to each other and from 5 to 6 per cent better than those obtained from the best condition (3) with angular bilge. This is what might be anticipated owing to the difference in the areas of wetter surface.

Generally speaking, the conclusions arrived at from the experiments referred to and others of a similar kind might be summarized as follows:

(1) Straight frame cargo vessels of speeds up to eleven knots, having angular bilges, will be from 2 to 3 per cent more resistful than similar naked forms on the ordinary lines, i. e., forms without bilge keels, the greater resistance being due to their increased skin area.

(2) When bilge keels are added to the ordinary form of cargo ship, the 2 to 3 per cent advantage in power which it possesses over the angular bilge

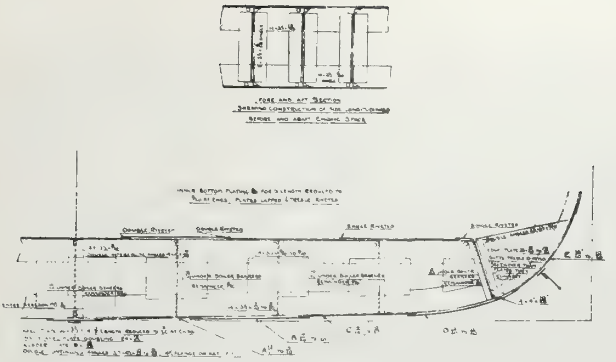


Figure 7

form is surrendered, and the latter type of form employs the extra surface, which in the ordinary vessel constitutes the bilge keel, to enclose volume, and therefore increases the displacement and deadweight accordingly.

(3) Straight-frame forms having chamfered bilges can be obtained, having forms as satisfactory as ordinary forms in cargo vessels up to eleven knots, and above that speed, up to sixteen knots, can be applied to intermediate vessels and only require a power of from 1 to 2 per cent higher than that required by the equivalent ordinary form.

(4) Straight-frame forms having a constant or varying radius at the bilge can be designed to give results as satisfactory as a similar ordinary form both in cargo and intermediate vessels, provided, it would appear, that the rounded bilge forward and aft follows the trace of what would be the most appropriate "chine" in an angular form. This means, for instance, that in cargo vessels the bilge should not be tangential to the sides and a constant rise of floor line, but should have a distinctly rising contour at both ends of the ship.

It should be borne in mind, of course, when assessing the values of these forms that the difference in power of 1 per cent, 2 per cent and 3 per cent, referred to in connection with cargo vessels, have only a theoretical significance. They imply no more than the every-day differences which occur between ordinary similar forms.

A final point that might be raised in connection with straight-frame forms, and one which is more a matter of seaworthy than of technical importance, is the question of flare or flam forward. The amount of flare which is given to a full cargo ship varies with the requirements of different owners. A series of average sections taken at the collision bulkhead from a large number of cargo vessels of the shelter-deck type and compared with the corresponding section taken from the form illustrated on Figure 3, shows the latter to be almost average practice. As a practical suggestion, however, even in a shelter-deck vessel on the straight-frame principle, it would be advisable to add a short forecastle.

Construction

With regard to the construction, this follows more or less orthodox practice (except in so far as the form greatly simplifies the work), which was a necessity of war conditions.

The principal features effecting this simplification are as follows:

(1) Straightness of the transverse frames throughout the ship.

(2) Complete absence of sheer for half the vessel's length amidships.

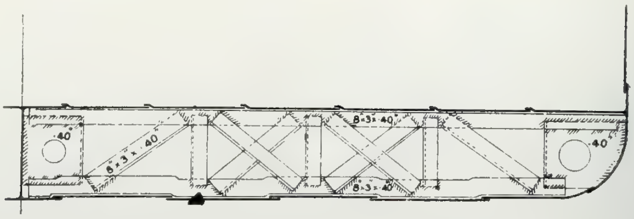


Figure 8

(3) Same thickness of shell-plate from keel to sheer strake.

(4) Very large percentage of the steel plates in the ship of absolutely rectangular form.

(5) The extensive scope provided by the foregoing features for multiple punching.

(6) The complete absence of furnaced plates throughout the ship.

This enumeration provides a ready inference as to the adaptability of the type to the "fabricating" process, which obviously depends for its success upon the precise repetition of similar parts. It is not affirmed, of course, that a considerable amount of the simplifying process could not be applied to ordinary vessels at least within the parallel middle body. But in these vessels outside that region many difficulties would arise, such, for instance, as transit accommodation for curved frames.

A feature of the original design, however, apart from other considerations, which might be called to notice, and one which, although not adopted for the N-type vessels, received support from several builders and owners, is the lattice-work arrangement of the floors and longitudinals in the double bottom.

At the time when the first proposal was made, the scarcity of steel plates was very marked, and considering that in the floors and longitudinals of a ship nearly 25 per cent of the plate steel is cut out for lightening purposes, it was thought that these members might be built up of sectional steel, which was cheaper and more abundant, and which afforded a certain scientific latitude in allocating material to such regions as required it. Figure 5 illustrates a midship section showing the proposal.

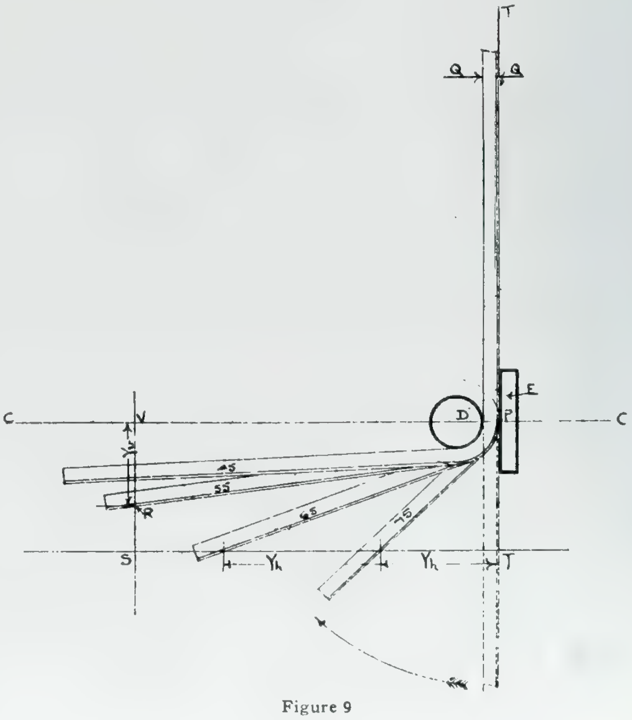


Figure 9

The floor is entirely latticed, except for shell and keel brackets, and is designed on the principle of the "Linville" girder, in which there are vertical struts with single bracing only.

As an alternative to this method, Figure 6 shows an arrangement of cross bracing which, in certain parts of the vessel, such as amidships, is, from a purely theoretical point of view, "redundant." At the quarter-lengths of the ship, however, where the shearing forces are greatest and their incidence uncertain, such an arrangement of ties would virtually comprise a "perfect" structure. But with a reasonable closeness in the spacing of the vertical struts, the single bracing will provide the necessary stiffness of frame. The object of framed structures is to provide requisite strength in association with minimum weight, and the general principles underlyng their design are sufficiently well known to guarantee that a floor structure in a double bottom can be arrived at which is capable of resisting all the hydrostatic and "cargo" pressures which ordinary floors are expected to contend with. It can scarcely be said, for instance, that a double bottom in which every frame has a latticed floor, or one in which every alternate floor between the latticed ones is skeleton, is weaker than a double bottom in which every third frame has a floor of lightened plate and the two intermediate ones skeleton, with a single vertical strut bracing the frame and reverse frame in the middle, and yet this latter arrangement is one of common practice today.

With regard to intercostals, these are an expensive and laborious means of supporting locally the inner and outer bottom plating and of providing material to absorb compressive stresses, and in cases of double bottoms the depth of which exceeds the length of the frame space, these girders are particularly extravagant. When it is considered that they frequently extend over a cargo hold ninety feet long, their structural credit is somewhat discounted when compared with that of the "containing" members, viz., shell and deck and double-bottom plating, and the natural tendency would appear to be to render these containing members to a greater degree self-supporting.

In the proposed section, therefore, shown on Figure 5, the center struts of the floors are braced by four continuous or partly continuous angles, which have no contact with the outside or inner bottom plating, except, if desired, immediately under the hatchways, where small flanged corner brackets can be arranged to support the double bottom.

As a matter of interest in this connection, reference must be made to three vessels, built nearly thirty years ago at Clydebank, when Professor Sir John Biles was naval architect there, viz., the New York and Philadelphia and the Friesland. Midship sections of these vessels have been kindly supplied by Messrs. John Brown & Company, Ltd., and the construction of double bottom in the Friesland is illustrated on Figure 7. In this case, and in the cases of the New York and Philadelphia, great use has been made of special angles, 14 inches by 3½ inches, by which the process of lightening the floor plates has been rendered unnecessary.

As regards the weight of a lattice-work, in comparison with a solid floor bottom, there is considerable saving both in the gross and net steel. It has been already remarked that about 25 per cent of the plate steel ordered for the construction inside a double bottom is cut off as scrap, and this exorbitant excess of weight does not figure in a lattice-work requirement, for there all the component parts are cut off neat from the ordered length. The midship section, already referred to and illustrated in Figure 5, is one which was approved for a vessel 400 feet by 52 feet by 31 feet, and which would in all probability have been laid down in 1917 for private owners, but for the inauguration of government control at the time. The calculated weight of gross steel in this design is 150 tons less than the gross steel in the "B" standard vessel, which is of identical dimensions, and there is also considerable reduction in the net steel weight, which would provide a perpetual gain in the earning capacity of the ship. It may be that the "B" vessel is not the best example of a typical ship for comparison, but generally speaking, from calculations made from various midship sections for vessels having ordinary frame spacing, the saving in gross steel effected by a double bottom framed as suggested is about 5 per cent of the total steel weight.

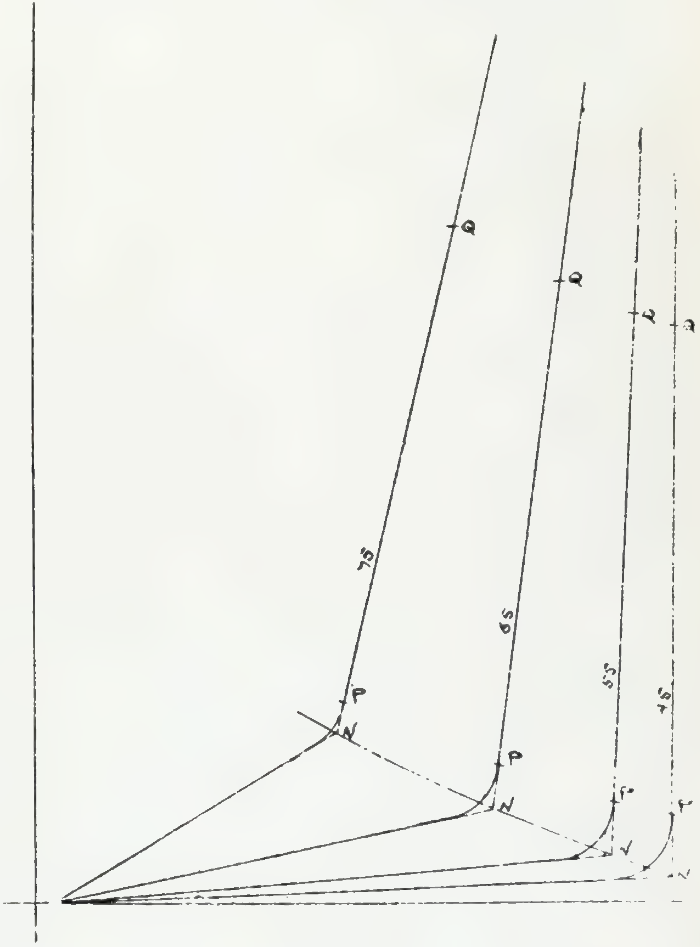


Figure 10

Figure 8 shows an adaptation of the lattice-work floor in the double bottom to the process of electric arc welding. The amount of welding in this arrangement of structure is 40 per cent less than what would be required for the ordinary continuous plate floor with frame and reverse frame attachments. In weight it is 25 per cent less gross and 14 per cent less net weight than the equivalent welded solid floor, and is 5 per cent lighter than the same lattice-work floor riveted instead of welded.

So far in this paper all attention has been directed to vessels of large size, but the numbers of coasting and other smaller ships have been greatly depleted during the war, and the cost of restoring them is relatively higher than for the larger vessels. In consequence, it would be profitable to apply to the building of vessels of this kind some of the methods of simplification already described. A straight-frame form having a rounded bilge of constant radius throughout would be a suitable type, the rise of the bilge forward and aft following the contour of the most appropriate hypothetical chine. The frames would extend in one piece from keel to deck with the single curvature at the bilge, and the offsets could be supplied in a manner so simple and applicable that there would be considerable reduction in the work and cost of laying down the form.

Figures 9 and 10, which are correlated, having corresponding lines and letters, illustrate a suggested method.

Figure 10 shows the final form to be taken by four frames, 45, 55, 65 and 75, of a single-bottom ship, the body plan of which is shown on Figure 10. N is the angular bilge at each frame and P is the upper point where the main frame line tanges on the bilge arc, which has a constant radius of fifteen inches. Q is a fixed point marked on each frame, such that P Q is of the same length throughout. Referring now to the process diagram, Figure 9, D is a plate disc, the radius of which, nine inches, is equal to that of the bilge, less the width of the frame web, in this case six inches. A line, C C, is drawn through the center and perpendicular to it, and six inches from the edge of the disc. A short piece of flat steel, E, is clamped down to the slabs, just leaving room for the frame to be slipped in between it and the disc. The fixed point, P, is marked on E, and a line, T T, is drawn coincident with the inner edge of E and represents the straight-frame line before bending, and along this line a distance, P Q, is set off on the slabs. Two arbitrary datum lines, T S and S V, are drawn perpendicular and parallel to T T, respectively, and with T and V as origins, distances Yh and Yv are given on the table of offsets for each frame. These distances are marked along T S and V S respectively, and the points so obtained give terminal positions to which the lower parts of the frames have got to be bent. Take, for instance, frame 55. Yv is equal to 2 feet 5¼ inches, and is marked along V S, giving the point R. The unbent frame is laid along the line T T with the point Q on the frame coincident with the same point on the slabs. The lower end of the frame is then turned round the disc until its heel edge intersects V S at the point R. If necessary, the lines of the lower parts of the frames passing through the terminal points can be drawn down for guidance.

All these offset particulars and their method of application are, of course, made out in the designing office, so that the liner-off and frame-bender have only got to proceed with a simple geometrical process. The attached table illustrates an offset sheet for this work.

NAME OF VESSEL

DIMENSIONS 160 FT B P × 26 FT. × 13 FT 6 IN

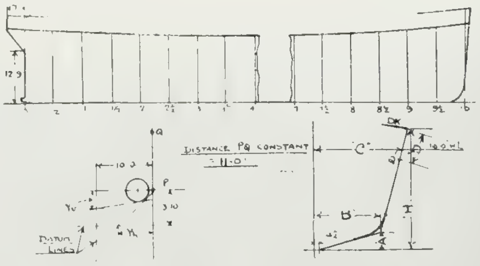


TABLE OF OFFSETS.

Frame or Station	"A"	"B."	"C."	"D."	"H"	Y_h	Y_v
	Ft In	Ft In	Ft In	Ft In	Ft. In	Ft In.	Ft. In.
0	—	—	4 1½	—	18 1	—	—
½	8 10	1 6	7 3	—	17 9	—	—
1	5 0	4 8	9 10	2 0	17 5	0 9	—
1½	3 5	7 0	10 3	2 5	17 2	2 11	—
2	2 5½	9 3	12 3	2 10	17 0	5 9	—
2½	1 7	10 10	12 6	3 0	16 10	10 2	—
3	1 1	11 11½	12 9	3 6	16 9	—	2 9
3½	0 8	12 7½	13 0	0 7	13 7	—	2 3
4	0 6	13 0	13 0	0 6	13 6	—	1 9
4½							
5		Constant radius of bilge = 15 in.					
5½		Rise of floor amidships — 6 in.					
6		30 per cent parallel middle body (4–7 stations).					
6½							
7	0 6	13 0	13 0	0 6	13 6	—	1 9
7½	0 8	12 8	12 10½	0 7½	13 8	—	2 2½
8	1 0	11 7½	12 4½	7 4	20 8	—	2 10½
8½	1 11	9 3	11 1	7 0	20 11	7 9	—
9	3 4½	6 1½	9 0	6 4½	21 4	3 3	—
9½	5 4½	3 0½	5 8½	5 5	22 0	0 9	—
10	—	—	0 1½	—	22 10	—	—

Offset table

POWER USED IN ELECTRIC HOISTS

A CLASS A-2, 2 P. 4000-pound hoist will consume eight amperes of 220 volts D. C. when hoisting full load, or 1760 watts. In lowering the same or any lighter load, it will consume two amperes or 440 watts.

Since the hoisting speed with 4000-pound load is 10 feet per minute on an average lift of 6 feet, it will be consuming current for .6 minute, and since it lowers at 25 feet per minute, it will be consuming current for .24 minute. Thus to make one lift of 4000 pounds raised 6 feet high and lowered again it will consume 1760 watts for .6 minute and then 440 watts for .24 minute. Since the unit of payment or cost of current is based upon the watt hour and the unit of performance is based upon pounds of load handled a given distance per minute, these units must be reduced to a common value for comparison.

Reducing the periods during which the hoist is consuming current to decimals of an hour, we find that it is consuming 1760 watts for .01 of an hour or 17.6 watt hours in lifting the load, and 440 watts for .004 of an hour or .76 watt hours in lowering the load, or a total of 19.36 watt hours per complete lift, and a total of 1.94 kilowatt hours per 100 lifts, which at a cost of 10 cents per kilowatt hour equals 19.4 cents per 100 lifts.

With electric hoists there is no leakage, and hence the cost of operating the hoist while handling its load represents the whole cost. To handle the same load by pneumatic hoist employing an air pressure of 100 pounds per square inch at the receiver, to overcome the frictional loss of the air through pipe line, and the necessarily small base which it is convenient to employ, the effective pressure at the hoist piston cannot be assured at more than 80 pounds per square inch; hence an area of piston of 55 square inches will be required, allowing 10 per cent for friction in the hoist. For each lift of 6 feet, 3960 cubic inches of air at 100 pounds pressure and 80 pounds cylinder pressure will be required, or a total of 2.24 cubic feet of compressed air, or 15.54 cubic feet of free air will be consumed. If the so-called balanced type of hoist is used, the total will be greater.

OIL ENGINE REVIEW

Libby Maine's Record Run

AGAIN the Libby Maine, staunch product of Pacific Coast ship and engine builders, has demonstrated her ability for big work. This time it is with a non-stop run of over 6000 miles. On her most recent voyage she left Seattle December 27, 1918, for Honolulu, Manila, Hong Kong and return. The record of this voyage, showing the distance traveled, the average speed and the fuel consumption, is given in the following table:

Total number of knots traveled	14,170
Seattle to Honolulu	
Distance in knots	2,458
Total fuel consumption (barrels)	255
Time: 15 days, 2 hours, 24 minutes	
Average speed (per hour), knots	6.78
Average daily fuel consumption, barrels	16.88
Honolulu to Manila	
Distance in knots	4,966
Total fuel consumption, barrels	468
Time: 28 days, 16 hours, 44 minutes	
Average speed (per hour), knots	7.21
Average daily fuel consumption, barrels	16.3
Manila to Hong Kong	
Distance in knots	658
Total fuel consumption, barrels	63
Time: 3 days, 15 hours, 45 minutes	
Average speed (per hour), knots	7.22
Average daily fuel consumption, barrels	17.23
Hong Kong to Seattle	
Distance in knots	6,088
Time: 35 days, 20 hours, 1 minute	
Average daily fuel consumption, barrels	17.25
Total mileage to date	23,523
Total consumption to date, barrels	2,571.3

Aside from the steady, continuous good running of the engines, with no worry and anxiety of engine trouble, other details of the voyage made by this vessel are worth noting.

She left Seattle with a general cargo consigned to Manila, stopped at Honolulu, and after taking on fuel, distillate and fresh water, left for Manila after a delay of twenty-four hours, due to the formality of securing a fuel permit by wire from San Francisco.

Leaving Honolulu on January 14, a steady, uninterrupted run was made to Manila, arriving there on February 13. Every part of the vessel was in perfect condition and was shipshape to proceed elsewhere.

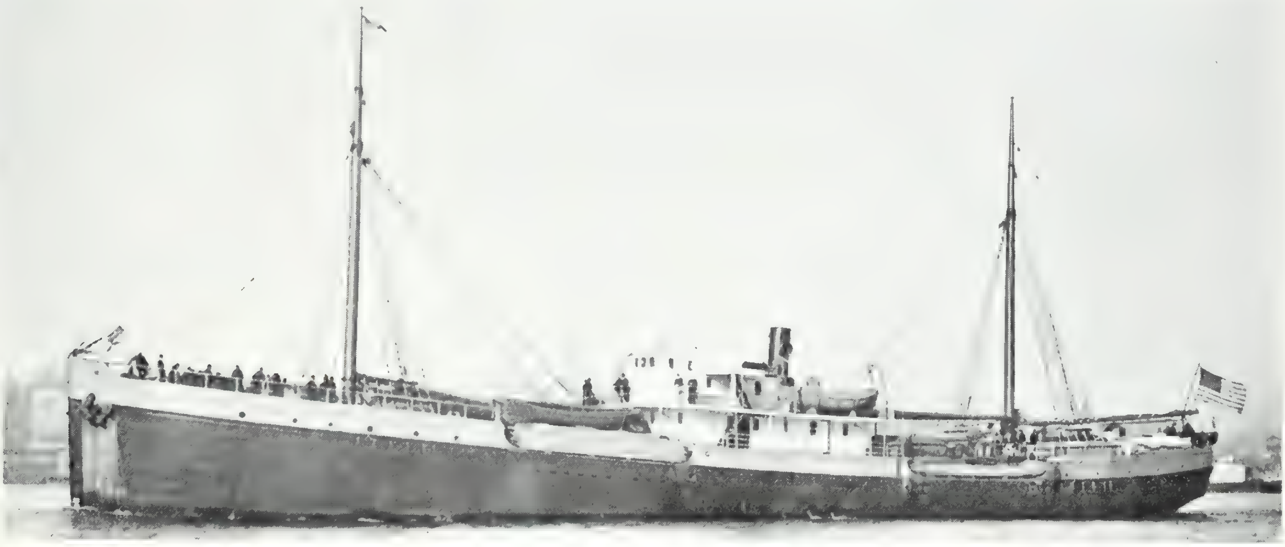
At Manila the third assistant engineer and Mrs. Herre, wife of the master of the ship, Captain E. M. Herre, died of black smallpox epidemic at that time. After the cremation and funeral of the dead, the ship left Manila for Hong Kong on March 14, arriving there after an uneventful and non-stop run on March 18. Here she completed her return cargo, consisting of Philippine hardwood, copra meal and firecrackers, and left Hong Kong on March 23. This, the longest non-stop voyage of the Libby Maine, covering a distance of 6088 miles, was made in schedule time and without the suggestion of trouble. The boat arrived in Seattle at 7:10 p. m. on the evening of April 27.

On May 6, at 6:15 p. m., she left Seattle for Bristol Bay.

Chief Engineer Fabel was extremely well pleased with the performance of the engines and was unstinted in his praise of their reliability. "I am just as confident," he said, "of the Dow Diesel engines as I am of any of the steam engines I have ever had under my care. The motors have proved themselves even beyond my expectations, and on the entire trip we have had absolutely no trouble."

The Libby Maine has made good by reason of two factors—her officers and her engines. The personnel of the vessel have taken great interest in furthering the cause of the motorship and have been justly proud of the success attained. In any marine Diesel installation there are four big items which determine the failure or success of the venture. They are: Design, material, workmanship, and operating skill.

Experience with internal combustion engines points conclusively to the full-Diesel four-cycle design based upon established European practice. No matter what the materials may be, or how accurate



Motorship Libby Maine in Seattle harbor

the workmanship, the principle must be correct and must be approved by years of experience under marine operating conditions.

The Diesel cylinder head or the Diesel piston stands up primarily by virtue of the proper distribution of metal sections. A strain-relieving element outweighs metal structure. A design proved by experience requires no alteration.

High temperatures and high pressures require careful selection of material, years of study often being required to determine the mixture and treatment of some small part. Materials judiciously selected, properly understood and carefully controlled, give no cause for trouble and guarantee long life to any machine.

As the accuracy of a watch depends upon workmanship, so the reliability of a Diesel engine depends upon workmanship. The Diesel engine requires workmanship of the highest grade, controlled by a thorough inspection system.

A Diesel engine built upon proved designs of select materials and of good workmanship demands the services of a marine engineer who takes pride in the machinery he is operating. The simplicity of a full Diesel, such as the Dow type, does not require an extensive knowledge of the Diesel principle as an essential to successful operation.

The Libby Maine has proved what an American-built motorship equipped with American-built Diesel engines can do. May she prove but a forerunner to a great fleet of motorships, the future merchant marine of the United States

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OIL TANKERS

WHEN Lord Curzon said that "the Allies floated to victory on a sea of oil," he made a statement that, at the time, appeared to be a mere figure of speech.

Post-war revelations demonstrate that the distinguished Briton was so far within the use of the soberest language in his reference to what petroleum did that he fell short in a full meed of praise, to a most vital factor contributing to the downfall of the Hun. Gaston Liebert, French consul-general at New York, said that had it not been for the uninterrupted flow of gasoline, the French army would have been unable to rush supplies and reinforcements to the beleagured poilus at Verdun by motor lorries, after the railroads had been destroyed by long-range German artillery, "but that it is conceivable that the noble defenders of France's Eastern fortress might have had to yield." Continuing, the consul-general said that "in March, 1918, when the Germans were plunging for Amiens and Nancy, it was the motor truck, rapidly shifting troops into threatened portions of the line, that saved the day. In December of 1917 the Allies had but a scant month's supply of gasoline on hand and the achievement of the Americans in putting down 90,000 tons of petroleum products in France in December and January alone made possible the maneuvers of March."

48 per Cent of British Navy Oil-Driven

Captain Arthur Snagge, R. N., naval attache at the British embassy in Washington, stated "that 48 per cent of the British navy is now driven by oil, and four-fifths of our oil supply comes from the United States. Had it been interrupted by the delay of even a single steamer, the result would have been frightful anxiety. Because it was uninterrupted the British navy was able to maintain its marvellous average of cruising an aggregate of more than 7,000,000 miles a month in the waters surrounding the British Isles.

"Without American oil it is only fair to say that 40 per cent of the British navy would have been paralyzed. It is needless to say that without it 100 per cent of the air activity would have been impossible."

The tank ship fleet, without which the navies and armies of civilization would have been powerless, did its work so thoroughly and so modestly, that its achievements are not even yet appreciated.

Representative vessels of the tanker fleet are the Fred W. Weller and the Standard. The latter is the largest tanker afloat. She is of 17,000 deadweight tons, 520 feet long and 68 feet beam. Her normal load is approximately 15,000 tons of crude petroleum. This is inclusive of her summer tanks. The term "summer tanks" is applied to a series of top tanks, used only in such weather as seems safe to load to the Plimsoll mark. It is asserted that crude petroleum is an even more dangerous bulk cargo than grain, shifting in a sea way—this because of its density, slowness of recovery, and weight of its impact against the top sides of a vessel. Hence summer tanks, except in most favorable weather, are seldom used save for the lightest distillates. A tanker of the Weller type loads, ordinarily, 100,000 barrels of crude or its equivalent in residuums or distillate. The large tankers are devoted almost exclusively to carrying crude. This is due principally to the fact that to take another cargo would require a thorough cleaning of every tank, a process involving much time and expense. A crude-carrier therefore remains a crude-carrier.

Flexible Pipe Connections

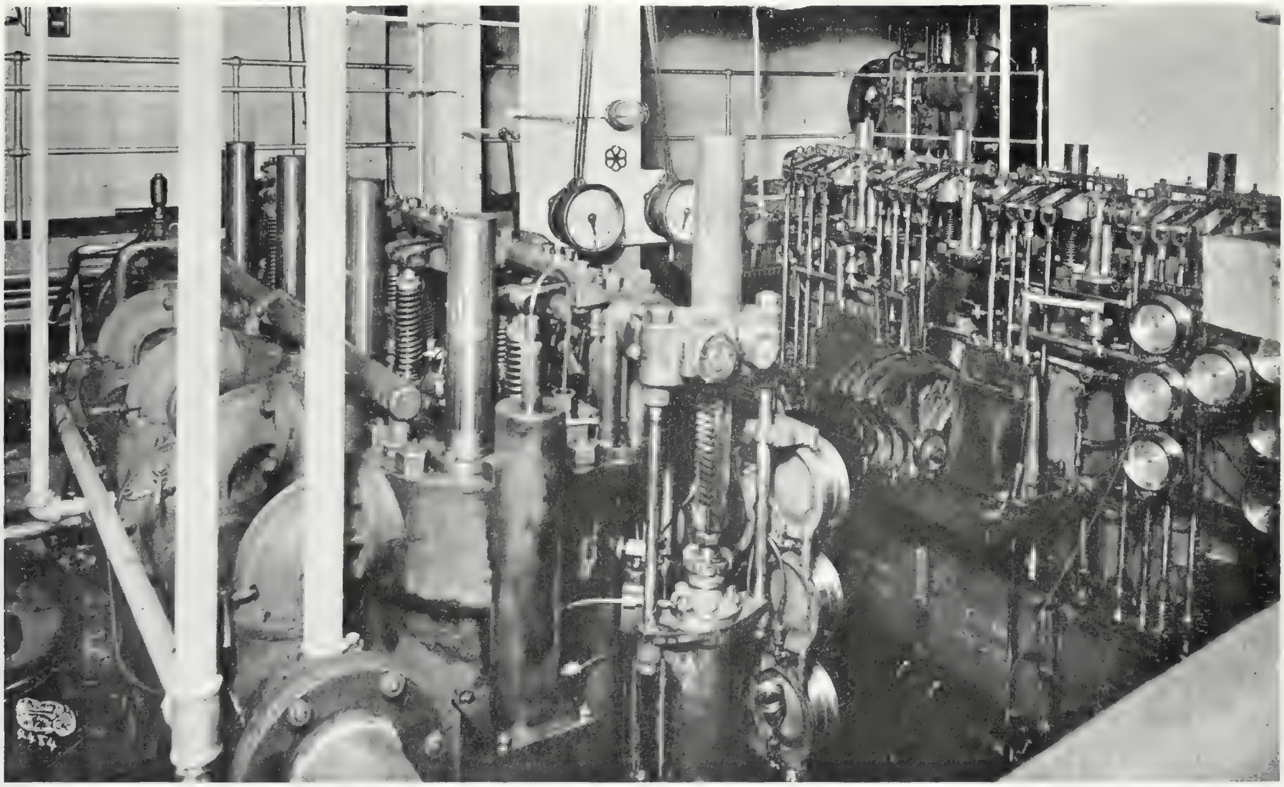
In the lower hold of the Weller are two pumps, amidship, port and starboard, with a capacity for 3000 barrels of oil each an hour. These pumps, on a fifty-pound steam pressure, will develop a seventy-five-pound oil pressure on the pipe lines.

The deck views of the two ships show a dissimilarity in tanker construction. The Weller is American in type, while the Standard is German. The latter was built at Kiel, Germany, in 1913. It will be noted that the American pipe line and valve arrangement is all above deck on the Weller, while on the Standard all this gear is between decks; also that the main pipe line on the deck of the Weller runs practically the full length of the ship. There are connections to it, port and starboard, fore and aft. A tanker of the size of either of these finds it impossible to get anywhere near storage in the shallow, narrow rivers of Mexessity of loading from a floating pipe line run out more than a mile from shore. The difficulties of taking on cargo under such conditions are apparent.

Oil in Double Bottoms

Under the stress of war the demand for petroleum products in Europe greatly exceeded available tanker tonnage and it became necessary to resort to expedients. The British Admiralty conceived the idea of transporting oil in the double bottoms of merchantmen and a vast amount was thus sent across. The White Star liners all were pressed into this service and the amount of oil they carried in this manner was a valuable supplement to the service rendered by the tankers.

Three Fine Motor Schooners

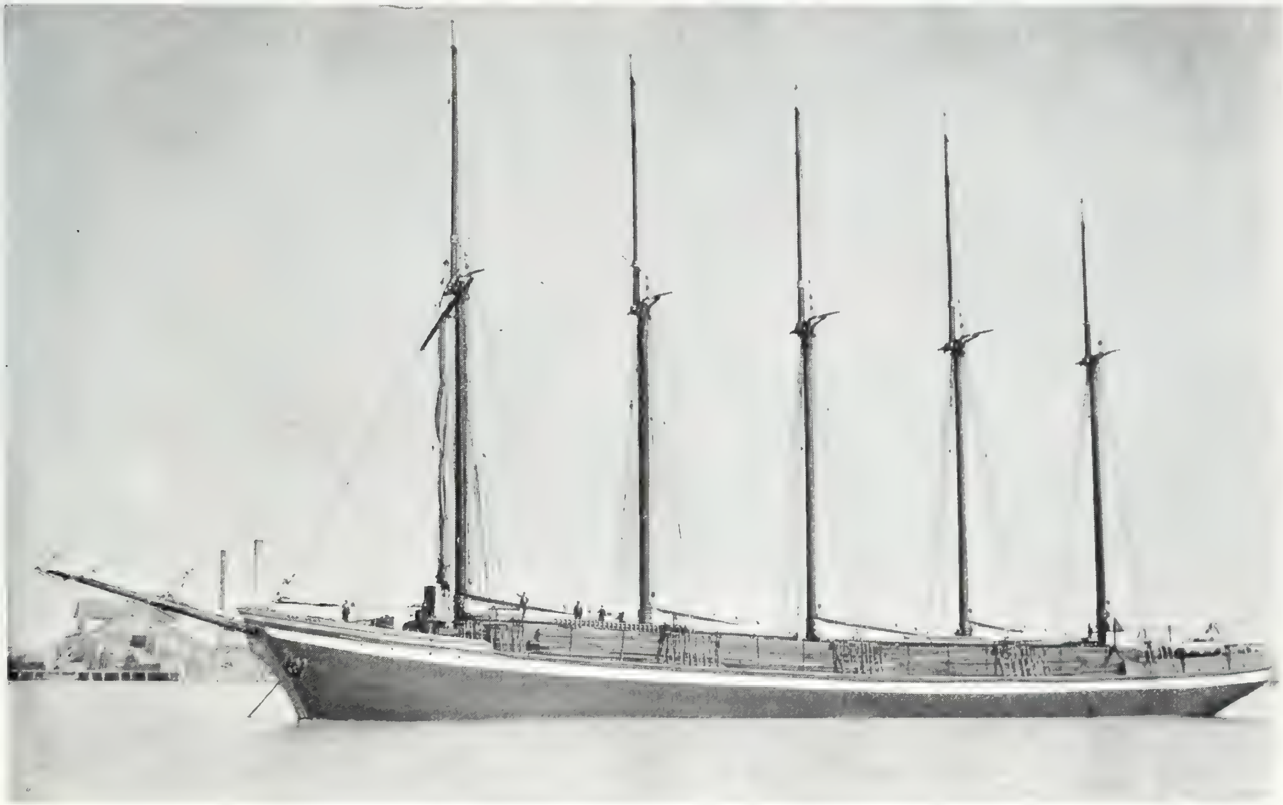


Two hundred horsepower Atlas Diesel engines in the Cap Nord.

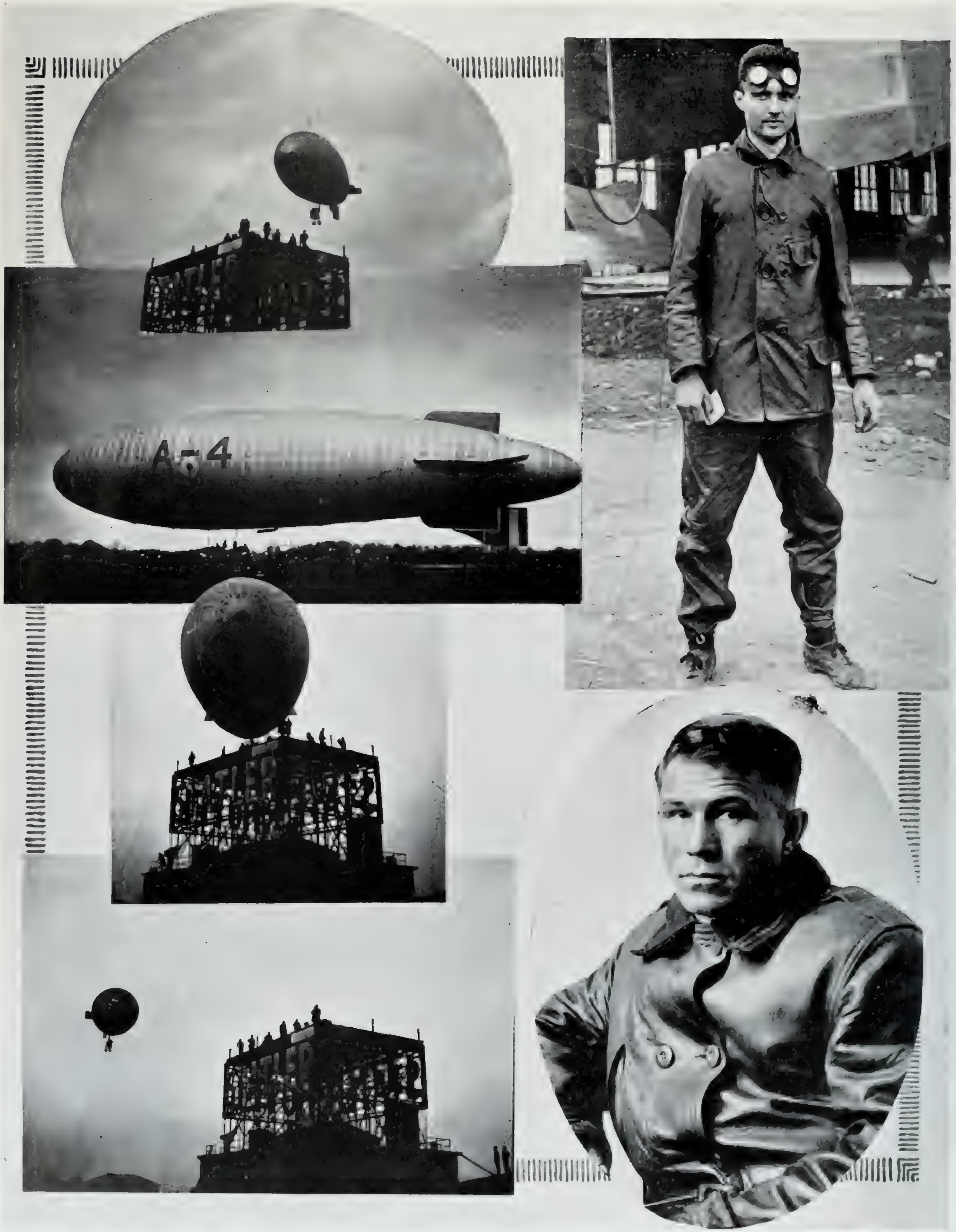
THE William Lyall Shipbuilding Company of North Vancouver have recently built three five-masted motor schooners to be operated by themselves in the lumber trade.

These vessels, the Cap Nord, the Cap Vert and Cap Horn, are all powered with two 200-horsepower Atlas Diesel engines, and a sixteen-horsepower Atlas Imperial engine for auxiliary power purposes. They are sister ships and measure 245 feet by 42 feet by 20 feet, with a capacity of 1,550,000 feet of lumber each. On the trial trip, empty, they maintained a speed of 8.6 knots an hour, and under load they chug along comfortably at 6.6 knots.

The Cap Nord, loaded with pine from British Columbia, is on her way to Buenos Aires.



Five-masted motor schooner Cap Nord.



The above pictures show a wonderful performance of a dirigible balloon. The occasion was a meeting and dinner given by the Society of Automotive Engineers at the Statler Hotel in Cleveland. Ralph H. Upson, chief aero engineer of the Goodyear Tire & Rubber Company together with Major C. H. Maranville, commander of the army aircraft detachment at Akron, Ohio, made the flight in the army dirigible A-4 from Akron to Cleveland and were delivered on a sixty-foot platform erected on top of the hotel's electric sign above the roof of the building. The dirigible then made its fifty-mile return trip without incident. This is the first time in the history of aeronautics in America that any type of aircraft has been brought to a quick and convenient stop in the heart of a large city for the purpose of landing passengers. The pilot, James F. Shade, is shown in the lower right hand corner with Ralph H. Upson above. The other pictures show very clearly the maneuvering of the big airship to gain a landing on the platform.

PACIFIC MACHINERY

Labor-Saving Machinery for Shipyards

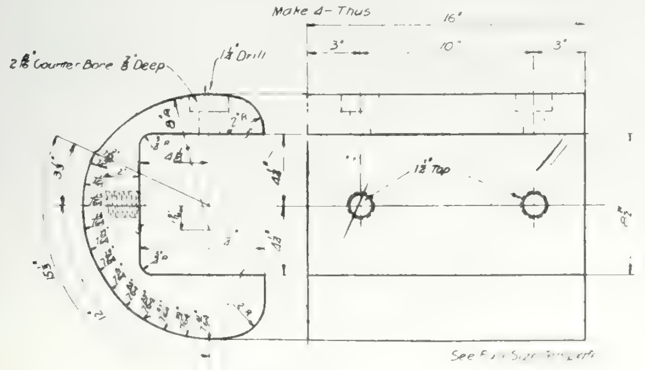
ONE of the reasons that the Pacific Coast has been able to make such an enviable record in building ships for the Emergency Fleet Corporation has been the adoption of time and labor-saving tools by the shipyard owners. Some of those tools we are able to show in this number.

The taper liner rolls shown on page 117, while not strictly a new tool, are made especially for this class of work, and will make taper liners 8 inches wide from ¾-inch plate, the maximum length being 12 inches. Between 300 and 400 liners of this size have been made in eight hours and as many as 600 liners in eight hours have been produced from ½-inch by 3½-inch stock. To do this it is necessary to have a large furnace close to the rolls with one man at the furnace and one at the rolls. Before this machine was put on the market the shipyards made the taper liners under the steam hammer—when they did make them—and a good man could get out about ten small ones an hour, to the injury of the anvil block and the steam packing at the piston rod. Every steel shipyard on the coast has one or more of these tools in its blacksmith shop.

The almost universal adoption of the Isherwood system of ship construction with longitudinals crossing the joints of the vertical seam of the shell plating would call for the use of several hundred tons of taper liners on each ship.

To save this excess of weight and the great amount of time used to fit liners, a scarph is made on the inner surface of the shell plating where the longitudinals cross the seam. This scarph is usually made to take three or four rivets, depending upon the thickness of the shell plating.

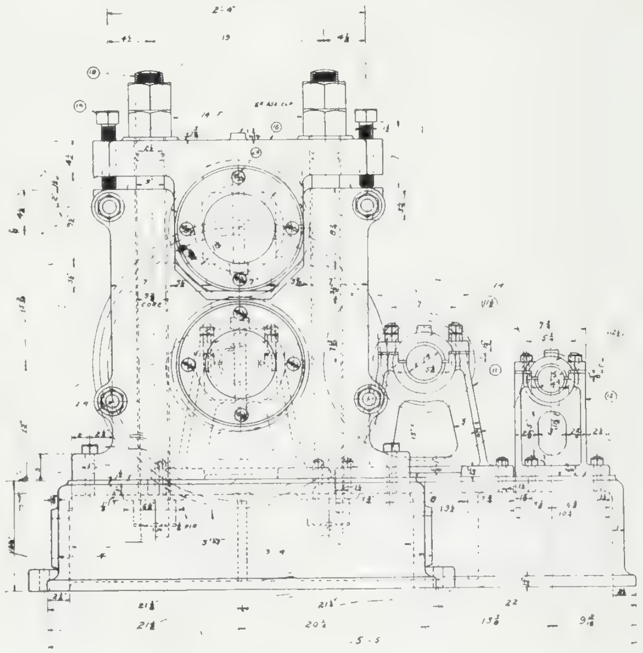
Some shipyards make use of the slow-working shaping machine with its single-way cutting operation. With a double-headed shaper, two scarphs 8 inches wide by 12 inches long on a ⅞-inch plate can be made in twenty minutes.



Roll for liner rolls.

The scarphing machine shown is of the end miller, continuous-operating type, and was designed by the writer to make a scarph 8 inches wide by 12 inches long with a ½-inch cut in three minutes. The return stroke is made in one minute.

With a 10-horsepower motor on each cutter there is ample power to take a cut ¾ inch deep and the full 8 inches wide, but the plate will not stand up to such severe duty, as the large 8-inch scarph is always at the corner of the plate which cannot be bolted.

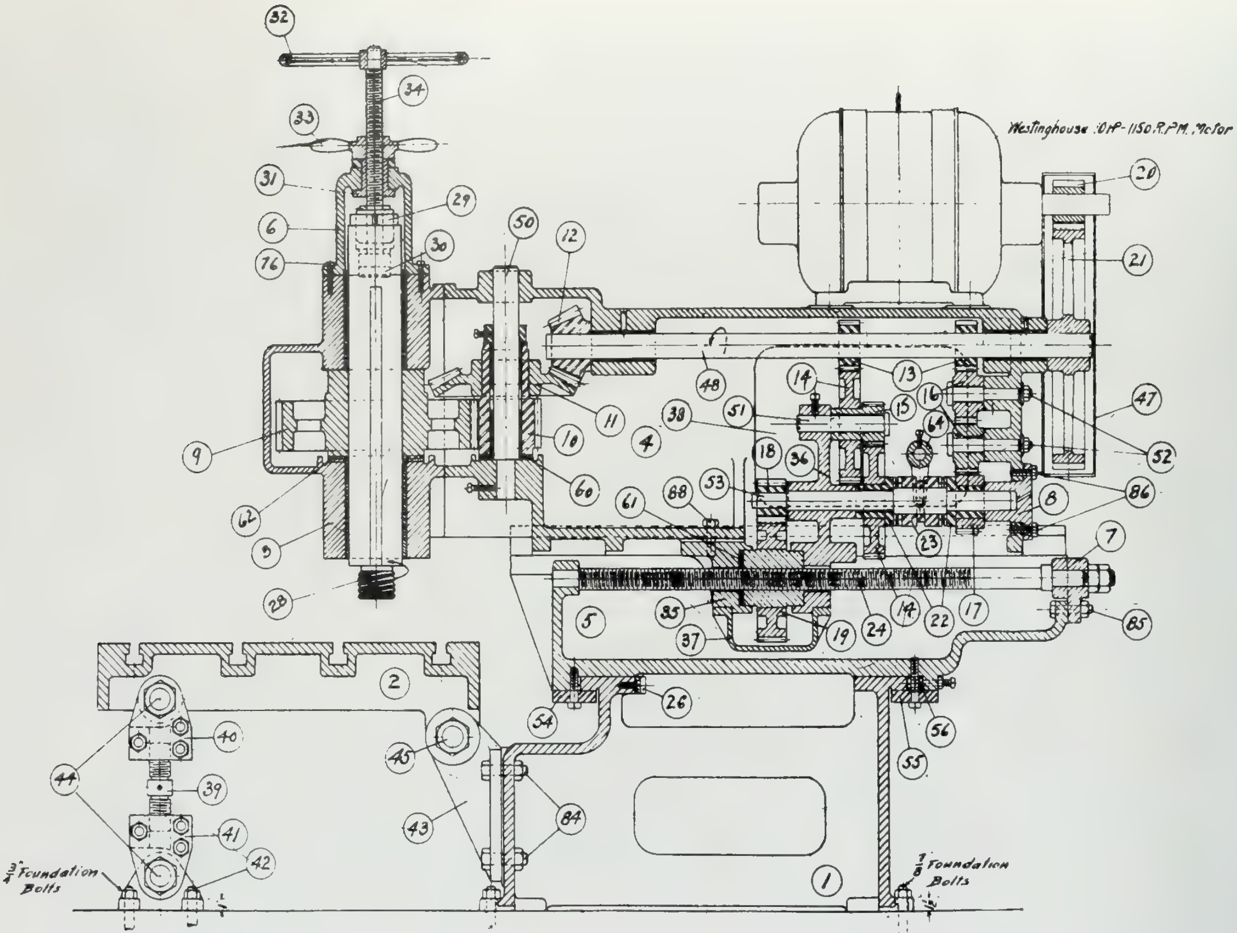


End elevation of liner rolls.

There is a 4-inch diameter cutter on each head to make the scarphs for the longitudinals; these small cutters are easily put in or out of the machine without removing the large cutter—in fact, the large cutter is the driver for the smaller one.

This machine was designed many months before anyone would take the risk of ordering a tool embodying such radical features in an end miller. It was the confidence of R. S. Moore, of the Moore Shipbuilding Company, in my ability as a designer of tools which gave the scarpher to the shipyards.

The milling cutter, as it is met with in the average machine shop, does not make a cut as does the lathe or planer tool. The reason of this may be said to be traditional practice of making the front

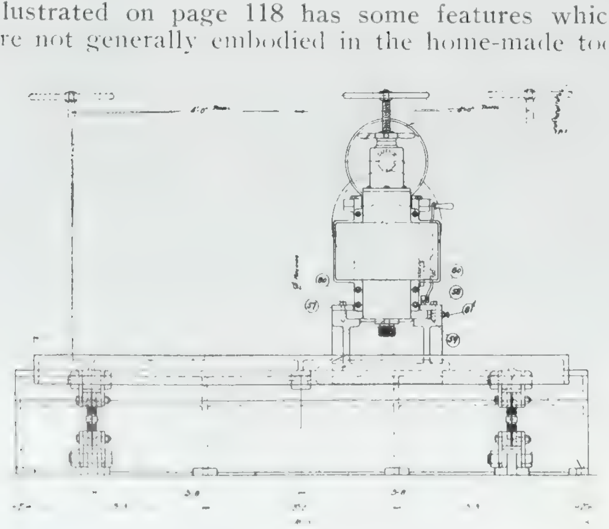


Sectional elevation of scarphing machine showing gearing and screw for tilting table.

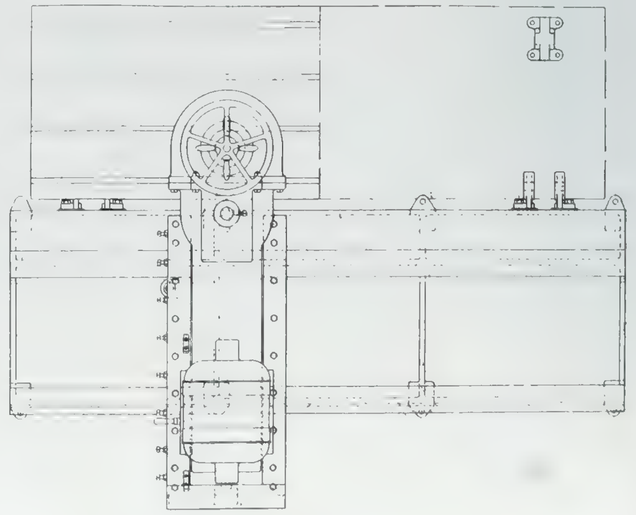
faces radial in all cutters. Radial-faced teeth can scarcely be said to cut—they push and jam the metal off. When heavy cuts are taken, this jamming becomes a serious matter and front rake is almost a necessity. Even a little front rake is very advantageous when the removal of the metal from a plane surface is the object sought, and it seems likely that such rake will become as common for milling cutters used on such work as it is for lathe and planer tools, and for the same reason. In making and regrinding the cutters of the scarphing machine, the above considerations must always be borne in mind.

The motor-driven, portable countersinking machine is one of the most useful tools in the shipyard when properly made and used. The machine illustrated on page 118 has some features which are not generally embodied in the home-made tool as seen in the Eastern, Northern or in most of the bay shipyards. The spindle is fitted for a vertical motion of about four inches through the frame and a front leg fitted to the frame to support that member in a horizontal position, enabling the machine to countersink, ream or drill a true vertical hole.

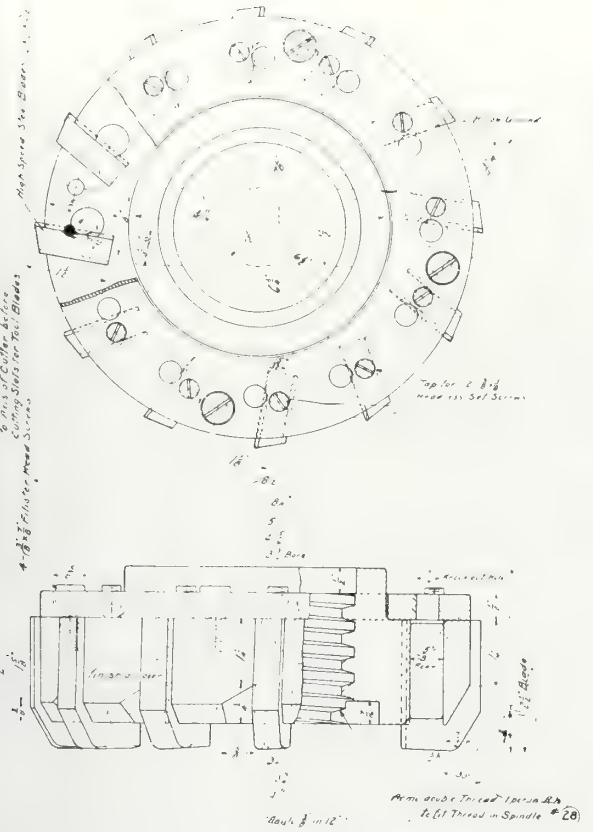
There have been a number of plate tighteners put on the market. The poor shipyard owners have been flooded with "the only tool" for this purpose, but all the appliances have failed or met with reverses, as they must be very powerful, which means massive, which means weighty, and the present class of workmen "means to have an easy time." Yet everyone who has to work on or around a steel ship will comment upon the great



Side elevation of scarphing machine.

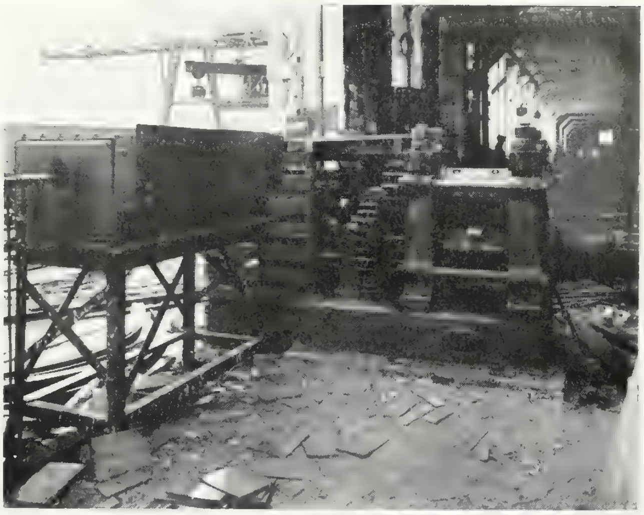


Plan of scarphing machine.



Cutter head for scarphing machine showing method of the cutters holding.

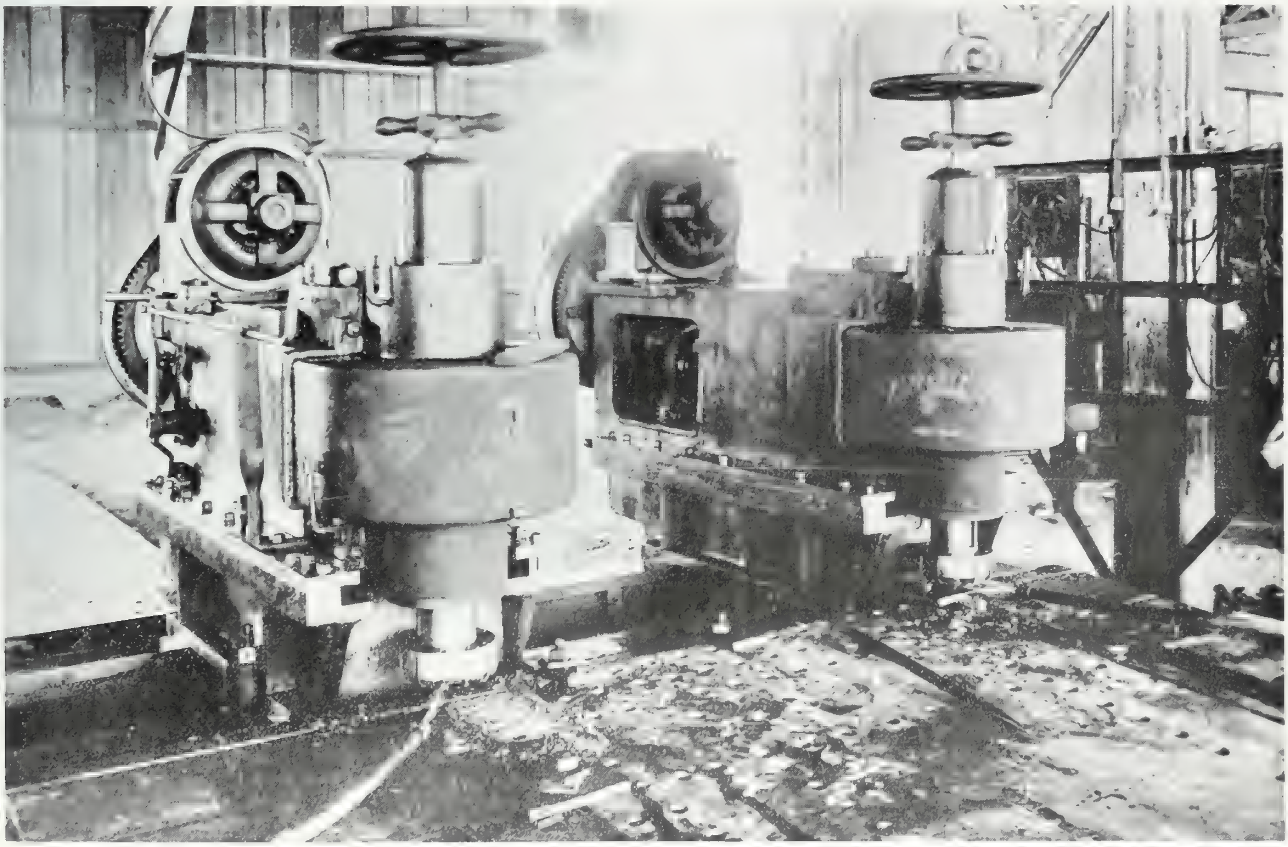
amount of time used in pulling plates and shapes together ready for the riveter and his gang. The toggle-jointed plate tightener shown is the strongest mechanical device that can be produced, and when made of proper proportions will do its work with a great saving of muscle and time.



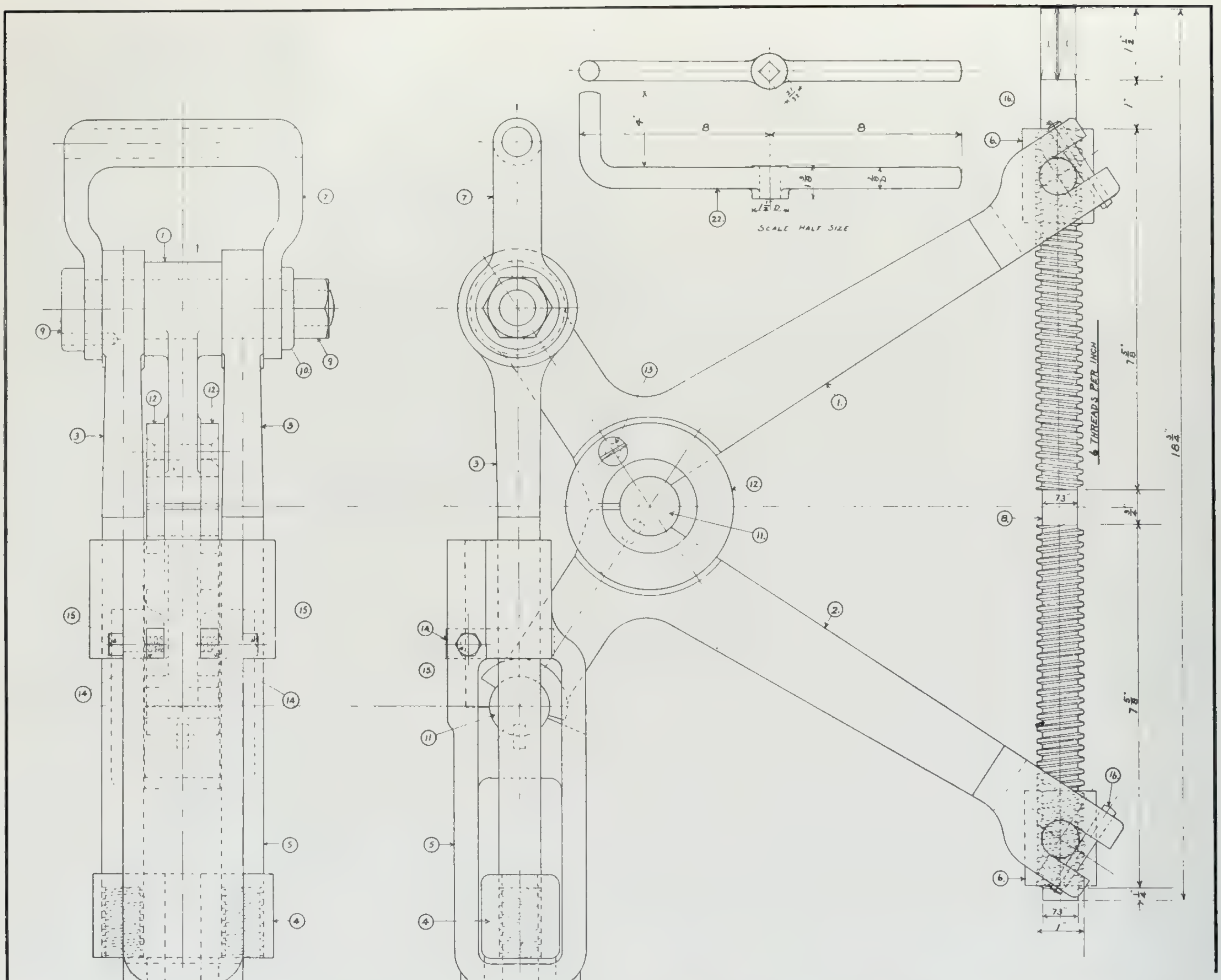
Liner rolls with furnace.

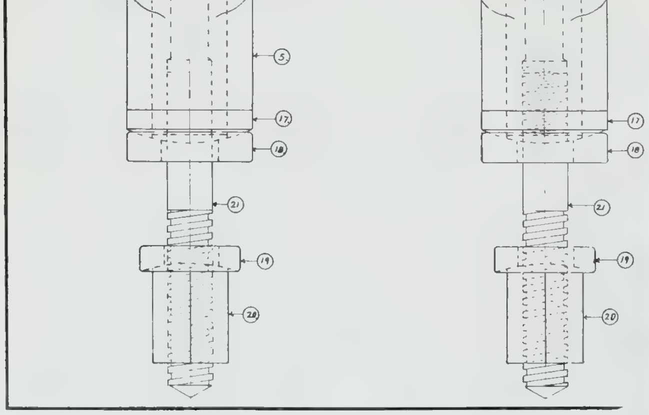
While the tools described above have helped production, there is still room for constructive thought for other appliances that will reduce the cost of construction so that this country may build ships at as low a rate per ton as any other.

A few suggestions will not be out of place, it is hoped, anent the much used and very useful tool called the punching machine. When this tool is received from the maker and about to be set in place, the first question to be decided is the speed at which it should be run, or the strokes per minute. If a motor is provided by the makers, the question is settled, as they invariably set the speed at thirty strokes a minute, which is about right for a 2-inch hole in a 1-inch plate, and there should

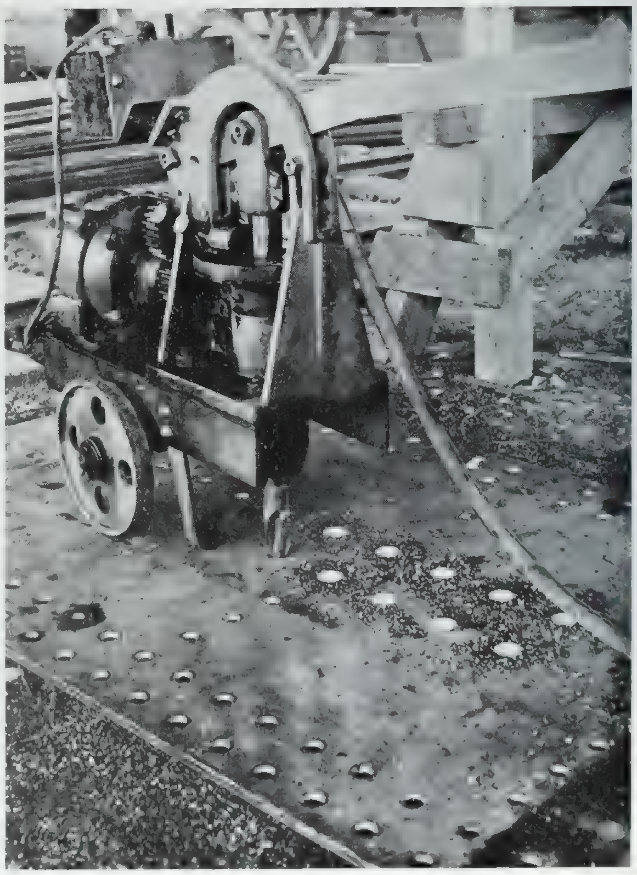


Double scarphing machine, specially adapted for the Isherwood system.





Upper: Plate pulling up device. Right: Portable electric counter sinking and drilling machine.



be one punch run at this speed in a four-slip yard. On this machine all 1-1/16-inch holes, and those above this size, should be punched. The speed of all other machines can safely run up to fifty strokes a minute, and if a lot of quarter-inch plate is used the speed can be sixty strokes a minute. There is always enough light work to keep this machine busy, punching liners, clips, ladder sides, etc.

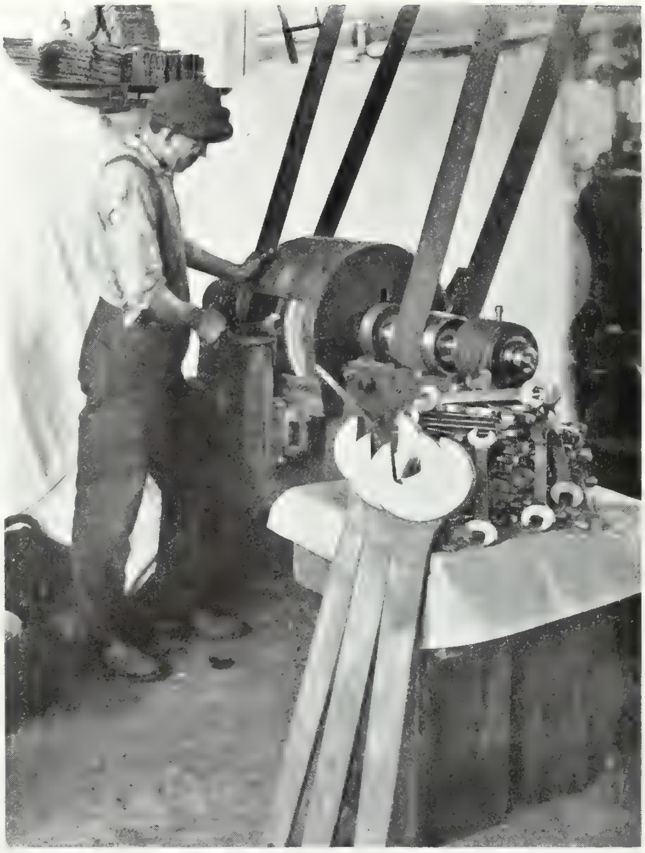
I know that many shipyards run their punches at or near thirty strokes a minute, losing good, useful time, and I believe that it would pay to make the change to the higher speed.

When running at these higher speeds it is absolutely necessary that there be a shock absorber with long springs between the trolley and the tackle.

DISC GRINDING

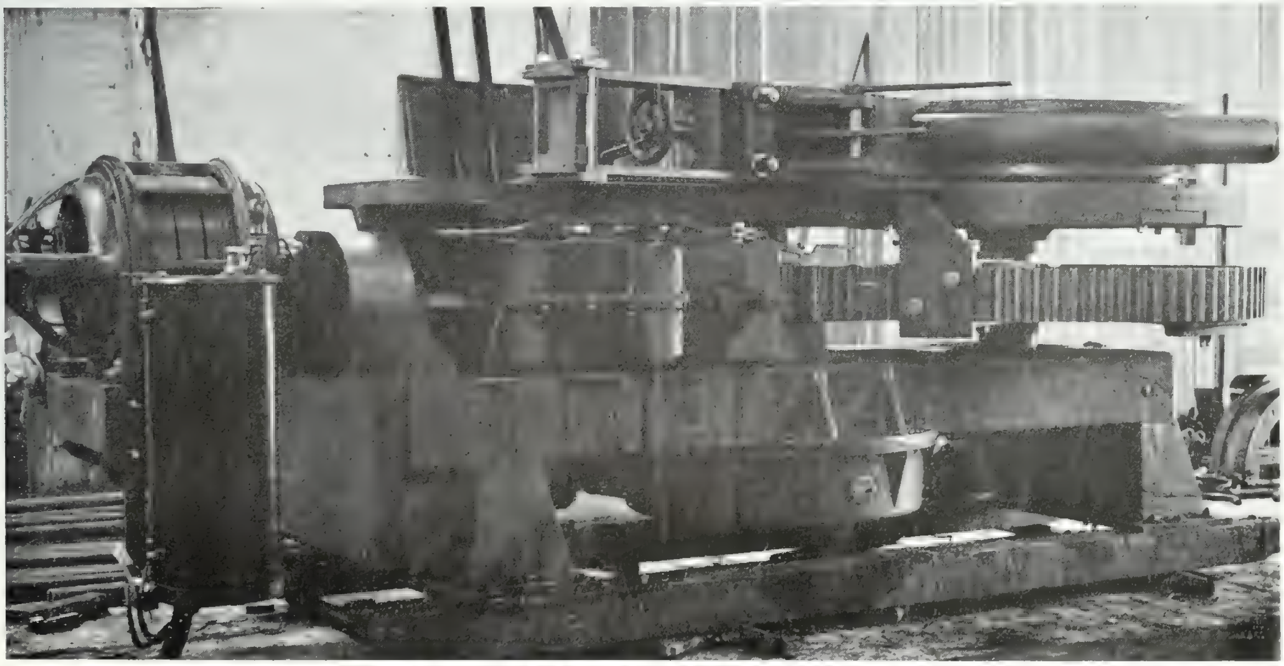
THE disc grinder has taken rapid strides, and although only a few years ago its uses and capabilities were comparatively little known, progressive manufacturers not only in America but abroad now are utilizing this type of machine tool to great advantage. Various kinds of disc grinders took a notable part in war-time manufacture, generally, in finishing automobile and motor parts, and, in particular, in finishing the base of shrapnel and high explosive shells.

The following is given as an illustration of the results obtainable on a modern disc grinder. The machine shown is a double-spindle disc grinder manufactured by the Gardner Machine Company of Beloit, Wisconsin. The two spindles which carry the grinding members, either steel disc wheels coated with abrasive grains or abrasive ring wheels held in suitable chucks, are mounted in sliding heads which move together when pressure is applied to either the foot treadle or hand lever. The wrench being ground is placed between these two wheels and the parallel sides are finished simultaneously. The double end wrenches shown in the photo are finished ready for polishing at the rate of eighty to one hundred an hour. It is necessary to take two cuts, the first to remove the scale from the forgings and reduce to approximate dimensions, the second to bring the parts to required thickness and leave suitable finish for polishing. In this case the forgings are very tough and the attempt to finish them so rapidly by any other means would present a particularly difficult problem to the maker. The large single end wrenches shown are finished on a different style of disc grinder, one face being ground at a time and three to four cuts being required to bring them to desired thickness and finish, due to the fact that excessive heat is generated when so large a surface is engaged too long with the grinding member.


Gardner Machine Company disc grinder

Power Pipe Bending Machine

THE San Francisco-built machine illustrated below will bend 3-inch to 6-inch pipe cold without filling. The working time required to set up the machine for any size pipe bend is ten minutes of one mechanic with a helper. The bending arm on the slow-speed travels at the rate of one revolution in four minutes. The bending time therefore for 6-inch pipe to a 90 per cent, 30-inch radius bend is one minute, speed of the return is double that of the working stroke, so that the total bending time is one and a half minutes. This machine will also bend 7 and 8-inch pipe at a temperature of about 900 degrees Fahrenheit. A 25-horsepower motor is used, and the complete machine weighs 26,000 pounds and occupies a floor space of 14 by 16 feet.


U. S. power pipe-bending machine, No. 2 Model

Oxy-Acetylene Welding in Hull Construction

By Charles C. Phelps

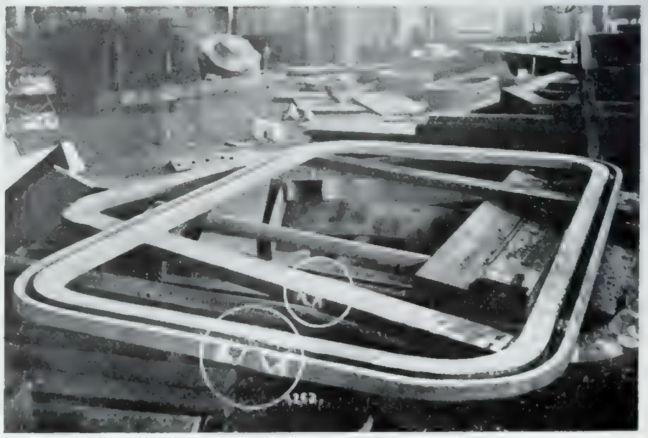
Open seam in mast, indicated by chalk line, welded by means of oxy-acetylene blowpipe.

ONE beneficial effect of the world war has been its modernizing influence on industry. American shipbuilding in particular has felt this influence strongly during its recent phenomenal growth. One of the modern industrial aids that came to be fully appreciated in shipyards during this period was the oxy-acetylene welding process.

Whether in a given case oxy-acetylene welding should be substituted for riveting, screw-jointing, bolting, calking, or a combination of these processes, depends upon a consideration of the various factors involved. Welding will frequently win out on a mere comparative first cost basis, but will often make a still better showing by its reduction of maintenance expense, by producing absolute water or oil-tightness, by avoiding the necessity of liners or packing, by eliminating gaskets and flanges in pipe work, by avoiding drilling, reaming, grinding and fitting, or by simplifying the design of interdependent parts.

In conclusion, some of the objects to which oxy-acetylene welding has been applied in other fields will be cited; these clearly indicate the reliability, efficiency and safety of the process: ammonia containers of refrigerating systems, which are subjected to extremes of temperature; compressed air receivers and compressed gas containers; Lib-

Fresh water tank with rounded corners oxy-acetylene welded.



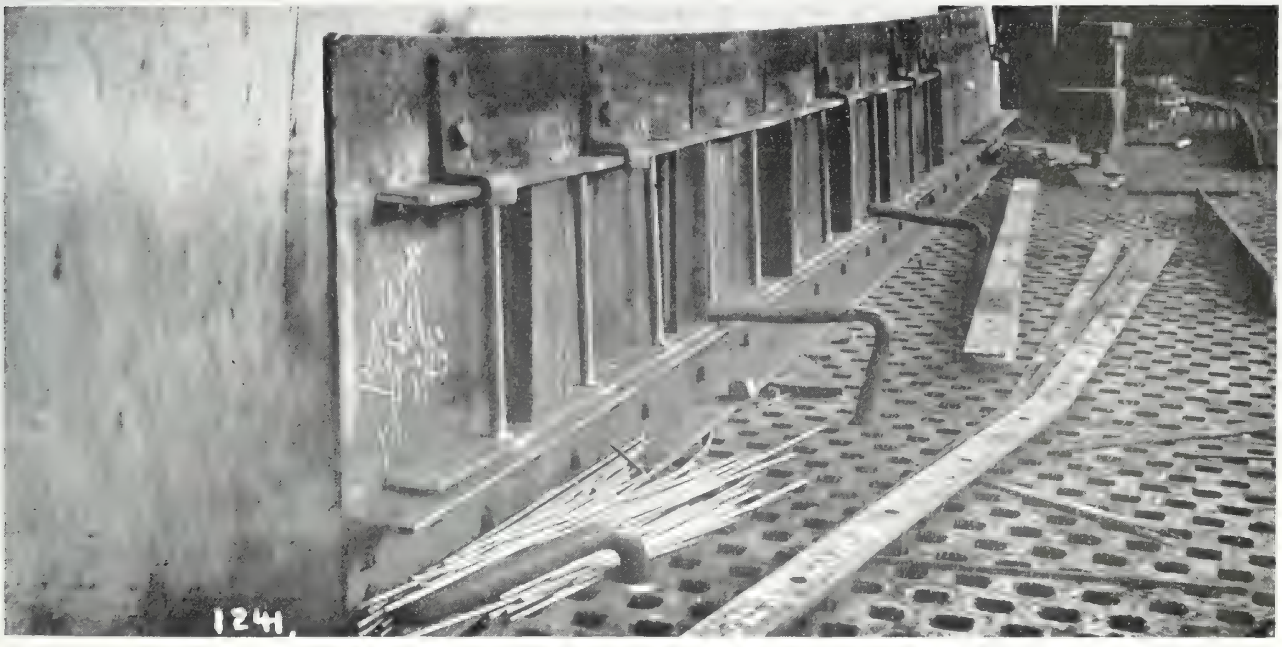
Top and bottom of welded hatch cover frames. Note the piecing out of the material on the upper frame.

Welding structural steel staples.

Split deck collar ready to be welded.

erty motors and many airplane parts, the failure of which would endanger aviators' lives; steam pipe lines, which are subjected to extremes of temperature and pressure; poison gas containers used in chemical warfare, the failure of which almost surely would lead to disastrous consequences; marine buoys, which must resist the corrosive action of the salt water and serve faithfully as sentinels to warn the mariner; various locomotive parts, the repair of which forms one of the most extensive applications of the process, and chemical plant installations which involve almost all possible physical and chemical extremes.

Those who know the oxy-acetylene process best have most confidence in it. So far as the quality alone of oxy-acetylene welds is concerned, there is no reason why they should not be applied to making almost any kinds of joints, as indicated by the present broad field of application. The sole remaining questions to be decided in each case are those involving expediency and relative costs.



Rungs of ship ladder welded with oxy-acetylene blowpipe.

What is Scientific Management?

By G. N. Somerville

THE word "efficiency" when applied to management in a manufacturing institution is usually looked upon with much suspicion by all concerned when first proposed. The stockholders and directors are inclined to think of efficiency in terms of dollars spent without return, and of the prospects of an army of clerks and other non-producing employes together with much red tape. On the other hand, the employe is inclined to look upon efforts in the direction of efficiency as a criticism of his work and an effort on the part of the employer to get more for the same remuneration.

That these viewpoints are not substantiated is proved by the many various and yet successful schemes of scientific management adopted throughout the Eastern manufacturing districts. Of course we are likely to hear the argument that we are not manufacturing in the same sense of the word as understood in such industries as the automobile, typewriter, adding machine, etc., but are constructing large machines and in much smaller numbers, and that scientific management cannot be applied to these endeavors.

Such an argument is entirely without foundation, because we have on the Pacific Coast today many shipyards and builders of ships' machinery who have realized the benefits of scientific management under just such conditions as are argued against us. It is nothing more or less than finding out the best and quickest way of performing each and every one of our daily routine movements and then adopting that method as a standard. After adopting a certain standard way of doing each of our duties, it becomes so firmly established upon our minds that we automatically and unconsciously perform more efficiently as time goes on. Scientific management is not the development of a single brain, but is the application of accumulated knowledge gained by years of experience, not only by the men who make a careful study of efficient means and efficient methods in manufacturing plants, but also by the army of employes who, being charged with the work of performing certain duties in our establishments, naturally make better time on the last of a batch of parts than on the first. Scientific management, therefore, simply means a method of gathering this data, compiling it and accepting the best methods as standard. It can be shown in many plants on the Pacific Coast that have not been favored with repetitive work that foremen's meetings for the purpose of thinking out ways and means of efficiently producing each and every component part of a completed machine have paid an enormous dividend on the time thus spent.

Records, another thing much tabooed and feared by the manufacturer about to embark on an investigation into the realms of scientific management, play an all-important part in the success of such an enterprise. Without properly-kept records, duplication of effort is unavoidable on every job, and it is surprising to note what a vast amount of information can be accumulated under the care of a single man on a set of cards especially designed for the purpose in hand. The manufacturer should know and his cards or records, in whatever shape they may exist, should show at all times the condition of his stock. It should also show him the money value represented, as well as the state of completion of the various parts, and this record is automatically kept without effort. The record should also show for what purpose the stock is ordered, its ultimate distribution, and final cost to produce or buy, as the case may be.

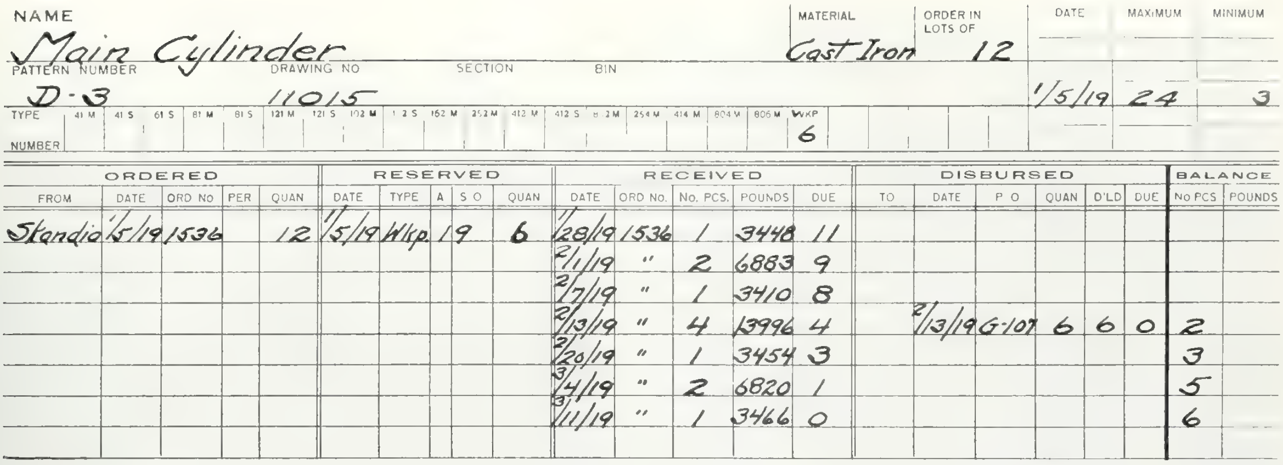
Figure 1 shows the record card desk in the order department of a progressive manufacturer in the bay district. The cards on the right side of the desk are used for the rough or unfinished parts previous to machining, and the cards on the left side are used for the purpose of recording the necessary records on finished parts.

Figure 2 shows a typical stock card which shows the name of the part, pattern and drawing number, material, standard order lots with minimum and maximum quantities. It also shows the number used on the various types of engines, in addition to showing on the main body of the card from whom ordered, the date of order, order number and quantity. In the second column under the heading "Reserved" is shown the disposition to be made of the parts ordered on the previous order number and the quantity so reserved. The receipts are shown under "Received," together with the dates, weights and balance due, and as disbursements are made from finished parts they are entered in the fourth column under "Disbursed," and in the fifth and last column, balance in stock and weight of same in the finished condition are carried out, showing at all times the amount of the available stock. The back of these cards is a continuation of the side shown in Figure 2.

To the uninitiated, these efforts may seem to involve a good deal of red tape, but stop for a moment and consider and you will agree that you make an unguided effort to get the same information, but in a "scatter-brain" fashion, and it must be conceded that this element of scientific management is nothing more or less than giving a good deal of thought and then adopting the best method of record keeping.

The same thing applies to machine-shop operations. It is possible by the use of shop clerks to save much of the superintendent's and foreman's time. Shop clerks can be utilized for the purpose of receiving orders from whatever department in the institution is charged with issuing same and by keeping in the shop office completed files of

Desk for card index records.



NAME Main Cylinder

MATERIAL Cast Iron

ORDER IN LOTS OF 12

PATTERN NUMBER D-3

DRAWING NO 11015

SECTION

BIN

DATE	MAXIMUM	MINIMUM
1/5/19	24	3

TYPE	41 M	41 S	61 S	81 M	81 S	121 M	121 S	102 M	1 2 S	162 M	252 M	412 M	412 S	8 2 M	254 M	414 M	804 M	806 M	WKP
NUMBER																			6

ORDERED					RESERVED					RECEIVED					DISBURSED						BALANCE	
FROM	DATE	ORD No	PER	QUAN	DATE	TYPE	A	S O	QUAN	DATE	ORD No.	No. PCS.	POUNDS	DUE	TO	DATE	P O	QUAN	D'LD	DUE	No PCS	POUNDS
Standio	1/5/19	1536		12	1/5/19	Wkp.	19		6	1/28/19	1536	1	3448	11								
										2/1/19	"	2	6883	9								
										2/7/19	"	1	3410	8								
										2/13/19	"	4	13996	4		2/13/19	G-107	6	6	0	2	
										2/20/19	"	1	3454	3							3	
										3/4/19	"	2	6820	1							5	
										3/11/19	"	1	3466	0							6	

Sample record card.

work to be done, in process, and finished. It is surprising how simple the work becomes and how much more time the foreman is able to give to the actual superintending of the production of the product of the plant, which, after all, is the duty for which he has been engaged. The big trouble with our Western manufacturers in the past has been that the superintendent and foreman have been allowed to make clerks out of themselves, whereas a man at a much smaller salary could relieve them of the detail work and the two together would turn out to be more than twice as efficient as the superintendent alone when obliged to perform his own duties as well as those of a shop clerk.

Let me again impress upon the reader that in the methods so far discussed we are not getting away from anything that may be considered standard practice in machine-shop management. We are simply dividing up the work in the most efficient manner. One manufacturing plant in the bay district, having promised delivery of an order for a large number of 120-horsepower marine engines, on a schedule of four a month, found that the adoption of the methods here described helped to attain a production of ten engines a month. One of the major reasons for this was the elimination of the clerical duty from the superintendent's and foremen's routine work. The clerical duties are easily performed by men highly skilled in such work, from whom little or no experience in machine-shop management is required.

Another opportunity to save considerable time and money is always present by the installation of automatic and semi-automatic machinery. Many manufacturers believe that this class of machinery is a luxury to be afforded only in industries where a sufficient amount of repetition work is available to keep the machine going indefinitely. Manufacturers of the Pacific Coast who have installed automatic and semi-automatic machinery are authority for the statement that this class of equipment frequently is found economical when as few as a dozen pieces of similar dimensions are to be machined. This is easily understood when we consider that the equipment furnished with such machines is so flexible that special rigging is not required, and, after the first pieces are machined, no further measuring is required, except the inspector's gauge where an inspection system is maintained. With automatic and semi-automatic machinery, it is possible for one or two men to operate from three to five machines, which results in a considerable saving to the manufacturer without undue exertion on the part of the employes.

Carefully thought-out shop arrangements, track facilities, crane service, store room arrangements, together with the details previously described, constitute efficiency in shop management. The only difference between the old rule of thumb methods in shop organization and the present much-discussed system of scientific management lies in the fact that we approach the subject from another angle; yet because some of the duties previously considered part of a certain employe's work have been taken from him and given to others, it is viewed by many as "red tape."

IMPORTANT TRADE ANNOUNCEMENT

THE Pratt & Cady Company, Inc., of Hartford, Connecticut, has opened a direct factory branch at 503-505 Mission street, San Francisco, with C. R. Mendelson as manager. Here will be kept a large stock of this firm's very complete line of brass and bronze, steel and iron, globe, angle, gate and check valves and asbestos-packed cocks.

The specialties manufactured by this firm include a double-seated bronze and iron gate-valve with renewable seats and reversible wedges, and a regrinding bronze and iron swing check-valve, on both of which repairs and replacement of parts can easily be effected without removing the valve from the line. They also manufacture an asbestos-packed cock in which the plug, carefully finished of standard taper and barffed, has no metallic bearing, but contacts only with an asbestos ring under the shoulder and asbestos strips held in U-shaped grooves in the body. These cocks, used as boiler and water column blow-offs, will stand up and give satisfaction where the ordinary ground-plug cock will fail.

This direct connection with the Pratt & Cady factory should be of great value to local marine engineers.

Daniel H. Cox, having resigned his position as manager of the ship construction division of the United States Shipping Board Emergency Fleet Corporation, has resumed his original business with the firm of Cox & Stevens, naval architects, marine engineers and vessel brokers, with offices at 15 William street, New York City.

The Biggest Marine Weld in the World

WHEN the huge 526-foot army transport Northern Pacific ran aground in a dense fog only 300 yards from shore, off Fire Island, Long Island, New York, on January 2, 1919, the readers of this periodical will recall the vivid newspaper accounts of the thrilling rescues of her 3000 passengers and the successful efforts of a fleet of tug boats in easing the steamship off the shoal sand and towing her into New York.

Nature of the Sternframe Injury

When the Northern Pacific was finally perched safely high and dry on the ways of a thirty-foot deep dryock in the New York navy yard, Brooklyn, New York, she underwent a "physical examination," which hardly required an expert to diagnose some of her injuries caused by the waves when she was stranded. Her interior machinery was badly disabled, and her turbines were thrown out of alignment. A great many of her plates were badly battered, and had to be replaced with new plates. In addition to this, the problem arose as to what should be done with her 26½-ton cast-steel stern frame, for just above the uppermost gudgeon the whole section of the sternframe was cracked through, the cross-section of the break forming roughly a triangle, each side of which was about two feet in length. A view of the broken sternframe is shown in one of the illustrations.

In handling this injury a mechanical repair was considered out of the question, and there remained only the alternatives of making a thermit weld, or of purchasing an enormously expensive new casting and installing it at a cost probably exceeding $50,000. Although the fracture was larger than that of any marine weld ever before made, the fundamental difficulties were not greater than those of many Thermit repairs of considerably larger size which are constantly being made in the steel mills. This process, therefore, was finally chosen.

Fracture in stern frame.

Cutting out fracture with oxy-acetylene torch to allow free flow of the Thermit metal.

General Explanation of the Thermit Process

To those who are unfamiliar with the thermit process, it may be explained that thermit is a mixture of aluminum and iron oxide. This mixture can be ignited by means of special ignition powder and on reaction produces superheated liquid steel and slag (aluminum oxide), at a temperature of approximately 5000 degrees F. This thermit steel is sufficiently hot to melt and dissolve any metal with which it comes in contact and amalgamates with it to form a solid homogeneous mass when cool. In making welds by the thermit process, the parts to be united are surrounded by a mold and the sections heated red-hot by means of a special preheater, after which the thermit steel is poured into the mold. Sixty-seven pounds of wax, six barrels of facing material and forty barrels of backing material were used in making the mold.

Suspending Crucibles in Position

The suspension of the two No. 10 automatic crucibles with their extension rings over the mold box was accomplished by removing a rivet from the hull of the ship on each side at about ten feet above the top of the mold box, and inserting eyebolts in these holes, from which chain hoists suspended the crucibles, as shown in the illustration.

The crucibles were held steadily in place by removing two additional rivets, about two and one-half feet apart, from each side of the ship at the height of the crucibles and lashing the crucibles against the hull by means of steel wire cable fastened around the crucibles and run through the rivet holes into the ship where they were tied. The base of each crucible was rested on two angle iron rails laid across the top of the mold box. Each crucible was steadied by iron pipes braced between the crucible and platform. When in place each crucible was filled with 700 pounds of thermit, making altogether 1400 pounds. Bricks were lined around the crucible extension rings.

As extra heat and fire precautions, asbestos was wrapped around the chains holding the crucibles, and asbestos sheets placed between each crucible and the hull of the ship. Molding sand was scattered over the platform to prevent its catching fire.

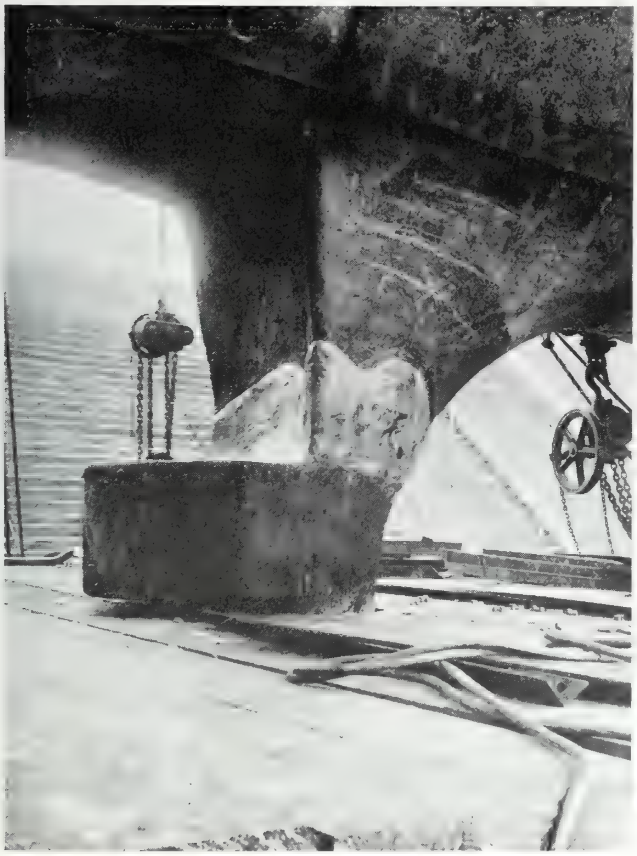
Preheating the Mold

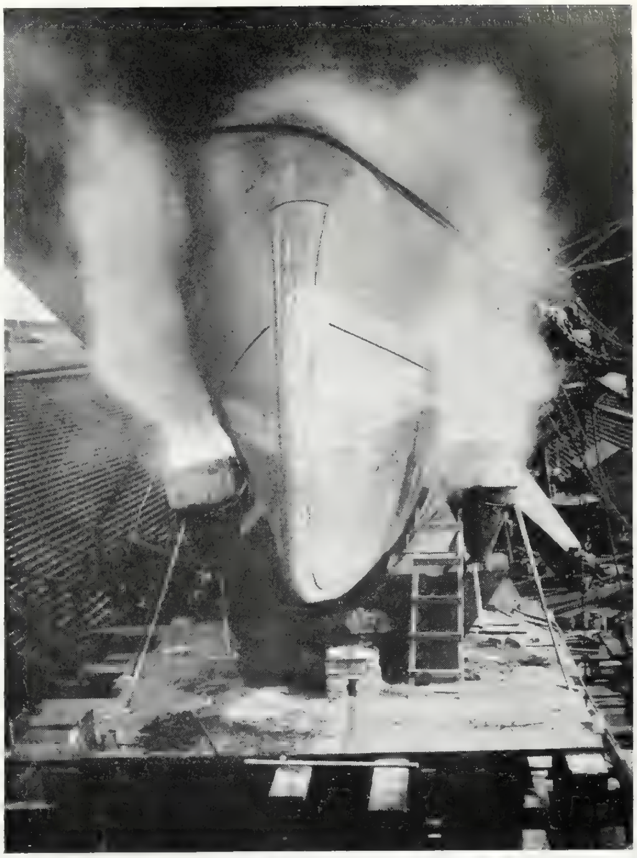
At 8:15 a. m. on the day of the reaction, the operation of preheating the mold was started. The object of preheating was for the purpose of drying out the mold, burning out the wax pattern and for heating up parts of the steel at the location of and adjacent to the weld in order to secure a uniform contraction on cooling. Two gasoline and compressed air preheating torches were directed through the sides of the mold box, a third down through the riser opening in the interior of the casting.

The preheating was kept up steadily for seven hours. By 3:15 p. m. the broken sections had developed a very bright heat. Pressure was then turned off and the heating gates on the sides of the mold plugged up with clay.

The Reaction

As the time approached for setting off the reaction, the impending "fireworks" attracted the attention of several hundred naval officers, sailors and civilian employes, and the steps at the end of the drydock served as a great amphitheater for the audience.


Finished weld.


The Thermit reaction.

Both crucible reactions were set off simultaneously by stationing a man on a ladder at each crucible. At 3:30 p. m., on a signal, each man ignited with a red-hot rod the teaspoonful of ignition powder which lay on top of the thermit; then, as the reaction started, jumped down and retired to a safe distance.

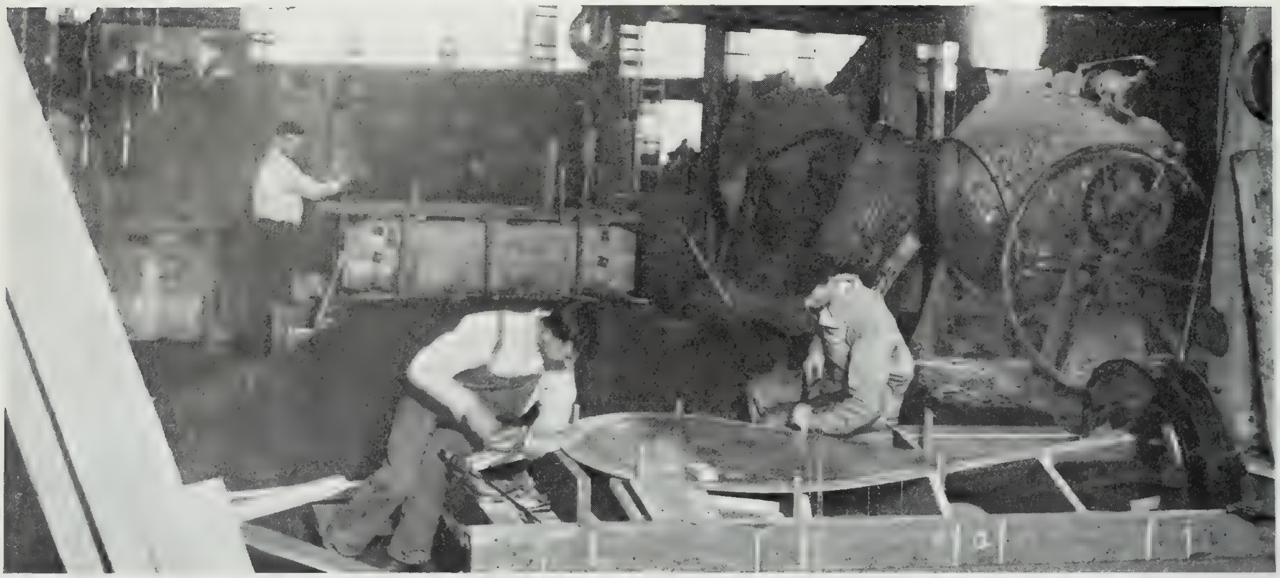
About forty-five seconds was allowed for the liquid thermit steel to form from the reaction, after which time the two assistants tapped the crucibles by knocking up the tapping pins with long iron rods, thus allowing the molten steel to escape into the mold. The platform had been well sprinkled with sand and there was no danger from fire. The stray pieces of aluminum oxide slag were quickly covered with sand and rendered harmless.

The weld was allowed to anneal itself by cooling slowly, the mold box not being dismantled until the following day. When the molding material was finally cleared away, the risers and gates cut off with an oxy-acetylene torch and the weld examined by chipping off pieces of metal, the thermit steel was found to be of a fine quality and appearance. The weld was then accepted by the navy yard representatives as being entirely satisfactory.

Time Consumed in Making Repair

The total number of fourteen working days taken to complete the job does not by any means represent the average time consumed for making sternframe welds. The other repairs on the Northern Pacific had destined her for almost four months' confinement in drydock; there was, therefore, no hurry on the sternframe weld. Furthermore, this repair required extra time in the unusual preparation of erecting a high scaffolding and platform, and in the delay occasioned in preparing the interior of the casting.

New Brass Foundry at Moore Yard



Setting the propeller blade pattern in the mold, brass foundry, Moore yard

A BRASS foundry with a capacity for casting two 4000-pound manganese bronze propeller blades a day is the latest addition to the plant of the Moore Shipbuilding Company in Oakland. This new unit of the shipyard is housed in a galvanized corrugated-iron building. The foundry was designed to produce two tons of castings a day, but the production from the first exceeded that amount, and it was found necessary to enlarge the building, the additional space being used for a place to clean and store castings.

The efficiency of the new brass foundry is due in a great part to the new and modern equipment. This high standard of equipment is carried out in the entire brass foundry installation. The work bench is fitted with the latest air apparatus for releasing patterns and cleaning castings. In order to cast heavy bronze propellers, a modern ten-ton electric traveling crane was installed. There are three Swartz furnaces, two of them being sixty inches and one thirty inches in diameter. The foundry has two core ovens—one of brick, six by twelve feet by eight feet; the third, a small sheet-iron oven. In the cleaning department there is a wet-rumbling barrel, a spruce cutter, several emery wheels, pneumatic hammers and other modern furnishings.

This up-to-date equipment would fail of its purpose if a high standard of workmanship and material were not maintained. To insure the best results in casting propeller blades, only virgin metal is used by the Moore Shipbuilding Company. Test bars from the propeller blades cast show tensile strengths ranging from 64,500 to 69,300 pounds a square inch, with elongation from 43 to 46 per cent in two inches. This is considerably higher than the requirements of the United States Shipping Board, which exacted a tensile strength of 55,000 pounds a square inch.

Lifting a blade casting from the mold, brass foundry, Moore yard

Pacific Coast Rolling Mills

An Historical Sketch

By Robert Hatton

Part II

IN the first installment of this story I endeavored faithfully to portray the story of the old Pacific Rolling Mills at the Potrero. The present installment will deal with all the later rolling mills that have been started on the Pacific Coast of the United States. The processes of reducing iron ore and making steel, and then of rolling or by some mechanical operation producing the required shapes in that iron and steel, are fundamental to all the engineering arts and underlie all our great industries. This fact should be recognized by all the business men of the Pacific Coast, no matter what their line of endeavor may be. And these men should all be willing to make slight personal sacrifices in order that these foundation industries, which are so vital to the manufacturing life of this coast, may be maintained here. If our business men can see their own and their neighbors' affairs in this light, we may hope for a great growth in the future. If not, it will be the same story over again.

Three of the rolling mills, whose beginnings are hereinafter described, are still operating. These are the Judson Iron Works at Emeryville, the Pacific Coast Steel Company of South San Francisco and Seattle, and the Llewellyn Iron Works at Torrance, Los Angeles. In all three of these mills extensive alterations are under way, and this series will be continued with a special story on each of these important plants.

The Southern Pacific Mill

In 1877 the Southern Pacific Railroad erected at their car shops in Sacramento a twelve-inch train to roll iron for the exclusive use of the railroad company. Mr. Steve Uren, the superintendent of the shops, a jolly old fellow, was the builder, and he built it from a blacksmith's point of view. The head roller was Mr. James Backrath (a companion of the writer in Chicago in 1871 and throughout our lives). He has been but lately pensioned. The first train being insufficient, a second one was installed, and in 1899 a twenty-inch train was added. Coal was used for heating, followed later by oil. The tonnage was light. The mills are still in operation, but not to any great extent. The writer visited the mills in 1878 and saw Mr. Backrath rolling two-inch by hand, three-high rolls. They were comical looking rounds, flat on four sides and made from five-inch hammered scrap. The day's run was five heats with one furnace, and the tonnage that day was eighty bars, or 14,000 a shift. A few days before the writer had rolled on two-high rolls at the Pacific Rolling Mills 480 bars of two-inch rounds from a six-inch box pile, working three coal furnaces with a total tonnage of 80,000 pounds, with only one boy helper. (Not a bad day's work on hand rounds. It would be a stiff job for any roller at the present day.)

The Judson Iron Works

In the year 1882 Mr. Egbert Judson, a well-known capitalist, commenced rolling iron. The builder of the mills was Mr. Napoleon Beauregard, commonly known as "The General." He was so nicknamed by Mr. Brunner of the Pacific Rolling Mills. The General was the first roll-turner on the Pacific Coast, and had a good deal to do with the building of the Pacific Rolling Mills. He was a very clever and ingenious mechanic. He erected the buildings for Mr. Judson and installed three trains of rolls—two ten-inch trains and one sixteen-inch train, with additional stands for rolling tack plate.

Five coal furnaces were built on the same plan as those of the Pacific Rolling Mills. The plan of operation and tonnage was about equal. Oil was soon substituted for coal, and the output materially increased. The Judson Iron Works in its entirety is a large and important plant, and has enjoyed a fair measure of prosperity, but like the Pacific Rolling Mills, suffered from lack of local patronage. Iron bars had been the principal product made from old scrap iron mixed with a large percentage of steel scrap and rails; but lately they are rolling steel bars from steel ingots, which are cast at their open-hearth furnaces on the Potrero, San Francisco. Many of the workmen had learned their trade in the Pacific Rolling Mills. The tonnage has never been very high, averaging probably 40,000 pounds per furnace. At the Judson works was rolled the widest flat bar in one set of rolls, viz., twenty-four inches wide. They also made a specialty of rolling tack plate. Two open-hearth furnaces have been built and supply all the steel required.

Booth's Mill

The fourth mill was located at the foot of Market street, Oakland, about the year 1880. It was erected by Mr. Booth, an expert cut-nail maker. Two twenty-inch trains were installed. The material used was old iron rails, rolled to 12-inch by 2-inch thick "slabs," and rerolled to all sizes of cut nails. No other product was ever rolled. For a while the mills were operated successfully. Steel plates were eventually used and wire nails were rolled, but after a few years' run the mill was closed, principally from lack of patronage. It was another case of not patronizing home industry.

California Industrial Company

The fifth mill to arise was the one in Los Angeles, known as the California Industrial Company. The date of the erection of this mill is not known to the writer, but it was probably in the early eighties. It was originally designed for rolling plate iron and sheets, but owing to its distance

Mechanical force at the Portland Rolling Mills of the Pacific Hardware and Steel Company taken in 1904 in the old apple orchard at the rear of the mill.

from trade centers and shipyards, it did not run very successfully. About thirteen years ago Mr. N. A. Becker took charge of the plant and made a radical change, and since that time merchant bar-iron has been the product. The mills have frequently been idle for considerable periods. This is to be regretted, as it is, or was until recently, the only rolling mill south of San Francisco, and Los Angeles is certainly in need of large industries in order to find employment for the men of its vicinity. This mill has been enlarged of late years and open-hearth furnaces erected, and all varieties of steel bars and shapes are rolled.

Ayer's Mill at Portland

We will now leave California for a while and tramp to Portland, Oregon. In 1892 Mr. N. E. Ayer, a Portland capitalist, decided to enter the iron industry and enjoy the "luxury" of owning a rolling mill—incidentally to make a lot of money—and he did so.

Like many other monied men, he did not know anything about operating a rolling mill—at least not that the writer could ever discover. Before he got through, however, he became better acquainted with the art of rolling iron, and also with the ways of rolling-mill men. Mr. Ayer chose for the site of his mill a very pleasant place of four or five acres, bounded on one side by a fine old mixed orchard and on the other by the county road leading from Portland down along the Willamette River to the junction of the Columbia, being surrounded by beautiful scenery. It was about ten minutes' ride by car to the center of the city. Mr. Ayer bought two old trains somewhere in the East and shipped them out West. Two pairs of shears, some rolls, a drill press and one coal furnace comprised the entire plant. Of course there was a building and 12-foot by 12-foot office. One train was a three-stand sixteen-inch two-high mill; the other was a nine-inch train of four stands. It was one of the oldest mills in existence, such as our grandfathers used along the Ohio River or in Wales seventy-five to one hundred years ago. A Mr. William Nevigold was the first roller. He was assisted by his sons. There was but one furnace, heated by coal, with a capacity of eight to nine tons a shift. The mills were idle as often as they ran, but in 1899 Mr. Ayer, having learned something about the rolling mill business, made some radical changes. He was fortunate at this time in having in his employ a Mr. James Sharp, who was one of the best coal, oil or gas furnace heaters on the Pacific Coast. He learned to heat in the Pacific Rolling Mills under Mr. Thomas Hatton. Mr. Ayer placed Mr. Sharp in charge, who, with the aid of a few Russian and German laborers (who had never seen a rolling mill before), built the first oil furnace in the Northwest. There was not a mechanic in the mill. The blacksmith, a Russian, was the only handy man in the place, other than the engineers. Mr. Sharp set about building the furnace according to his own practical ideas, principally from the wreck of the old one. The oil burners were entirely home-made, of a very simple but effective style. "Home industry" certainly prevailed, and in a short time the mill was running again successfully. Oil heating had proved a success in San Francisco and Oakland, but it was doubly so in Portland. Mr. Ed. Murphy, an old pioneer, was the heater, and he made it work. In a few weeks the output, which never had risen above nine tons with coal heating, was increased to 40,000 pounds. Mr. W. Kitto and Mr. Robert Hatton were the rollers—both men of large experience in rolling-mill work in the Judson and Pacific Iron Works, respectively. The output increased rapidly until, to Mr. Ayer's gratification and delight, it reached twenty-five to thirty tons of first-class, finished iron a day. No steel was rolled or used except some old steel rails rolled for track or flat mining rails. A good scale was paid and the men, as well as Mr. Ayer, enjoyed a number of years of prosperity. The base rolling price was seventy-five cents a ton on the bar mill. In 1904 Mr. Ayer, to the regret of his workmen, sold his mill to the Pacific Hardware & Steel Company. The sixteen-inch mill bedplates were all broken and the stands rocked like cradles. Sometimes they were propped up until the turn was finished. The Pacific Hardware & Steel Company soon found that a new bar mill was an absolute necessity, and a new sixteen-inch train was ordered and installed at once. It was a good three-high train. The old nine-inch train was not changed. The output of the mill increased until the nine-inch train had a record with one furnace of 75,000 pounds of three-quarter-inch finished rounds made of four and one-half-inch iron box piles. With two furnaces the record was 125,000 pounds of the same order. The 70,000 pounds of finished iron a day was at that time the largest tonnage for any iron mill in the United States, but it cost too much to make new iron. The scrap was busheled and baled at the squeezers, the next night reheated and rolled to stock bars; the next day cut and piled and reheated and rolled to finished bars. The writer endeavored to have this plan altered, but did not succeed, and it ran along in this wasteful manner for a few years. In 1911 the plant was sold to the Pacific Coast Steel Company and closed down and dismantled. Mr. Arthur Callan was the last manager, and Mr. August Hein was the roller. The mill was very pleasantly situated and the most cordial relations existed between the employers and workmen. The closing of the mill was never mentioned in the newspapers.

Oswego Mill

About 1890 an attempt was made to start a rolling mill at Oswego, about eight miles south of Portland, on the banks of the Willamette River. Someone went prospecting and located iron ore back in the tall timbers. Mr. W. Ladd, a leading banker of Portland, took the matter in hand. He built a blast furnace to smelt the ore. It was the only blast furnace ever built for that purpose on the Pacific Coast. A light railroad was laid to the ore beds, and in due time the ore was tested out, but it proved to be a very inferior grade, and the project was abandoned. Had the ore proved to be of good quality, there would undoubtedly have been a large rolling mill there today; in fact, the officials of the Pacific Rolling Mills were scared for a time. The furnace and part of the squeezer are still there, for all the writer knows to the contrary. It was an ideal site for a rolling mill. A large foundry for cast iron pipe now occupies the site.

Judge Wilson's Mill

The eighth mill to come into operation was located at Lake View, Washington, a few miles from Tacoma. It was a very romantic spot, surrounded by tall pines—hardly the place to look for a rolling mill. The plant was owned and operated by Mr. E. M. Wilson, or the "Judge," as he was universally designated by all who knew him. Contrary to all the other "mill proprietors, presidents, secretaries, etc.," on the Pacific Coast, Mr. Wilson was thoroughly familiar with rolling-mill work. The mill was an old one, brought from the East. It was similar in character to Mr. Ayer's mill in Portland, but in much better condition. There were two trains—one nine-inch train and one sixteen-inch three-high bar mill—and both trains were in fair condition.

Nothing but scrap iron and old iron rails were used, but there was no reheating and rerolling in that mill. Everything was rolled direct to finished bars, as far as possible. Everything that passed through the finishing rolls was paid for. At that time up North everything was accepted. The output was never large, and, so far as the writer is aware, coal was the only fuel used for heating. But this was the forerunner of a greater project, as will be related presently. The mills being in an out-of-the-way place, it was difficult to keep first-class men there, but it enjoyed a fair measure of prosperity, and a good scale price was paid to the men. In the year 1905, Mr. Wilson, who at all times managed the mill himself, and in a very able and active manner, concluded to move the plant to Seattle. He rebuilt it on the west side, and called the place Youngstown, so named after his home town in the East. In Seattle an addition was made. An up-to-date twelve-inch mill was installed, oil-heating furnaces were built, and in a few months the mills were running very smoothly. The twelve-inch train was originally intended for reducing steel rails of a large section to small sections for mining purposes. Mr. John R. Davies of Colorado was the roller on the twelve-inch train, and Mr. Wolfe on the nine-inch train. They were both very efficient men.

Reducing steel rails was soon abandoned, and for some years the mill has been engaged in splitting steel rails into three pieces, and rolling each piece into corrugated squares and rounds, etc., for reinforced concrete buildings. This is done very successfully and profitably. The other two trains are used for merchant bars.

Busheling scrap is engaged in to obtain slabs or stock for the merchant iron.

It is gratifying to know that the mills are still running successfully, and it is hoped they will continue to do so. The mills are under the management of Mr. Birt and Mr. T. S. Clingan.

For some time past the demand for steel bars exceeded that for iron, and it was necessary to obtain steel blooms and billets, so steel blooms were shipped from South San Francisco to Seattle for rerolling into finished bars, but that method proved too slow and costly, and eventually, to meet the demand for steel in the North, open-hearth furnaces were built, and a twenty-two-inch train was installed. For the past year the plant in Seattle has manufactured its own steel ingots and rolled all the steel finished bars required, thus taking care of its own territory. The sixteen-inch train in Portland was shipped and installed in Seattle, reserving the old bar mill for rolling iron scrap to stock for finished iron bars.

North Beach Mill

During the early nineties a small mill, consisting of one train of rolls, was installed at the North Beach, San Francisco, near the spot where in early days we used to spend the day in visiting the monkeys and the Cobweb Man and his saloon. The mill has never been a competitor to any great extent in the steel trade. It is used to roll small angles, chiefly for iron-bed manufacturers. Steel rails are used exclusively. They are split and rolled direct to the various shapes and sizes required by the trade.

Port Townsend Mill

We must tramp away North again—this time to a very out-of-the-way place indeed, viz., Port Townsend, Washington. In 1910-1911 a rolling mill plant and open-hearth furnace were erected, but had a very brief career, and were so entirely out of the way that accurate information of its operations is lacking. It was fully expected that a large steel industry would have flourished there, but after a brief run—too brief to demonstrate what might be accomplished—it was closed down and, passing into the hands of a receiver, was dismantled, some of the machinery being shipped to Seattle and some to South San Francisco.

Pacific Coast Steel Company

Back to California again, and to a very different place and climate from any other that we have so far described. The locality is called South San Francisco, nine miles south of the city of San Francisco, and lies directly in the wind and fog belt of Colma and the ocean, making a delightfully cool place for a rolling mill site.

Here is located the eleventh rolling mill. It is known as the Pacific Coast Steel Company, of which the Seattle Rolling Mill plant is a unit, and it bears out the statement previously made that the old Lake View mill was the forerunner of greater things. It is doubtful if Mr. E. M. Wilson, or Mr. William Piggott, ever anticipated such an important combination when they engaged in rolling iron at Lake View and later when they organized in Seattle. This most important plant was erected in 1911, and operations commenced in November of that year. It is an up-to-date plant, devoted at present exclusively to the manufacture of new steel from old steel, iron scrap and rails, which are cast into ingots 10 inches by 10 inches in size, each ingot weighing about 1500 pounds. These ingots are reheated in a large, continuous furnace, rerolled to smaller sizes, and cut at the shears to any weight required by the finishing mills. At first but one open-hearth furnace was built, followed soon after by another. The furnaces were built under the supervision of Mr. James Early, an experienced steel maker. Mr. Early was in the employ of the Pacific Rolling Mill Company for a great many years, and has been the superintendent of the open-hearth furnace department with the Pacific Coast Steel Company from the beginning. The rolling department at first consisted of an eighteen-inch train of three sets of stands. The first set or roughing was used for blooming the ingots, which at that time were only 8 inches by 8 inches, weighing about 800 pounds each. A very good grade of steel was cast and rolled, principally to squares and rounds for reinforced concrete buildings. The other mill was a ten-inch train of five sets of stands. Two Swindel furnaces of the continuous type were built, one for each mill. The eighteen-inch mill was equipped with all the latest improvements for charging and drawing the ingots. Raising and lowering tables were operated by two men only, one on each side.

The ingots are reduced to a three-inch billet, as a rule, and cut to length to suit the ten-inch train. The tonnage of the ten-inch train averaged for some time about forty to fifty tons a shift, but it has been largely increased of late. A third open-hearth furnace was built to meet the increased demand for steel. If one furnace is to be repaired, there are always two in operation. Every ingot is fully tested by the chemist, and after the finished bars are rolled, short pieces are taken and tested by cold hammering, bending and twisting into various shapes, under the inspection of competent inspectors for the contractors, thus insuring that no imperfect or faulty steel is shipped.

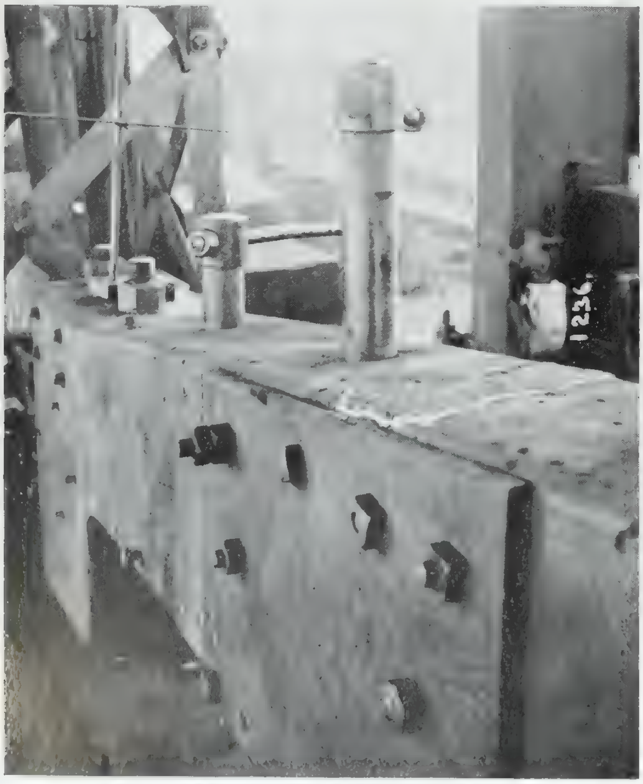
Llewellyn's Mill

We now come to the last mill, which makes the number a round dozen. We refer to the new mill erected by the Llewellyn Brothers of Los Angeles. The Llewellyns are an old and highly respected firm in Los Angeles. They are Welshmen, as their name implies (four l's, if you please), tracing their lineage back to the last King of Wales. The mill was erected in 1916 and commenced operations the beginning of 1917. It is located at Torrance, near the city of Los Angeles. The plant consists of four trains in all, as follows: One eight-inch straight train, with a four-door furnace; one twelve-inch train with fourteen-inch roughing, separated from the other stands with a Laughlin continuous furnace; and a twenty-two-inch train for blooming, with eighteen-inch finishing attached—both trains driven by a powerful motor, served by a Laughlin furnace. All the furnaces are heated by gas. The open-hearth department comprises two furnaces of forty tons' capacity a cast. The plant is run on two nine-hour shifts.

Massive Shipyard Machine Successfully Welded by Oxy-Acetylene Process

IN the rush to build ships to beat the Hun, shipbuilders picked up what equipment they could buy and worked it to the limit—and often beyond the limit! Then came the oxy-acetylene welder's opportunity to rescue the broken machines from burial in the scrap pile.

A large boiler plate planing machine that went through such an experience is shown in the accompanying illustration. The planing machine was originally built in Scotland and had seen long service before it was purchased second-hand by an American shipyard. The break occurred in the solid cast-iron arch member which contains the screw clamps that hold the work securely in position on the bed of the machine. The bed is shown in the left foreground; the planing cutter is not shown in the photograph, being on the opposite side of the arch. The massiveness of the arch member is indicated by its span, which is thirty feet over all. The arch legs are each a foot in length at the base, leaving an opening beneath the arch twenty-eight feet in length. The break occurred about five feet from the end, and is indicated by chalk marks on top of the arch. The depth of the arch member at the weld is seventeen inches and the width ten inches, making a total cross section of 170 square inches of welded metal.



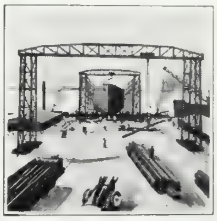
Weld in the arch of an old plate planing machine.

The planer has seen many months of hard service since the repair was made, and in fact it was planing a one and one-half-inch steel boiler plate at the time the photograph was made. The welding was done with Oxweld equipment. One hundred and twenty-five pounds of cast-iron filling rod was added after preheating the broken parts in a charcoal fire.

Another interesting repair was made on the driving pulleys of the same machine. In cutting an opening in an overhead platform, through which to pass the belt from an electric motor to the driving pulleys, the Oxweld cutting blowpipe made such a clean cut that the part cut out fell before it was expected to do so and broke the rims of two pulleys directly beneath. This accident, however, was of little consequence, as the rims were easily oxwelded and are as good as new.

George H. Thacher & Company, the well-known propeller manufacturers of Albany, New York, have merged their interests into the Thacher Propeller & Foundry Corporation. Under this reorganization they will largely extend their plant at Albany and will specialize in the casting and finishing of propeller wheels for steamships. Offices are to be opened in New York, Chicago and London, and the business will be made international. The plant at present employs 165 persons; the new plant will occupy nearly four acres and employ about 500.

Material Handling



Freight-Handling Machinery in Terminal Sheds

By T. Fred Sowers

MUCH attention has been focussed on ship-unloading machinery, while the importance of mechanically handling and disposing of goods inside the freight sheds and warehouses on the docks has been overlooked.

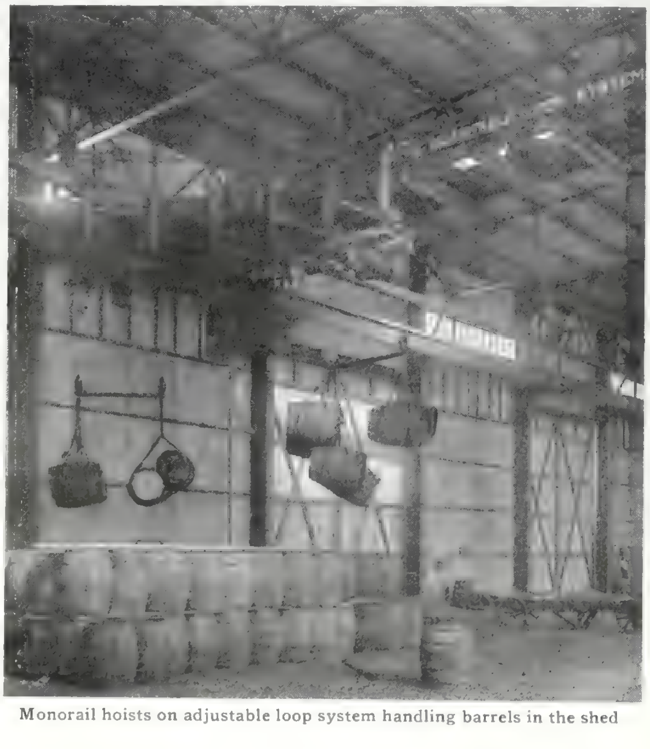
Cargoes of miscellaneous freight can seldom be unloaded directly from ships into freight cars, drays, terminal sheds or warehouses for long-time storage. A considerable amount of rehandling is necessary and this work is carried on to a large extent inside the terminal shed, where goods are temporarily stored. The objects sought in layout of terminal sheds are: Rapid removal of goods from point of deposit, placing in the shed so as best to use the entire shed area, and accessibility in removal for reshipment.

The most efficient results can only be secured by co-ordinating the shed design to the design of the whole terminal, and laying out the shed in the beginning to accommodate overhead machinery with the definite aim of getting the most out of it. The shed layout involves, among other things, consideration of location, shape, height, structure and adaptability to the installation of machinery. A long, narrow, one-story shed built in one bay seems to offer a better arrangement than a short, wide one of two or three bays. If the pier or quay is long enough to berth more than one ship, the long shed is essential for rapid disposal of two cargoes unloading simultaneously. Such a shed, built to a considerable length, need not be made wide to accommodate a heavy tonnage, as by the use of overhead machinery the otherwise wasted air-space can be used, and the shed cost be kept down, because a narrow shed is obviously cheaper than a wide one of the same length, even if it is higher under the roof trusses. With overhead machinery, also, a long shed offers no obstacles to the rapid transfer of goods from one end to the other.

If, on the other hand, the pier is only long enough to berth one ship at a time, considerations of cost and convenience again seem to warrant the selection of a narrow shed of moderate height rather than a low, wide one of two or three bays, for the reasons mentioned above. Where storage space is of prime importance, the high, narrow shed with overhead machinery that admits of stacking the goods suggests possibilities of getting two or three times the goods in the same floor area. Furthermore, the lengthwise movement of goods with the specialized types of overhead machinery now available is quicker and easier than lateral movement between bays, as the latter involves the more or less slow transfer bridge system.

If sheds are arranged for any type of overhead machinery, they should be built high enough so that there will be adequate head room for tiering such commodities as can be stacked. Consignments of large numbers of duplicate bags, boxes or barrels in one order can be almost always stacked to great advantage with overhead machinery, thereby saving a great deal of floor space. If stacking is carried up to fifteen feet, it is obvious there should be space enough over this for the overhead machinery to pass when loaded and for proper clearance both below the hoists and between the hoists and roof trusses. With the sheds of the long, narrow type, adding a few feet to the height of structure adds proportionately little to the cost and a great deal to the usefulness of the shed.

Devices for handling miscellaneous freight in terminal sheds may be divided into three classes—conveyors, storage battery, trucks and trailers and electric hoists. Terminals handling large numbers of cargoes of standardized products, where cases or packages in great quantities are exactly the same, may in many instances find great service for conveyors. Many terminals have worked out conveyor systems which are marvels of efficiency in rapid handling. Coastwise or river steamers that have entrance in the sides of the vessels can fre-



Monorail hoists on adjustable loop system handling barrels in the shed

Monorail hoists handling miscellaneous freight in net slings

quently make excellent use of conveyors directly from vessel into shed and stacking in shed in the same operation.

Trucks and trailers are increasing in use and have a place in nearly every port and terminal because of their ability to go everywhere—through doorways, in and out of railroad cars and even up inclines of considerable grade. The tendency is in the direction of tractor units hauling a number of trailers, as these give the greatest handling capacity per dollar for first cost and per ampere hour battery capacity.

Overhead machinery finds its usefulness in carrying on operations inside the shed in stacking miscellaneous merchandise and in contacting the movements which otherwise could not be accomplished with trucks or trailers without the necessity of leaving wide aisles for the latter. Furthermore, trucks and trailers have no inherent stacking ability.

Where ships are to be unloaded with the speed that economy in operation demands, it is just as essential rapidly to clear away the unloaded goods to prevent congestion in the ships and on the piers as it is to get the goods out of the ship's hold. This is the prime basis for equipping all ships and piers with mechanical-handling and unloading devices.

When overhead machinery is to be considered, it is of course essential that it should be able to cover the whole floor area and should be able to cover this area at the highest rate of speed permissible for safe operation. Such a condition involves elimination of switches, and some arrangement whereby more than one hoisting unit can be utilized without interference from other units on the same bridge or runway, as in the case of a true monorail system.

The adjustable loop system satisfies these conditions by providing at all times a continuous loop track fixed on either side of the shed and with the curved section adjustable or movable so as to permit crossing the shed at any part of its length. This is accomplished by having the cross track section attached on the bridges at each end of the shed, these bridges being movable. The bridges carry the curved track, which is in turn fitted with a sliding frog or switch in continuous contact with the side rails and so disposed that the runway is free for the travel of hoisting units off and on the bridge from the side track without any switching at any point along its entire length.

On this track a number of monorail-hoisting units can travel one after the other, each one picking up and depositing its load where desired and following around to the opposite side of the building, completing its circuit without interference from other hoisting units.

Because of the absence of switches, the movement can be carried on at high speed and all parts of the shed can be reached.

The most efficient use of the system designed to meet the conditions of any problem is accomplished when the surrounding structures are adapted for the machinery installed. So in the case of the adjustable loop system, efficiency is greatest when the shed is designed with this end in view.

THE NEW REAMER FACTORY

The Hot Shearer Machine Company of Waynesboro, Pennsylvania, have recently opened up their plant No. 2 at Waynesboro, in which they are manufacturing bridge and boiler reamers exclusively. They have specially designed machinery for the manufacture of these reamers and expect to raise their capacity to 600 reamers a day within the next sixty days.

The Electric Furnace Construction Company, Finance Building, Philadelphia, reports the following orders received for Greaves-Etchells electric furnaces: Lancia Company, Turin; Bresciana Company, Brusche. They have also successfully started up new furnaces at the Daimler Motor Company, Coventry; at the Tyne Electric Steel Foundries, Ltd.; and also a furnace for Kayser-Ellison & Company, Ltd., Sheffield, designed for up to fifteen tons cold metal or twenty tons hot metal process.

The Cleveland Machine Tool Company has the pleasure to announce as their new French agent the J. Horstmann Company, under the personal direction of Mr. Henri Nourry, who is a member of the firm of J. Horstmann.

Mr. J. W. Spensley, who has had several years' experience as crane sales engineer, has been appointed to represent the Champion Engineering Company of Kenton, Ohio, manufacturers of Champion cranes, in the new York territory. Mr. Spensley has opened a sales and service office in New York at 149 Broadway, room 1001, Singer building.

Mr. J. W. McCabe, who until recently has been district manager of sales for the Chicago Pneumatic Tool Company at Buffalo, New York, has been appointed special representative for the company's foreign trade department and will depart shortly for an extended trip throughout the Orient, Philippine Islands and Australia. Mr. W. H. White has been appointed acting district manager of sales at Buffalo to take charge of that territory during Mr. McCabe's absence.

Material-Handling Manufacturers

A VERY important meeting of the engineering committee of the Material-Handling Manufacturers' Association was held at New York, June 9, 1919, to confer with B. F. Cresson, Jr., consulting engineer of the New York and New Jersey Port and Harbor Commission. Mr. Cresson had, previous to this meeting, requested the association to obtain for the commission a paper from each manufacturer descriptive of the material-handling machinery built by him, and of its application to the physical requirements of a pier, a wharf, a shed, a storage warehouse, and of adjacent yards and runways, and that the same information be furnished with regard to the deck machinery of ships and possible installations in the holds of ships. All this data, together with photographs and references as far as possible to installations in actual use, must be in the hands of the commission by June 13, 1919.

Mr. James A. Shepard called attention to the fact that if the manufacturers would in good faith try to describe how most economically to get the right results, then there would be collected the best available knowledge in the world on material-handling equipment.

Mr. B. F. Cresson, Jr., came into the meeting shortly after and favored the group with a brief resume of the information gleaned on his recent trip to the West Coast; a summary of the work done and proposed to be done by the commission; and gave in detail the reasons for his confident belief that his plan to have the manufacturers' cooperation enmass would result in the commission securing much better information and in its being placed in a better position to make definite recommendations of economical handling methods and machinery, than if he and his engineering staff attempted to gather this from individual makers.

Mr. Cresson outlined many of the features he desired the manufacturers to cover in their papers, including the width of area between transit shed and bulkhead if cranes were used; the height of door openings (figuring 4½ feet rise and fall of tide), if automatic conveying machinery were used; the size of hatch openings; the height of exterior and interior of pier sheds, warehouse rooms, runways, etc.; the character of floor necessary if industrial trucks were used, for instance; the strength of structural beams if trolley hoists or overhead conveyors were to be used; area that conveyors, automatic or otherwise, might require in ship's hold or on piers; height and area tiering machines' need. In fact, all essential details are wanted about the general cargo and freight movement it is possible for each manufacturer to provide machinery for, and the physical factors which the terminal engineer must provide in order that such machinery may be economically installed for handling. The assumption to be in every case that "general cargo" is handled.

Mr. Cresson explained that the commission have the staff and funds to make thorough and careful time-study records and observations of every character. They have already tabulated the records of railroad movements in and out; ship arrivals, detail of cargo and its handling; reloading and detail of its handling; time studies of hand and various manual and winch combined handling; tonnage, weights of packages, type and character of packages. In fact, every detail, including the time study of such mechanical handling equipment as they can locate.

He said, however, he wants manufacturers to supply the committee with definite facts regarding all of their installations which have an essential bearing on this subject, and where possible he will send commission representatives to make records of their performances, even if these are distant from New York City, provided the facts presented by the manufacturer seem to warrant the expense and time which would be required.

With reference to his trip to the West Coast, Mr. Cresson at this meeting, and previously to the engineering committee, stated that there is a tremendous movement of port development under way on the West Coast, involving expenditure of approximately $4,500,000 at Los Angeles, a good portion of which will be for handling machinery; $8,000,000 at San Francisco, where they are planning a big project further up the bay; $5,000,000 at Portland; $2,500,000 at Seattle, for Smith Cove work; $2,500,000 at Tacoma; and that Vancouver is asking for $5,000,000 for improvement at English Bay.

He informed the committee that the commissioners at Seattle advised him they earned a profit of 38 per cent net last year on the handling and stowing machinery on one dock, and that the big $30,000 derrick there earned over $50,000 loading locomotives and heavy cargo last year. At one port he saw wheat being handled in bags by conveyors at the rate of seventy-five tons an hour.

That the commissioners and engineers of the West Coast are all very actively interested in this subject of mechanical handling equipment, that they want to know what New York City is doing, that Mr. Cresson told them of this association committee, and, above all, that they believe mechanical handling a money-making investment for state or municipality, as well as for industries.

At San Francisco they have formed a committee of exporters and steamboat men to study this subject of economical mechanical handling.

It is well also to point out the fact that the results and information which these papers and conferences bring together will all be available for the use of this association and manufacturers generally in presenting the problem of the use of mechanical handling devices to committees, engineers and harbor commissions of ports all over the United States and even to representatives of foreign countries.

E. Logan Hill, formerly secretary of the United States Port and Harbor Facilities Commission, gave the gathering some facts about the research conducted by the government during the war. He advised these records of the Shipping Board, together with the information secured from European ports by Captain Chambers, are, or soon will be, available for committee perusal and use. These include studies of European use of handling equipment, etc., and the recommendation to the Senate Commerce Committee that:

> "We construct * * * what might be termed a 'United States Experimental Terminal' * * * to consist of a pier or piers, with transit sheds and warehouses of the most modern and ideal type, equipped with various handling machin-

ery suitable for the purpose. * * * to be used for commercial shipping * * * to be under the direct control of the government * * * to compile complete records as to costs and rate of handling. * * * Various schemes suggested for handling devices could, within limits, actually be built at the terminal and could not only be tried out but thoroughly tested and reliable records be obtained as to what the device might accomplish.

"Many a machine that has merit has been discarded to the scrap pile because the stevedores or operating men used their efforts to make it a failure, which would not be the case under a government controlled terminal."

(Senate Committee, print Sixty-fifth Congress, third session, titled "Port and Harbor Facilities Commission.")

Complication of the Problem

It may seem strange to laymen in these matters that an engineer of a port commission should have to take so much trouble to begin to find out the best methods of handling general cargo, but the fact is that this subject is one of the most complicated with which engineers have to deal, and port and harbor commissions everywhere are very much at sea in regard to getting accurate and trustworthy information. The installation, for instance, of the most economical apparatus for handling all the variety of packages which make up the following lists of cargoes for freighters out of San Francisco would test the ingenuity and resources of the most experienced, and yet these are simple compared with some lists we have seen.

A Cargo for the Orient

The steamer Cadaretta, which cleared on May 22 for the Orient, carried the following cargo:

To China

Two autos, 925 pounds auto goods, 10 cases arms and ammunition, 6000 pounds cocoa, 3 cases canned fruit, 300 cases canned goods, 7 cases dry goods, 9 cases electrical goods, 20 packages furniture, 500 cases gasolene, 350 pounds glue, 7 cases groceries and provisions, 108 packages hardware, 5 cases honey, 3000 pounds and 1 case leather, 14 cases merchandise, 2 boxes motor, 1080 pounds nails, 30 cases and 3794 barrels oil, 25,603 pounds paper, 610 cases polish, 17,000 pounds pipe, 536 bundles, 3289 bars and 1524 pounds steel, 322,352 pounds soap, 1592 pounds of soda ash, 1800 pounds salt, 77,748 pounds tin plate, 2316 pounds wire.

To Manila

Twelve cases athletic goods, 7 cases arms and ammunition, 20 cases books, 51 cases canned fruit, 798 cases canned vegetables, 1826 cases canned goods, 56 cases compound, 330 pounds cereals, 160 pounds cheese, 100 pounds coffee, 60 pounds candy, 4 cases cigarettes, 52 cases drugs, 41 cases dry goods, 3740 pounds felt, 700 cases and 4176 drums gasolene, 7 cases groceries and provisions, 20 packages hardware, 41,400 pounds iron culverts, 2475 pounds ink, 20 cases merchandise, 71,499 pounds machinery, 7939 pounds nails, 4 barrels oil, 911 pounds packing, 132,468 pounds paper, 372 boxes polish, 10,096 pounds pipe, 6 cases paint, 459 pounds rubber goods, 17,525 pounds steel, 3810 pounds soap, 30 cases shoes, 6000 pounds tractors, 600 pounds tubing.

A Cargo for South America

The steamer Santa Rita, which cleared on May 21 for South America, carried a cargo as follows:

To Peru

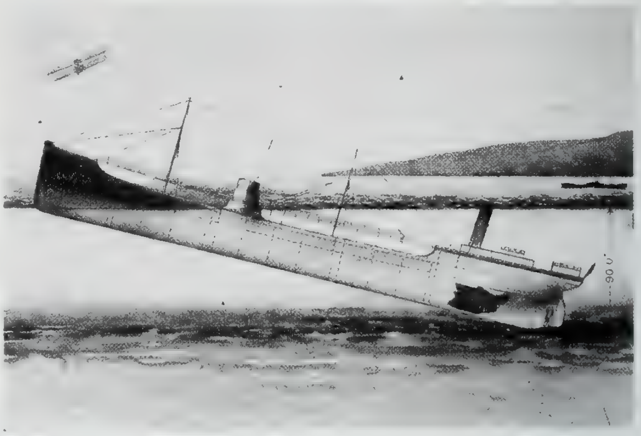
Sixty-one cases acid, 330 cases beer, 1000 pounds butter, 139 cases canned fruit, 17 cases canned vegetables, 377 cases canned goods, 54 pounds cereals, 1000 cases distillate, 1000 pounds dried fruit, 10 boxes fruit, 19 cases furniture, 200 cases gelatine, 22 cases hardware, 1100 pounds hops, 70 pounds ham and bacon,24,354 pounds iron culverts, 10,000 feet lumber, 4794 pounds machinery, 1 motor truck, 18 cases merchandise, 16 bundles oars, 9 cases 2 barrels oil, 250 pounds paste, 7500 pounds prunes, 13,240 pounds rope, 1310 pounds rubber goods, 11 cases salmon, 100 pounds seed, 6207 pounds spice, 28 cases shoes, 1568 bundles shooks, 19,869 pounds trucks, 418 pounds tractor parts.

To Chile

Seven hundred ninety pounds acid, 355 pounds auto goods, 10 barrels beer, 200 cases blasting caps, 1105 bundles bags, 88 pounds candy, 1000 pounds cocoa, 20 cases canned vegetables, 25 packages cod fish, 520 cases dynamite, 52 cases fuse, 200 cases gasolene, 6 cases groceries and provisions, 13 cases hardware, 3 cases merchandise, 12,854 pounds machinery, 800 cases powder, 10 cases salmon.

To Bolivia

Four cases butter, 14 cases canned fruit, 8 cases canned vegetables, 343 cases canned goods, 760 pounds cod fish, 5 cases drugs, 10 cases groceries and provisions, 4 cases merchandise, 5 cases oil, 4166 pounds paper, 20 cases salmon.



Oil tanker San Zeferino sunk by a German submarine

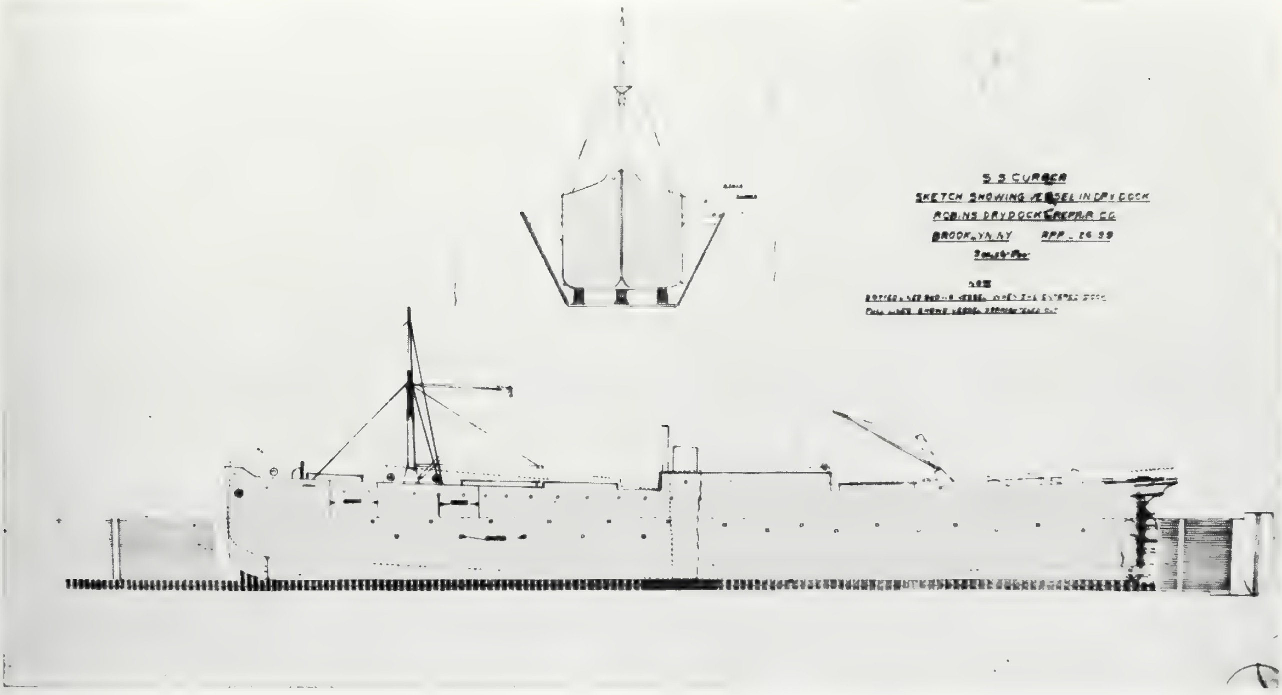
ISHERWOOD TANKER

An example of the value of the increased longitudinal strength is shown by the Eagle Oil Transport Company's San Zeferino. The vessel lay in the position shown in the illustration for a month, when she was successfully raised. A thorough examination showed there was absolutely no indication of any structural straining, and further, part of the cargo of oil was found to be in perfect condition, the remainder of the oil having been pumped overboard during the salvage operations.

Mr. L. H. Mesker, vice-president of the Cleveland Milling Machine Company, has turned over the duties of sales manager to Mr. H. I. Miner.

The Cleveland Milling Machine Company has the pleasure to announce as their new French agent the J. Horstmann Company, under the personal direction of Mr. Henri Nourry, who is a member of the firm of J. Horstmann.

Unique Engineering Feat



Diagrammatic sketch showing steamship Curaca in drydock

IN the reconstruction of the British steamer Curaca, the Robin's Dry Dock & Repair Company has again demonstrated its ability to handle successfully any job sent to its big plant in Erie Basin, Brooklyn. The Curaca was sunk during an explosion in Halifax harbor some months ago. Of a crew of seventy-two, only two lives were saved. The superstructure of the Curaca was blown away and she was buckled at about the mid length to such an extent that when refloated the draft at buckle was 16 feet 2 inches, while the draft at bow was 7 feet and at stern 9 feet 8 inches, showing that the vessel was forced up 9 feet 2 inches from the base line at bow, while the stern was forced up 6 feet 6 inches.

In this condition the vessel was raised, temporarily repaired, and brought to New York, and the work of straightening and repairing commenced on April 25, 1919.

The big problem here was to restore the vessel to an even keel. On a preliminary survey this seemed to be impossible. Further examination was made, and finally George J. Robinson, vice-president of the company, outlined a plan which subsequently proved successful. His report on the job is of more than ordinary interest and value, and reads as follows:

"We decided to use No. 2 graving dock for the Curaca. Keel blocks were set solid for a length of thirty-six feet, as it had not been determined exactly where the buckle was located. On April 25 the vessel was warped in, placed over the blocks and plumbed up. Shores from each side of the dock were then put in place against the sides of the vessel. Wire hawsers were extended from each side of the dock and made fast ashore, so that there would be no danger of either the forward or after section listing if a break should result at the buckle point before the strengthening of the vessel was completed.

"The dock pumps were then started. As soon as the buckled area of the keel touched the blocks the pumps were stopped and examination made to see that the vessel was perfectly upright and over the blocks. The sides of the vessel were then gradually cut at the buckle from the deck to the water line on both sides. The pumps were again started and as the dock was slowly freed from water the cutting was continued about six inches at a time.

"Close observation showed that as the cutting of the plates and the pumping away of the water progressed, the ends of the Curaca dropped gradually, being without the support of the blocks. During this operation frequent inspections were made to determine that both the forward and after sections were upright, that the hull had not twisted and that no structural change had resulted. When the dock had been pumped dry the entire keel of the Curaca rested on the blocks.

"This operation was begun at 7:30 a. m. and was successfully completed at 3 p. m. the same day.

"We found that the bottom plating around the buckle had fractured, due, probably, to the vessel having worked at this point. The bottom of the Curaca was also damaged in the explosion to such an extent that fifty-four of her bottom plates needed repairing and renewing."

It is understood that the vessel was taken in tow after the explosion, but abandoned by the tugboats and drifted on sand banks, where she lay supported at the ends only and in a very grave condition. This accentuated the possibility of her breaking her back and becoming a total wreck.

The Curaca was 403 feet long, 52 feet 3 inches beam, and 37 feet molded depth to shelter deck; deadweight tonnage about 9600. She belongs to the New York & Pacific Steamship Company, and was built in 1912 by J. L. Thompson & Sons, Ltd., of Sunderland, England.

The Curaca was built on the well-known Isherwood system, and proves the contention of the inventor that his type of construction enables a vessel to withstand an unusual and terrific strain.

By Special Correspondent

THE optimism of the Seattle steel shipbuilders over the future of shipbuilding was apparently well founded, judging from Mr. E. N. Hurley's recent announcement of the sale of nineteen Shipping Board steel vessels at prices ranging from $210 to $225 a ton.

Seattle builders have maintained ever since the armistice, accompanied as it was by widespread cancellation of contracts, that all that was necessary to rehabilitate the shipbuilding game was to maintain a firm stand in the matter of tonnage valuations, and this attitude was based on statistics. It is certain that the ship tonnage of the world is still between 10,000,000 and 15,000,000 tons short of what it was in 1914, just prior to the outbreak of the war.

Early in the year Mr. Hurley declared that ships could and would be built in the United States for $160 a ton and less. Every Pacific Coast shipbuilder disagreed with that statement. It cannot be done if the American workman is to receive the wage he is getting today, and the Pacific Coast shipbuilders, especially those in Seattle, positively asserted that the plants would be forced to close were a wage reduction considered.

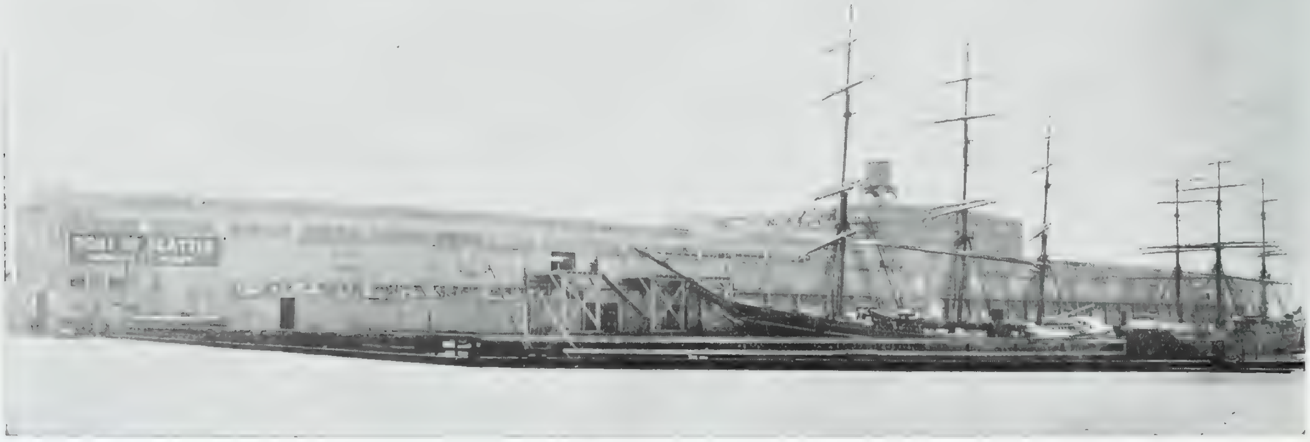
The published announcement attributed to Mr. Hurley, that an Eastern shipyard had taken contracts for $149 a ton, or stood ready to do so, has been all along scouted by local builders. Shipbuilding at $149 a ton might be possible at a government yard, but even that possibility is not thought probable by Northwest shipbuilders. That the recent sale, involving as it does over $28,000,000, has finally brought the head of the Shipping Board to see the light, is now the prevailing opinion in shipbuilding circles here.

The four big Seattle steel plants are building ships probably more slowly than during the war emergency, but nevertheless they are building them better and pretty nearly as speedily as during the big drive. In June all four plants held launchings, Skinner & Eddy slipping four 9600-ton vessels, Ames two 8800 tonners, and the other two, Duthie's and the Seattle North Pacific, one each. All of these plants delivered two or more ships to the Shipping Board during the month, there being a total of eleven steel ships delivered, not including three from the Todd plant at Tacoma.

In other words, Seattle's shipbuilding industry is thriving at present. There are contracts enough remaining to maintain the plants at their present rate for the balance of the year at least, and before the end of 1919 the builders anticipate either the restoration of cancelled contracts, or the long-talked-of construction program for foreign account.

By special arrangement with the United States Shipping Board and the Association of Northwest Shipbuilders, the visit to Seattle of the National Editorial Association during its annual convention will be marked by the launch of a 9600-ton steel steamship, named and sponsored in honor of the editors. This vessel is now building at the Skinner & Eddy plant, and is to be christened Canon City, after Canon City, Colorado, the home town of Congressman Guy E. Hardy, president of the National Editorial Association. Mrs. Hardy will be invited to act as sponsor.

Again encountering heavy ice in the effort to reach Nome after the long winter months of isolation there, the steamships Victoria, of the Alaska Steamship Company, and Senator, of the Pacific Steamship, were delayed several days bucking the floes. On June 1, Nome's roadstead was reported clear of ice, and when the vessels sailed from Seattle it was expected that they would encounter no difficulty in reaching the far northern port. They had not reached Unimak Pass, however, before a cable message announced the ice pack re-



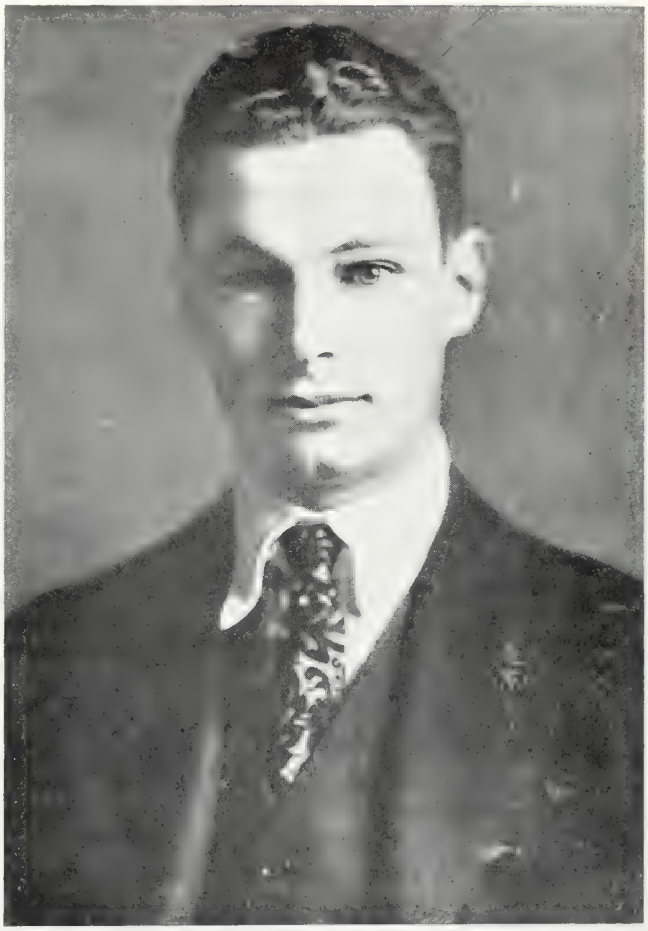
turning to Nome, and this ice cutting in just ahead of the vessels was responsible for the delay. Both ships, however, arrived at Nome March 16, and the next day the freighter Latouche, of the Alaska Steamship Company, en route to St. Michael, joined them. Another voyage to an isolated far northern district of Alaska is more or less of interest. The Alaska Steamship Company's freighter Cordova sailed from Seattle June 16, bound for Kotzebue Sound and other Arctic Ocean points. On this voyage, the farthest north undertaken by a regular steamship service out of this port, the Cordova will cross and recross the Arctic Circle three times. She is carrying a complete cargo of supplies, including 1100 tons of sacked coal and some livestock. Included in the latter are eight goats destined for a mission near Teller and their milk is for orphaned babes whose mothers were victims of the influenza epidemic during the past winter.

The steamship Northwestern, which ran ashore in Wrangell Narrows June 1, was drydocked here on her return from Seward and found to be undamaged. The inspection was made at the Heffernan plant, after which she returned to service and sailed on schedule.

H. F. Alexander, president of the Pacific Steamship Company, and D. C. Jackling, millionaire mining operative of San Francisco, are now joint owners of the second largest steam yacht on the Pacific Coast, as they recently acquired by purchase, price withheld, the handsome yacht Acquilla, formerly owned by Benjamin Rogers of Vancouver, British Columbia. In size and appointments the Acquilla is second only to the yacht Venetia, owned by John D. Spreckles of San Francisco.

Messrs. Alexander and Jackling will alternate in the use of the yacht. Mr. Jackling has already scheduled a trip of several weeks in Alaskan waters this summer, during which he will be accompanied by a number of personal friends, and on his return Mr. Alexander will use the yacht for several weeks. After that they plan to allot the craft to Jackling in California waters during the winter and to Alexander for the North Pacific in the summer. Captain A. J. Storrs, superintendent of the Pacific Steamship Company, brought the yacht from Vancouver to Tacoma, June 17.

David S. Hanley, General Sales Manager Pacific Coast Coal Company, Seattle



G. W. Skinner, son of D. E. Skinner, of Skinner & Eddy, Seattle, just returns from overseas' service

P. W. Davis, chief clerk to the district manager of the United States Shipping Board, recently resigned that office, and plans to engage in business at San Francisco. He is now enjoying his first vacation in two years. Mr. Davis was formerly in the employ of the Pacific Steamship Company, but left that concern to accept a position with Captain J. F. Blain when the latter assumed the duties of district manager for the Emergency Fleet Corporation.

A CORRECTION

In the Seattle Notes of last month, when reporting the activities of three Seattle-built wooden vessels, we stated that the Snetind was operated by Messrs. Comyn, Mackall & Company for the Universal Shipping & Trading Company. This statement, we are informed, is incorrect, and we regret its insertion in our notes. The three vessels mentioned in the report—the Snetind, the Trolltind and the Brisk—were chartered by Messrs. F. Griffin & Company of Seattle, Washington; the first two to Messrs. Comyn, Mackall & Company, and the Brisk to Messrs. Tomlinson & Mitchell of Vancouver, British Columbia.

By Special Correspondent

PORTLANDERS are not to be content with building steel freighters for Uncle Sam, but want to operate them as well, and in addition to the three vessels that the Pacific Steamship Company is running from this city to the Far East, the Columbia Pacific Shipping Company, a corporation formed by Portlanders, has asked the Shipping Board to allot four of the 8800-ton carriers to be placed in service between the Columbia River and New York, while the Charles R. McCormick Company has also applied for two to run over the same route, carrying lumber eastbound and loading back with whatever offers.

Williams, Dimond & Company have announced their intention to operate 8800-tonners between New York and Pacific Coast cities, and it is assumed that some of the fleet will be assigned from the coast yards and that others which are now on the Atlantic Coast may be given over to the line. There is talk of other Atlantic Coast operators having eyes on the Canal service likewise, so it would appear that if the local and outside organizations are to realize their wishes, there will be abundant facilities between the two coasts, with all-American ships handling all-American cargo.

During the past month the heads of four steel shipbuilding properties in the Portland territory were in the East as members of a general committee from the coast to place their immediate future in the hands of Edward N. Hurley, head of the Shipping Board, whom they asked to reinstate contracts cancelled in the spring, so that they might continue their plants and retain their men until work might actually be commenced on foreign contracts. William Cornfoot, president of the Albina Engine & Marine Works, which launched its last 3800-ton hull for the government June 12; Joseph R. Bowles, president of the Northwest Steel Company, with five more 8800-ton hulls yet to float, and A. F. Smith, president of the Columbia River Shipbuilding Corporation, which has six yet to go into the water, agreed that they could have accomplished just as much by remaining at home. While numerous inquiries were received about the middle of June from foreign operators anxious to place contracts, Mr. Hurley had not carried out his promise to lift the ban against accepting outside orders.

Delivery of four steamers in June—the Buttonwood, Kangi, Bushrod and Aimwell—paved the way for the G. M. Standifer Construction Corporation to deliver four more from its wood plants in July, leaving only two steamers to finish—the Byfield and Mendora—which will be floated from the Vancouver plant the latter part of this month. Five of the fleet floated at the North Porland wood plant of the same interests were delivered as hulls only.

Inland water transportation was given impetus during the past month through the inauguration of a service between Portland and Lewiston, Idaho, by the Yellow Stack Line, using the steamer Grahamona. The run of three hundred miles is made in fair time despite the swift current of the Upper Columbia and Snake Rivers. The schedule so far calls only for a direct run, no way freight being handled.

The Emergency Fleet Corporation has completed arrangements for taking care of hulls and barges in North Portland harbor, just downstream from the G. M. Standifer Construction Corporation's plant, where about twenty-five vessels can be moored at the dolphins to be driven. The hulls are expected to remain there until sold, so their stay is indefinite.

William D. Wheelwright, president of the Pacific Export Lumber Company, and Mrs. Wheelwright, returned early in June from a six months' tour of the Orient. Mr. Wheelwright says he regards the outlook for a resumption of business on the former scale as promising, but does not expect large business until peace is assured.

In addition to the orders placed in the Northwest by the United States Railroad Administration, which are being delivered to New York, Baltimore and Philadelphia, in wood steamers of the Shipping Board, several vessels have been assigned to carry ties to the United Kingdom, British tie orders in the Northwest aggregating about 30,000,000 feet of lumber. The American orders amount to 50,000,000 feet and transporting both is expected to "clean up" the wood tonnage.

With at least four full wheat cargoes floated during June on Shipping Board steel steamers, and half again as many carrying flour, the June exportation of cereals from the Columbia River was a record for any similar period.

Due to an overheated flange on a steam pipe connected with the winches, a fire broke out in a temporary bunker aboard the wood steamer Buttonwood June 14, but was extinguished with slight damage. The vessel was loading a cargo of British ties at Vancouver, Washington, at the time, and was cleared for Hull with 1,500,533 feet.

What is reported by Captain Tinn, her master, to be the record run, is the voyage of the Portland-built steamer West Hardaway, which reached New York from Honolulu June 10 after being out twenty-seven days. The steamer was built by the Columbia River Shipbuilding Corporation.

One of the few Northwest-built wood steamers to be sent to California for lumber is the Afrania, constructed at Portland by the Grant Smith-Porter Ship Company, which was dispatched the middle of the month for Eureka to work a cargo of redwood for the Atlantic. She is sailing under the management of the Pacific Steamship Company.

H. E. Pennell, of the Coast Shipbuilding Company, which is finishing the last of eight Ferris ships for the government, has announced that as soon as a settlement is made with the Emergency Fleet Corporation his company will begin the construction of sailing vessels or auxiliary schooners.

C. O. Yoakum, recently appointed Pacific Coast manager of the division of sales, through which the Emergency Fleet Corporation expects to dispose of the material and equipment remaining from its wood ship program, has established offices at Portland and will soon enter into active negotiations for moving machinery and the like. Already the Charles R. McCormick Company has indicated a desire to purchase machinery for a new steam schooner, provided reasonable figures are agreed on. The new schooner is to have a lumber capacity of 1,500,000 feet and will be laid down at the plant of the St. Helens Shipbuilding Company.

Mrs. Guy M. Porter, who was victory goddess of Portland's Victory Rose Festival, June 11, 12 and 13, was accorded the honor of christening the hull of the 3800-ton steel steamer Doylestown on June 12. This vessel was the seventeenth and last floated by the Albina Engine & Machine Works for the Emergency Fleet Corporation. The launching platform was made into a floral bower for the occasion and a band from the cruiser Minneapolis, flagship of Admiral Fullam, together with a Kilties' band, assisted in the exercises.

The steamer Coaxet has been selected to carry the second cargo in Portland's re-established Oriental line, operated by the Pacific Steamship Company. The West Munham, built by the Columbia River Shipbuilding Corporation, was the pioneer of the service. The West Celina, of the Northwest Steel Company's fleet, was to have been the second ship, but it was decided by the Shipping Board that the Coaxet, which is the second of the Standifer fleet of 9500-ton steamers, was best suited for the Pacific trade. The Cokesit, the first Standifer ship completed, was reported at Hampton Roads, June 17, on her way to France with a flour cargo from Portland.

The Port of Portland Commission has decided to offer the pilot schooner Joseph Pulitzer for sale and utilize the Wallula for carrying pilots at the entrance of the Columbia River. The Pulitzer, named after the famous New York newspaper editor, first did service off the entrance to New York harbor, and after being brought around to the Columbia River, served as a pilot boat until after the Port of Portland took over the service, since which time she has been used only occasionally.

Fred A. Ballin has repurchased an interest in the Supple-Ballin Shipbuilding Corporation, a half interest, in which he disposed of more than a year ago to New Yorkers. It is proposed to wind up the affairs of the corporation as soon as a settlement is made by the Emergency Fleet Corporation. The composite ship Airlie, designed by Mr. Ballin, reached New York, May 29, with 1500 tons of vegetable oil in barrels, all of it delivered in the best of condition and not a leak reported, which is declared to be unusual with that class of freight.

The Foundation Company has chartered the tug Daniel Korn and a barge to make weekly trips from Portland to its yard at Victoria, British Columbia, carrying Scotch marine boilers from the Willamette Iron & Steel Works. The latter firm has completed the last of twenty boilers which will be taken north in sets of two each. The Foundation Company is turning out twenty wood steamers in the British Columbia harbor for the French High Commission. Half of the boilers are being manufactured on the other side of the border.

The schooner Oakland arrived in the Columbia River June 15 from Apia with a copra cargo consigned to the Kaola Company. The vessel completed her first round voyage since being floated from the Oregon beach, near Nehalem, in 1918, where she had been ashore two years, having been abandoned by her crew when on her way from Coos Bay to San Francisco with a cargo of ties.

The Commission of Public Docks has effected a settlement with Grant Smith & Company, contractors engaged in building the million-bushel grain elevator at the St. Johns terminal, and is determined to carry out the work on a force account basis, expecting to have the elevator ready for wheat by October 1. George W. Boschke, a widely-known engineer, has been retained as consulting engineer, working with G. B. Hegardt, chief engineer of the commission, and they have mapped out a program for speedy results. The extension of Pier No. 1 from 1200 to 1500 feet, the building of an additional warehouse there from the first completed unit to the limit of the pier, 1500 feet, is also under way and the driving of piling for Pier No. 2 has been contracted for. A fill is being made for a site on which tanks are to be erected at once for handling export oils and molasses, and the end of the present year will find a considerable portion of the terminal layout completed.

Voters of the Port of Portland district authorized a bond issue in the sum of $1,000,000, June 3, which the Port of Portland Commission is privileged to use in offsetting differentials in port charges, cost of fuel, temporary subsidies, and such, in the interest of increasing the city's steamship connections with foreign lands. The commission is to name a traffic manager soon and launch a strong organization in behalf of after-the-war trade.

Launch of S. S. Cokesit

On the Shores of Grays Harbor

By Special Correspondent

THE fame of Hoquiam and the Northwest is soon to be carried to the ends of the earth by four schooners, two of them built in Hoquiam and two in Seattle, each bearing the name of one of the Northwest mountains—Mount Shasta, Mount Hood, Mount Whitney and Mount Hamilton. Over a course covering 9000 miles of ocean lanes, through the "roaring forties," amid fair weather and foul, the vessels are to stage a unique race, probably the longest in history, from Washington ports to the Panama Canal, and thence to Cardiff, Wales. Every nerve of every member of the four crews will be strained to prevent the needless loss of a moment in accomplishing the voyage, for huge wagers on the outcome of the unusual contest are said to have been laid by the Scandinavian mariners, descendants of the Vikings whose nautical exploits illuminate the pages of medieval history, who will navigate the ships. Two of the vessels are equipped with motor power, while the other two depend upon canvas and the winds; so there will really be two races, one between the motor-driven vessels and the other between the sailing ships. The contesting vessels are:

Mount Shasta, full powered Diesel auxiliary schooner, built at the Matthews Shipyard, Hoquiam; Captain Reinhart Mithassel, master.

Mount Hood, built at the same plant, but minus power equipment; Captain Aslak Mithassel, master.

Mount Hamilton, full powered Diesel motor auxiliary powered schooner, built by the McAteer Shipbuilding Company, Seattle; Captain Thorolf Coldevin, master.

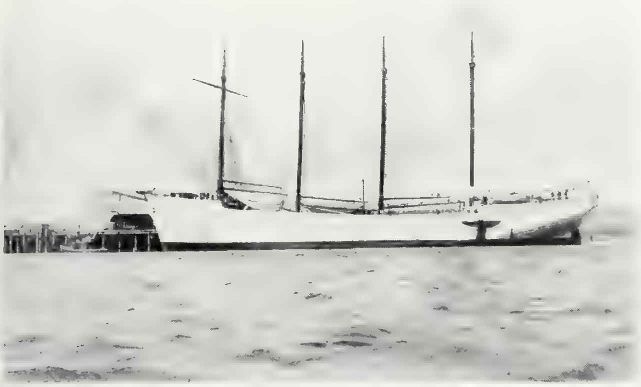
Captain Reinhardt Mithassel, commander Motorschooner Mount Shasta

Frazier Matthews of the Matthews Shipyard, Hoquiam. Builder of Motorschooners Mount Shasta and Mount Hood

Mount Whitney, "bald-headed" sailing schooner, minus auxiliary engines; Captain Jacob Samuelson, master; also built by McAteer of Seattle.

Each of the four vessels is 2400 tons deadweight capacity, capable of carrying 1,500,000 feet of lumber, with which product each will be loaded. The four shipmasters, by the way, two brothers, a brother-in-law and a cousin, are among the best known navigators of the Norwegian seafaring fraternity. All have for years been masters of vessels in the service of Cornelius Bull and Mons Isaksen of Christiania, Norway, for whom the four vessels were built.

Major H. W. Patton of Hoquiam, prominent Pacific Coast newspaperman, is making the trip on the Mt. Shasta. Before sailing, Mr. Patton gave the following description of the vessel: "The officers' quarters aft would do credit to a fine hotel. The captain has a private dining saloon. In his room is a big brass bedstead, and he has a private bath, toilet, etc. There also is a spare room for any of the owners who may want to take a voyage. The officers have a nice dining room, baths and other conveniences. There are a dozen rooms aft, including the sick bay. What interested me the most was the quarters of the crew. I have been on many ships, but I never saw such a fine forecastle. It is divided into rooms, each holding two



Fourmasted Auxiliary Motorschooner Mount Shasta

sailors. There are iron beds, spring-mattresses, sheets, pillow cases, and all the comforts of home, including electric light, two baths, separate closets, toilets, a well-heated dining room, which is also a social hall for the sailors in their watch below."

Approximately $5,500,000 was spent in operation of the Aberdeen yard of the Grant Smith-Porter Company during the two-year period from June, 1917, to the wind-up of the Federal program at the yard, June 1, of this year. That Grays Harbor received the benefit of this vast sum is shown by the fact that the only part of this money spent with outside firms was for certain articles of equipment not obtainable in the Harbor cities. Of the total expenditure $3,000,000 was paid for materials and $2,500,000 reverted into the channels of trade through the payroll.

When the shipyard was purchased in June, 1917, from Andrew Peterson, it had three ways and had delivered three vessels — the Oregon, Columbia River, and Idaho—and had launched a fourth, the Phyllis, this vessel being completed under the new management. Four additional private ships then were built by the Grant Smith-Porter Company—the Santa Christina, Suzanne, Santa Flavia and Fanestrand.

Two Federal contracts, each for eight vessels, were awarded to the yard. Fifteen of these vessels were built and turned over to the Shipping Board, the contract for the sixteenth having been cancelled after the armistice. All were of the Ferris type, 3500 tons, and all were completed as steam schooners except the barge Acamedia, launched May 29. During the time the war program was in full swing, an average of one launching every three weeks was maintained.

Charles Albertson, prominent business man of the Northwest, outdoor man and mountaineer, and especially well known through his active work as an officer of the Mountaineers, has been manager of the Aberdeen yard since the present owners took charge. Mr. Albertson was one of the mountaineers' party that made the trip into the Olympics and down through the Grays Harbor country some six years ago. It was the first large party of mountaineers to invade the fastness of the Olympics. J. R. Selby came to the yard as timekeeper in September, 1917, and has been paymaster since December of that year. R. E. Adams has been bookkeeper and office manager since August, 1917. Z. A. Toye was purchasing agent of the yard from September, 1917, to May 1 of this year. J. C. Langille of the Portland yard of the company succeeded Harry Hall as superintendent several months ago.

The wreck of the launch Hester, from Hoquiam, which foundered off the mouth of the Columbia the latter part of May, immediately after its owners had been taken off by the life-saving crew, has been found on the beach between Queets and The Hoh. The finder was Frank Fisher, an Indian. The hull was too badly damaged to be of further service, but the engine was in good condition.

Of a fleet of thirty-two government vessels, including both wooden and steel carriers, dispatched during the last ten months by W. C. Dawson & Company of Seattle, seven were built on Grays Harbor—the Aberdeen, Bromela, Broncho, Brookhaven, Kaskaskia and Wishkah. Of the five wooden steamers recently assigned for transportation of railway ties to the East Coast and the United Kingdom, two are Grays Harbor products—the Aiken and Fort Snelling.

Major H. W. Patton

Another industry has been added to Hoquiam's list—the boatbuilding establishment of Guy Hitchings—located in North Hoquiam, on the bank of the river near the bridge. Mr. Hitchings is an expert in that line of work, and formerly was employed at the Matthews yard. He makes a specialty of small boats, launches and fishing boats, and already has shipped to Quinault Lake No. 13 on a contract for thirty small boats for the Halbert Boat Company. The site for the plant was purchased last spring.

TACOMA

By Special Correspondent

THE proposed port development at Tacoma through a port commission raised considerable controversy, but ultimately the port project was favored by the voters of Pierce County at a general election held May 31. Under the election $2,500,000 was voted to carry on proposed port work, which includes the purchase of 240 acres of land in the center of the harbor industrial district. Plans have been drawn for the proposed docks and waterways, and when this work is carried out it is declared by shipping men that the port facilities will be second to none on the Pacific Coast.

In this matter it was not so much a question of going ahead in development of the harbor as to what section should be developed and how much land should be purchased. Under present conditions the purchase of the entire tract was held to be most feasible, as it is believed that the values of property in this section will rise so that within a few years the price of land for extension would be prohibitive. The land, trackage arrangements and all, can be developed with a minimum of expense now, to fit modern conditions.

The land purchased lies between the Todd Shipyard and Milwaukee docks. It is free from hindering rail lines and switching arrangements can readily be made to all tracks. The trackage question was one of the big drawbacks to other sections considered in harbor development.

Flour shipments from Tacoma continue very heavy. There have been on an average for the month of May two cargoes a week for the Atlantic Coast and European ports. It is believed now that the business will continue until July. Some of the vessels were totally loaded, while in other instances the cargo would amount to only half a load, or from 4000 to 5000 tons. Among the latest vessels to sail from Tacoma were the Polybius, Edgewood, West Irmo and West Hembrie.

With the launch of the barge Inoska at the Babare Brothers yards, May 29, the last vessel under construction here for the government went into the water. The vessel was christened by Miss Mary Babare, sister of the builders. Babare Brothers will close the plant for a short time and then enter into the shipbuilding game again, either in large construction work or fishing boats, as business may offer.

Some small building is being carried on at the Tacoma Shipbuilding Company's yard, and it is possible that this firm will continue building, provided work can be secured. This company has two partly-finished vessels of the Ferris type on the ways, but what disposition will be made of them has not been announced by the Shipping Board.

After making the run to and from Shanghai, the Garland Line steamer Javary, Captain Charles Poindexter, arrived in Tacoma several days ago. On the outward voyage, when 800 miles off the coast, the steering gear of the Javary became disabled during a heavy gale and the vessel was placed in extreme danger. After hard work a jury gear was rigged and the vessel made port. Captain Poindexter has received the congratulations of shipping men on successfully bringing his vessel in under such trying conditions.

After being in port ten days loading lumber for Australia, the schooner Columbia River, Captain Neil Murchison, got away early in June. The vessel took 600,000 feet of lumber from local mills for Sydney, Australia. The balance of the cargo was secured at Vancouver, British Columbia, mills.

Captain H. E. Farrer, of the Elihu Thomson, brought his ship to Tacoma to discharge recently after a collision with an iceberg off Cape Spencer. The Thomson was northbound at the time of the accident. She had three holes stove in her hull forward, but the water was checked by a bulkhead. The section of the forepeak affected was filled with cement and the ship came south in good condition.

Considerable cargo is being offered to vessels in the Hawaiian Island trade. So far every vessel going out to the Islands has got at least half of the freight from the Sound. The Glorietta, Captain A. O'Brien, was among the last vessels to sail from Tacoma to Honolulu.

After being absent in the East for five months, H. F. Alexander, president of the Pacific Steamship Company, has returned home. Mr. Alexander says that business is in excellent shape, both in the coastwise and foreign trade. Mr. Alexander has recently been appointed a member of a committee to meet with Chairman E. N. Hurley of the Shipping Board to suggest changes in the marine laws which would be of benefit to American shipping. The recommendations will be submitted to Congress by Chairman Hurley. Mr. Alexander is the only Pacific Coast shipping man on the board.

Although Oriental inbound trade seems to have dropped off to a considerable extent, the vessels of the Osaka Shosen Kaisha continue to carry full cargoes to and from Tacoma. On account of shifting conditions it is believed that all extra and chartered steamers of this line will be cut out and the tonnage brought down to a pre-war basis. Several of the vessels have been shifted to European routes or direct from Japan to New York via the Panama Canal.

Upon the arrival of the steamer Grayson, of the Garland Line, from China, the vessel will be sent to the Atlantic Coast. Lack of freight here and high rates on the East Coast are believed responsible for the shifting of this vessel. The steamer goes around from here in ballast. This leaves the Javary and Justin on the route.

LOS ANGELES

By Special Correspondent

THE Long Beach Shipbuilding Company has made a departure from its usual procedure in construction work on steamers for the Emergency Fleet Corporation which promises to increase the speed of delivery and decrease the labor cost.

The stern, rudder post and fantail were erected first in order that the machinists might begin installation work aft of the engine room. Bulkheads were riveted on the tank top before being raised into position, thus eliminating a large amount of stage work, shoring and scaffolding. Girders, pillars, shaft tunnel, thrust recess, and everything that could be assembled on the ground, was assembled, bolted and riveted there and inspected before being moved to the hull.

An important announcement was made in Los Angeles last month to the effect that the harbor commission and the city council advocate the construction of a high density cotton compress. Under the plans of the commission which have been approved by the city council, the compress will be erected by the harbor commission and used by the cotton buyers and shippers of Southern California. Texas cotton also may be shipped here for compress. A new cotton buying concern which will make a specialty of the purchase of the cotton grown in the Imperial Valley has been organized and will be known as Turner, Kuhn & Fraser, Inc. The officers are: K. M. Turner, of New York, president; H. M. Fraser and R. A. Fanton, both of New York, vice-presidents; J. Robinson, of New York, treasurer, and G. C. Dennis, of Los Angeles, secretary.

Canners of tuna and sardines have organized a clearinghouse association whereby the catches of the different launches may be distributed more equably among the twenty-two canners in the harbor district. E. D. Seward of San Pedro has been appointed manager, and the association has procured the use of harbor tide lands in East San Pedro, upon which an office will be erected, where all fishing launches will deliver their catches and the latter will be apportioned to the different canners. The canners have agreed upon the prices to be paid to the fishermen for their catches. Already some large quantities of albicore and tuna have been received. The canners agreed to pay the fishermen $125 per ton for albicore cleaned and $110 a ton for albicore in the round. For tuna the prices were fixed at $90 and $100. Canners unite in saying that the present season will be one of the largest in the history of the tuna pack here. The fish began running earlier than usual and many launches brought tuna in from Mexican waters.

News of the burning of the floating cannery John G. North, owned by the Van Camp Sea Food Company, was brought in by some of the crew of the cannery. The fire broke out in the morning of May 13, and was due, so the returning employes say, to incendiarism by dissatisfied Mexican workers.

The schooner Ruby was near the floating cannery at the time of the fire and its officers and crew aided in the salvage of the safe and some of the effects of the steamer. Fred S. Dohman, first officer of the Ruby, used an acetylene torch on the anchor chains of the John G. North and thus enabled the hulk to be towed near the shore, where it was beached. The loss on the cannery and contents is estimated to be $50,000.

When the new fire tug was measured by the United States steamboat inspectors, she was found to be 65 feet 0.3 inch long, which brought her into a class requiring a larger crew than was intended by her designers. A carpenter's plane soon shaved off the extra 0.3 inch and the tug was passed and put in service. She has a peculiar appearance, there being but few houses above the deck to interfere with handling lines of hose. She will have a pumping capacity of 2500 gallons a minute and will carry eight lines of 2½-inch hose.

The harbor department has applied to the War Department in Washington for permission to place a drawbridge over the West Basin channel entrance. This request is the preliminary step toward the improvement of the harbor for which $4,500,000 worth of bonds were voted by Los Angeles residents in May. The construction of the bridge will enable the department to complete the harbor boulevard from San Pedro to Wilmington.

The Charles Nelson Company, owners of the Consolidated Lumber Company in Wilmington, have been granted permission by the harbor commission to fill an area north of the East Basin with silt from what is known as the consolidated channel. This channel was filled with silt several winters ago when the Los Angeles River overflowed, and the wharves and docks on the channel have not been used by steamers since then.

United States Engineer Major Charles T. Leeds, in charge of government work in this district, has notified the county supervisor that the War Department has approved the plans for the flood reclamation channel in Long Beach. The channel there is six miles long and is part of the great flood-control system for harnessing the waters of Los Angeles County and the prevention of the silting of the harbor of the county. The government has appropriated $1,000,000 for its share of the flood-control work.

The United States army will make this port an assembling place and distribution center for many of the supplies which the quartermaster's department has been purchasing in Southern California. The supplies will be stored in the municipal warehouse in the outer harbor.

HONOLULU

By Special Correspondent

ACTUAL work with the ultimate aim of increasing by 50 per cent or more the facilities for handling of ships in Honolulu harbor was begun the first of this month with the dismantling of old Pier 2, now obsolete and unsuited for use. Plans and specifications for the new wharf are receiving finishing touches so as to be ready when the wreckers complete their job. The concrete piers are being prepared and borings are now being taken. The new Pier 2 will be used as a lumber wharf when finished and will also form a unit with the Kewalo basin project, which will house all the sampans that make this port their headquarters, and also take care of lumber.

Plans are nearly finished for erecting sheds over Piers 8, 9 and 10, which will give the harbor three excellent wharves. The bare piers are already built and only lack the sheds to make them highly desirable for deep-sea traffic. Work on these will commence in ninety days and will take six months to complete. With the completion of Kewalo basin the sampan fleet will be removed from Pier 15A, which will give additional wharfage space.

Honolulu was urged to take advantage of the splendid geographical position she holds in the Pacific and establish herself as a trans-shipment center for the Orient-South American trade by M. W. Linebarger, international attorney for the Ku Ming Tong, with headquarters in Shanghai, which is establishing a large commercial organization in China. Mr. Linebarger, who is also a well-known economic writer and speaker, urged the city to capture this traffic, pointing out that at present the biggest trade grab in the history of the Pacific Ocean is in progress and trade lines are now in a molten state. It is at such a time that Honolulu can take away the South American traffic from the northern great circle and Pacific Coast ports and establish a direct line route via Hawaii, if the business men of the city will provide warehouses and necessary facilities.

According to Mr. Linebarger, this port has exceptionally good locations for warehouses on deep water and is already provided with an excellent harbor. The distance between Chinese ports and South America is no greater via Honolulu than via the great circle, and the business could be handled here more satisfactorily than by the latter route.

Predicting that in a very few years the paramount trade areas of the world will be shifted from the Atlantic to the Pacific, Mr. Linebarger characterized the Atlantic as a back number. Honolulu threatens to become as isolated as Guam, said Linebarger, if she does not seize her opportunity while the trade channels are still readjusting after the war and before they become fixed and set.

Business interests have the problem of attracting such commerce under close study, and it is expected that men in touch with the situation are alive to the opportunity and will soon take some steps of a definite nature.

Despite strenuous efforts by the Honolulu Chamber of Commerce, nothing has been accomplished to relieve the hampering passenger traffic problem which has gripped Hawaii with tighter and tighter restrictions from month to month since before January 1. A statement issued last week by the Chamber of Commerce announced the fact that it has been found impossible to obtain one of the Pacific Coast passenger liners which it was hoped could be chartered for at least one trip. The only passenger carriers capable of relieving the situation are primarily built for freight—the smaller Matson boats—and their total capacity of about 250 per month has proved painfully inadequate to bring relief to what has already caused much loss and impediment to business interests of the city.

The following is an excerpt from a statement made by the commercial organization, which indicates the situation viewed from a Hawaiian angle: "Strenuous efforts have been made with the steamship agencies in Honolulu with the hope of securing at least one vessel that can make a special trip to Hawaii to relieve the passenger congestion from here to the mainland. Up to the present time, unfortunately, nothing can be pointed to as even a possibility. All the through boats are tied up with their regular schedules; several vessels that were on the run before the war and belong here are still in government service.

"Steamers on the coast runs all the way from Los Angeles to Alaska are chock-a-block with their regular traffic; the new Shipping Board vessels are primarily designed for freight and not equipped for the passenger trade; the Inter-Island boats are all doing duty serving the outlying islands of the group and are not available. It therefore looks rather bad, but tourists cannot possibly feel the situation any more than we do.

"The people of this country are between two fires, because hundreds of thousands of dollars are invested here to see a reasonable return from tourist travel. On the other hand, we cannot and will not encourage tourists to come here because of the steamer situation. The present condition is highly regretted, but is one growing out of the war, and every effort will be made to relieve the situation."

Since the issuance of that statement, no rays of hope have permeated to shipping men or tourists.

Conditions at the present time in the sugar shipping industry are very satisfactory, it is reported, and more than 60 per cent of the crop this year has been sent eastward, either to San Francisco or through the Panama Canal to New York. Approximately 60,000 tons are now in storage waiting for bottoms to take the tonnage East. This is a better condition than at the first of June in 1918, when 117,000 tons were piled up in the warehouses awaiting ships. On June 1, 1919, approximately 340,000 tons out of an estimated crop of 593,000 tons have already been moved. The total of shipments in the month of May stood at 78,228 tons, of which the amount of 28,666 tons was sent direct to New York by the all-water route.

Reports from Pearl Harbor issued by Admiral Fletcher, commandant, indicate that the completion of the big drydock will be made in August. At present, dredging operations are going on to deepen shallow places and cut away several ridges, in order to make the giant dock available for more ships. When it is finally finished it will be the largest on the Pacific, capable of taking care of any of Uncle Sam's navy craft afloat.

Moorings are to be constructed soon to accommodate at least a dozen of the biggest ships in the lock opposite the Pearl Harbor drydock. Admiral Doyle, who has just retired as commandant, recently made the statement that the harbor is large enough to very comfortably house the majority of the British grand fleet.

Plans are on foot to have Secretary of the Navy Josephus Daniels, if possible, or, if he cannot come, Assistant Secretary Franklin Roosevelt, come to Honolulu for the formal opening of the drydock and harbor. The matter is being fostered by the local Chamber of Commerce and other civic interests.

The only vessel of the fleets now in Honolulu is the army mine planter Colonel George W. Armistead, which arrived May 15 for a two months' course to the various coast artillery units on Oahu in the art of laying and firing mines. The little vessel this time successfully negotiated the trip from the coast. During the last few days of the course "live" mines will be planted and fired. The steamer is scheduled to return to San Francisco on July 8.

The matter of the fate of the bark Harvard, which has lain in Honolulu harbor some eight months, a constant problem to port officials, is still unsettled. Early this month the bark was auctioned off to pay port charges, but brought only the paltry sum of $2700. The Federal court refused to confirm the sale and another attempt will be made to get a better price June 24. An offer of $5000 for her has since been made, which is barely sufficient to pay off all claims allowed by the court against her.

Recently the board of harbor commissioners appointed Captain Richard Nelson, who for the past eight years has been pilot at Pearl Harbor, to the post of pilot for Honolulu harbor, made vacant by the resignation of Captain MacCaulay. Captain Nelson has had twenty-three years' experience on the sea and will take charge of the post on July 1, the day after Captain MacCaulay's resignation takes effect. Captain Nelson in 1912 occupied the position of first substitute pilot for Honolulu. He was selected from a field of five applicants.

Statistics on the exports of Honolulu in the year 1917-18 were made public this month in the report on the situation drawn up by Governor McCarthy. The report shows exports in excess of $81,000,000 from April 1, 1917, to April 1, 1918, with customs receipts at $24,000,000 since 1901.

Honolulu water sportsmen are speculating with interest upon the question of who will be the next owner of the trim cruiser yacht Kulamanu II, which was built at Belvedere, California, in 1909 and brought to Honolulu in sections to be used by the late Mrs. B. M. Allen. Announcement has been made that the beautiful pleasure craft will be auctioned off in a short time and it is wondered if it will be purchased by local interests or go back to the mainland. It is the largest and fastest gasolene yacht in the islands, being 61 feet long and of 30 tons gross. With a 100-horsepower six-cylinder motor it is capable of great speed.

The large movement of Filipino and Japanese laborers to the mainland from Hawaii caused an alarm call from the Japanese press recently. So far, although the migration has been steady, other laborers from Japan and the Philippines have come in in larger numbers than have departed and and planters are not betraying undue anxiety. Spanish laborers on the plantations also appear to be determined to leave the islands, and very shortly there will be very few of that race left. The T. K. K. Line does not take steerage passengers of this class to San Francisco on its boats, it was announced.

IMPORTANT BRITISH FISH-TRADE COMBINE

THE London Daily Telegraph recently announced the formation of a powerful combination to carry on the fish business from the sea to the consumer, including trawling, distributing, curing, oil refining, frying and retailing. A notice issued by the Fishmongers' Association of London mentions $10,000,000 as the capital of the undertaking. Fifteen fishmongers' stores in London are said to have been purchased, and negotiations are proceeding for acquiring others. So far only "wet" and "dry" businesses have been bought, but it is reported that the purchasers intend to go into the fried-fish business as well. They control oil refineries now, a great asset to a large frying business. This is a very important section of the fish industry, employing about 50,000 people and accounting for about 18 per cent of the total consumption of fish in the United Kingdom. It is estimated that $97,330 a week is spent in the fried-fish shops of Sheffield and $38,932 a week in Bradford, providing 500,000 meals in the two towns.

The fish trade connect the name of Lord Leverhulme with this proposition. He is the proprietor of the Island of Lewis, and is interested in the Mac Line of trawlers and drifters (capital, $2,433,250), which is to develop the Lewis fisheries, the principal industry of the island. In addition to the sea fisheries there are salmon and trout streams.

The total capital invested in British fisheries is estimated at figures ranging from $500,000,000 to $1,000,000,000.

BACK NUMBERS WANTED

Owing to the rapidly increasing demand for our magazine, several numbers are unfortunately out of stock, and we have been requested by Mr. Herbert Putnam, librarian of Congress, to bring before our readers the fact that the National Library requires certain numbers of Pacific Marine Review to complete its files. The copies required are: January, February and March of 1918. We would very much appreciate hearing from any of our readers who have the necessary copies and who would be willing to supply the library's needs.

SAN FRANCISCO

ALONG THE WATERFRONT

THE United States Shipping Board has just sent Frank P. Littlefield, chief engineer of the Shipping Board training ship Iris, to Pittsburg, where he will take a six weeks' intensive training course on the construction and operation of marine steam turbines and reduction gearing with the Westinghouse Manufacturing Company. From Pittsburg he will go to Schenectady, and there take a similar course under the direction of the General Electric Company. Then he will come home ready to instruct a class of future turbineers.

The Parr-McCormick Steamship Company have moved during the month from Pier 21 to Pier 7, thus assuring their many customers a more favorable drayage rate and themselves ample facilities and space to take care of increasing business.

All the waterfront is looking forward with great interest to the regatta and water carnival which will be held on Mission Bay on the Fourth of July. All the rowing clubs from San Diego to Eureka will be there with entries for the races, and the rivalry will be very keen.

Both freight and passenger traffic is very brisk. Coast steamers almost invariably are compelled to leave some freight on the dock, and Oriental and Island steamers are booked weeks ahead. With the vegetable and fruit canners calling for heavy space allotments, shipping and brokerage firms are besieging the Shipping Board headquarters for allocations of bottoms. Many ships are promised, but the summer and fall tonnage of California's food products cannot be shipped to Europe through the big ditch on promises, and the shippers are becoming nervous over the situation.

"YANKEE SWANSON" PASSES

CAPTAIN Andrew W. Nelson, commodore of the Pacific Mail Fleet and commander of the steamship Columbia, dropped dead from heart failure in the office of his ship, half an hour after the vessel had berthed at Pier 44.

Born in Sweden in 1864, Andrew Nelson, at the age of twelve, shipped on a fishing schooner, and after following the sea for three years found himself on the Pacific Coast. He joined the Pacific Mail service thirty years ago and worked quickly up through the various grades of sea service. For many years he commanded steamers on the Panama run. His first trans-Pacific command was the Korea.

Captain Nelson wrote a noted book of his early adventures and called the volume "Yankee Swanson." Ever afterwards the title of the book became the affectionate sobriquet by which the captain was known among his friends. These friends were legion, and many travelers to the Orient would book months ahead to be sure of getting on "Yankee Swanson's" ship.

SAN FRANCISCO FREIGHT REPORT

OUR last report was dated May 19, and freights have since advanced slowly but steadily.

The United States Trading Corporation chartered two United States wooden steamers at $35, direct port United Kingdom, Continent, usual limits, option of $40 Copenhagen or Christiania. G. W. McNear chartered the Kimta (government boat) at the same price, and the American wooden barkentine Rolph, just launched at Eureka, for about first of August loading at $36, Cork for orders, United Kingdom.

Balfour, Guthrie chartered the American steel schooner Alta to Cork for orders, United Kingdom, $38, option of Havre, Antwerp or Dunkirk, $40.

Strauss & Company chartered the United States ship Waneyanda and steamer Monada at the same limits as the above steamers, followed by E. L. Eyre & Company taking two more of the same kind of vessels at the same rates.

Lumber freights are steady, and we believe will be higher. The steam schooner Nehalen and J. B. Stetson were both chartered from Eureka to Callao by Balfour, Guthrie at $35 a thousand. The schooner Okanogan was chartered by Comyn, Mackall for ties from Eureka to Arica, Chile, at $33.50. The auxiliary schooner Mildred is reported today as chartered from Columbia River to Rosario, on the River Plate, at $55. The charterer's name is not yet announced.

J. J. Moore & Company have chartered the bark Olympic for a lump sum from Humboldt Bay and San Francisco to Melbourne.

For the United Kingdom there is still a lively demand, and no doubt from ten to fifteen wooden steamers would be quickly jumped at by the different shippers were the United States in a position to give them any more tonnage. The Mount Hamilton was the last chartered, at $53.50, and today $55 is bid for United Kingdom or Continent for lumber.

A. O. Lindvig will temporarily withdraw the Governor Forbes from their regular line, they having chartered her for about six months at 35/- on time charter for Gulf of Mexico trading, with delivery and re-delivery San Francisco, to the Ward Line.

The British steamer War Cavalry has been chartered by Mitsui & Company for immediate loading, to carry about 4,000,000 feet of lumber to the United Kingdom at about $54 a thousand, the remainder of the cargo being oil in barrels, at probably about forty odd dollars a ton.

Copra freights from Sydney are better, G. W. McNear, Inc., having chartered the Watson A. West from Sydney to Seattle at $25 a ton, weight.

As we close, there is a good demand for tonnage, especially for barley for July-August-September, as also for lumber to the United Kingdom or Continent.

PAGE BROTHERS, Brokers.

FREIGHT RATES ANNOUNCED

The Shipping Board has announced a partial list of the freight rates that will be effective on the fleet of government steamers to run between this and other Pacific Coast ports and Europe, beginning with the first sailing in July. The list follows:

Direct to ports of the United Kingdom:

	Per 100 Lbs.
Canned goods and beans	$1.80
Dried fruits in boxes and fruit kernels	2.00
Honey	2.10
Dried fruits in sacks	2.40

To the rate direct to French ports, Antwerp and Rotterdam, 25 cents additional will be added for each 100 pounds. Fifty cents a hundred pounds will be added when the shipment goes direct to Copenhagen and Scandinavian ports. Rates on other commodities will be announced later.

SAN FRANCISCO STATISTICS

Comparative for Month of May, 1918 and 1919

	May, 1918	May, 1919
Bank clearings	$455,393,221	$564,250,225
Building operations	857,010	1,225,075
Real estate sales	2,856,955	4,931,218
Postal receipts	370,276	407,860
Exports (mo. of April)	15,097,428	21,316,556
Imports* (mo. of April)	26,600,587	14,667,003
Tonnage departures, tons	431,968	591,405
Tonnage arrivals, tons	454,049	521,209

* Decrease due to supplies for manufacutre of munitions, the importation of which has ceased.

W. M. Alexander and R. N. Lynch, of the San Francisco Chamber of Commerce, returning from their recent Oriental trip

AN ISHERWOOD PIONEER

E. W. Hannay, superintendent of hull construction at the Bay Point shipyard of the Pacific Coast Shipbuilding Company, is indeed an Isherwood pioneer, having had charge of the construction, in 1913, of the first vessel built on the Pacific Coast under this system. Twenty-three years ago he served his apprenticeship in the Union Iron Works and he has continuously followed the shipbuilding industry. His success as a constructor is due largely to his keen insight into human nature and his ability to get team work in his organization.

E. W. Hannay

CAPTAIN BREWER

Marine engineers and motorship operators and owners will be interested in the announcement that Captain R. W. A. Brewer, formerly inspecting engineer on trucks and tanks being built by the British government in America, has opened an office in San Francisco as consulting engineer.

Captain Brewer has had an immense amount of experience in the design, construction, testing and operation of oil engines, and is by education and training a mechanical and electrical engineer of the highest class. He will act as motorship engineer-surveyor for British Lloyds here, and his experience with oil engines should prove of great value to motorship owners.

THE BERKELEY WATERFRONT

A fifty-year lease of the entire Berkeley waterfront has been granted by the city council to Rufus P. Jennings of Oakland. The lease was sold by auction and Jennings was the only bidder.

No plan for the improvement of the property is included in the lease, but following the meeting of the council, Mr. Jennings displayed plans prepared by B. F. Cresson, Jr., and Charles W. Standiford, engineers of New York, which provide for the building of a series of piers or moles, each 3000 feet wide and extending into the bay a distance of about 15,000 feet, or about two and one-half miles. The plan is said to entail a cost of between $2,500,000 and $50,000,000. No announcement has been made regarding the financing of the project, but it is thought probable that a bond issue may be floated.

The Service Department of the Union Construction Company

THE rapid growth of the shipbuilding industry on this Coast has prevented the development of a standard form of organization, and each yard presents some features of special interest in connection with its particular organization plan.

The Union Construction Company has for eight years been well known in connection with the design and construction of gold dredges and certain types of mining machinery. During the past year the company has extended its activities to include the building and repairing of steel ships, and at the present time about 4700 men are employed at its plant in Oakland.

As soon as the working force began to increase, the management saw very clearly the advantages of a centralized employment department, and a man was secured for the work. There are many activities connected with the operation of a large plant which are difficult to assign to the yard executives, and it was natural for the management to make more and more use of the new department until there developed what has been named the Service Department.

The service department of the Union Construction Company is organized to handle all personnel problems, and, in addition, to assist the general manager by attending to many miscellaneous and important matters which do not belong to production, but which would otherwise have to be distributed to departments which are not prepared to handle them. The service department is under the direction of Mr. John F. Johnston, whose title is service manager, and whose authority in his particular field is second only to that of the general manager of the company. In order that he may be effective in his relations with others the service manager has been given standing as a full department head, and has received the most hearty co-operation from all with whom he has had to deal.

The most important branch of the service department is the employment work, which is under the immediate direction of the employment manager, Mr. C. L. Foster, who has had several years' experience in the work, and with the exception of department heads and other confidential employes every person who enters the employ of the company passes through the employment office. As much time is given to the selection of workers as is possible under the present conditions, and fortunately in this connection, the personal acquaintance of the employment manager enables him to distinguish in many cases between desirable and undesirable applicants. Now that the press of war work is over, an effort is being made by the employment department to reduce the turnover by means of a careful analysis of the termination records and the gradual elimination of the wrong conditions which the analysis reveals. A plan has recently been put into effect whereby a systematic daily follow-up is made by a man with an automobile for the purpose of reducing unnecessary absences, but it is too early to draw any conclusions as to the value of this work. Arrangements have also been made to give the employment manager control of all transfers between departments and this plan will eliminate a great deal of confusion and expense. The full and accurate records of the employment department and the completeness of its service place it foremost among the shipyard employment departments of the Pacific Coast, and, in the mind of the management, more than justifies the expense involved.

The plant hospital, under the direct charge of Dr. C. P. Maddux, is perhaps second in importance only to the employment department. Dr. Maddux is assisted by a trained nurse in the day time, and at night the work is in charge of a male nurse of many years' experience. Through much publicity it has become generally understood that all injuries, however slight, are to be treated at the hospital in order to prevent infection, and the results obtained indicate very clearly the advantages of careful attention to small injuries.

Safety Organization

Closely allied with the hospital is the work of Mr. W. L. Denton, the safety engineer. Mr. Denton gives his whole time to safety work and has been remarkably successful in securing co-operation from the men themselves, so that a very complete and business-like safety organization has been built up which enables the company to secure a low compensation insurance rating and thus to more than pay for the most of the safety work. There are about thirty safety committees who hold meetings during the month in the company's time for the discussion of safety work. Full minutes are kept of every meeting, and copies are forwarded to each member of the committee. A recent count shows that to date 500 formal safety suggestions have been received, and of these 493 have been accepted and put into practice. Too much praise cannot be given for the conscientious cooperation of the production department in this work, and the excellence of the working conditions in the plant is a source of pride to all concerned. On May 31 the company gave an entertainment and dance for the 250 members of the safety organization and their guests, and this has of course greatly increased interest in the organization.

Lunch Counter

Another important branch of the service department is the lunch counter, where employes are served at cost with sandwiches, pastry, milk and various other specialties. The lunch counter was started at first as a temporary expedient until the building of the regular cafeteria, but its success in serving the men quickly and with what they seem to want, makes it more than probable that the lunch counter will be developed and retained permanently. Arrangements will soon be made to sell work-shirts, gloves and other standard supplies for which there has gradually developed a demand, and there is now under consideration a plan to assist employes by buying for them on the wholesale market.

Miscellaneous Activities

The service department also takes charge of certain activities such as plant fire department, plant guards, janitors, automobile service, publicity, advertising, launching programs and entertainment, compensation insurance, and various other matters which would otherwise have to go to the general manager's office. The service manager is expected to be fully informed at all times upon questions affecting adjustments and except in very important cases he acts as the representative of the general manager in conference with business agents, or other employers.

Grievances and Personal Help

It is intended that the office of the service department be ready at all times to consider the complaints or troubles of employes and to see that the company comes as near as possible to giving every employe a square deal. In an endeavor to centralize the responsibility for the correction of just complaints the service manager is required to pass final judgment upon all protested lost tool charges, and to approve all requests for advances in pay. No well organized attempt has yet been made to do any relief work, but it is probable that something will soon be started for the benefit of the most pressing cases.

Educational Work

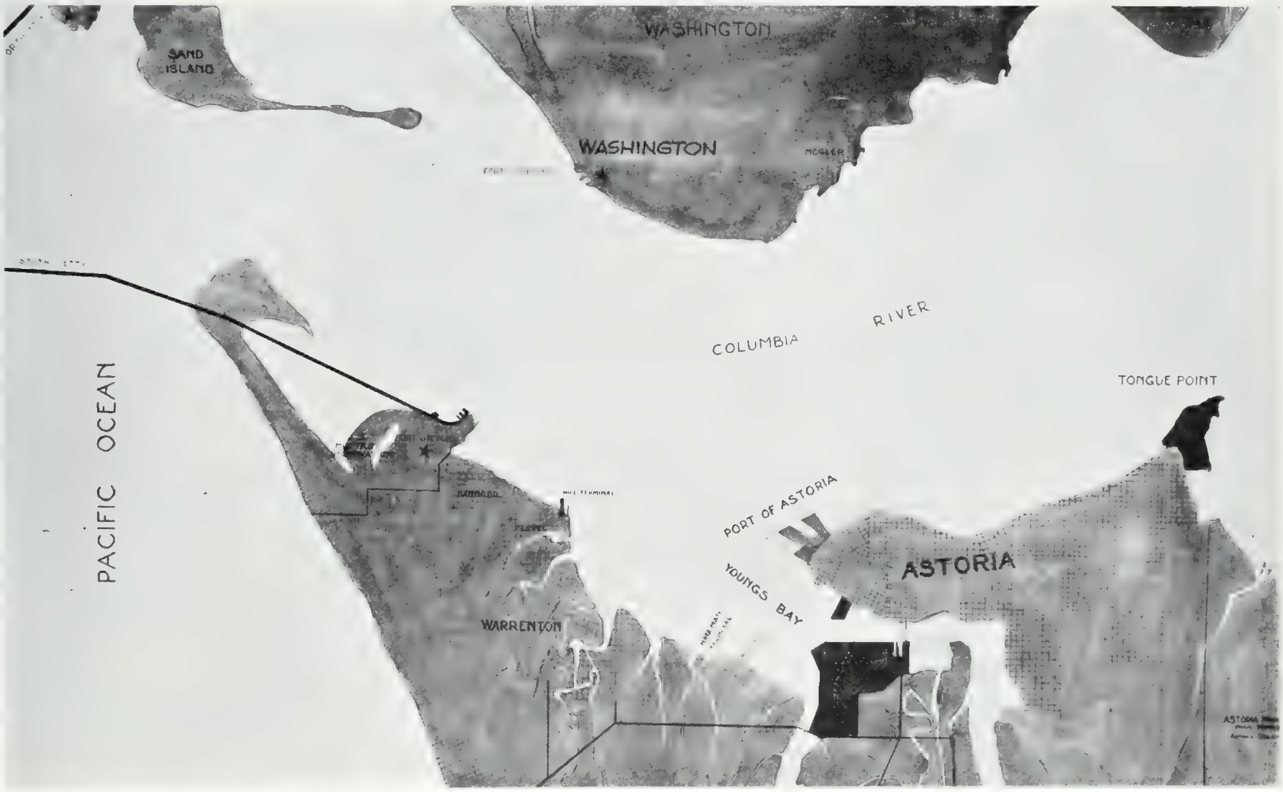
As soon as labor conditions are more stable, it is intended to start something in the way of educational work, and the service department is already operating for employes a circulating library of technical papers and magazines of interest to shipworkers. It is possible that something will be done in connection with the naturalization and Americanization movement which is so rapidly gaining headway, but this work will probably not be started until more normal conditions are reached, and the work force becomes more stable.

Employment Organization

The company recently announced a plan of a works organization which will give the employes an elected committee system for the purpose of handling any questions of activities pertaining to the comfort and welfare of the men. The plant is divided into fourteen departments and each department has an elected committee of three who represent it in conference with the management of other departments. The chairmen of these department committees form the yard committee, which acts for the yard as a whole, and the three officers of the yard committee meet with the service manager as an executive committee whenever necessary. It is intended that the works organization will handle relief, discipline, athletics, entertainment, grievances, and all similar yard questions. The organization of these committees is now going on but it will be several months before judgment can be passed upon the value of the plan.

Conclusion

This brief description of the service department of the Union Construction Company will serve to show the variety of the work which can be assigned to such a department and will suggest the relief from small details which its operation can give to the management. The combination of personnel work with a miscellaneous group of management details is not in accordance with the usual plan of a service department, but in this case the whole makes a well balanced and very interesting activity which the management feels is going to be more and more useful as it gains experience and becomes more generally understood.



The Port of Astoria

The above illustration shows very clearly the location of Astoria in connection with the mouth of the Columbia River. An important fur-trading and shipping point in the old days of the Hudson Bay Company and later of the Astor family, this town later became the center of considerable grain and lumber activities, and then later of wooden shipbuilding and of ship-outfitting. The Astoria correspondent of Pacific Marine Review has recently forsaken journalism, but his successor is now appointed and in August we will resume our Astoria Port Notes.

FIREMAN'S FUN
Insures Hulls, Cargoe
HEAD OFFICE: CALIFORNIA AND SANSO

JOSEPH HADLEY, European Agent
3 LOTHBURY, E. C.
LONDON

G. KIRKHAM SMITH, Special Agent
714-715 BOARD OF TRADE BUILDING
PORTLAND, ORE.

FRANK G. TAYLOR, GENERAL AGENT FOR WASHINGTON, OREGON, ALA

Recent Developments in Marine Insurance

TWO developments of more than ordinary interest have attracted considerable attention among marine insurance men in New York City and the East generally. One is the branching out of the Springfield Fire & Marine, and the other the licensing by the State of New York of the Eagle, Star & British Dominions. The Springfield has long ranked among the soundest and most conservative of fire underwriting companies, and has a loss-paying record second to none. It asserts, and doubtless justly, that it paid the first claim settled in the San Francisco disaster of 1906. Its marine writings have, however, been moderate. The latest official figures, those for the business of 1917, show that out of net premiums of $7,667,342 received that year, only $172,899 were for the marine account. The marine risks written in 1917 totaled $181,633,286, but after deducting expirations and terminations, the company only had $28,071,367 of marine business in force at the close of the year, and nearly $8,000,000 of that has to be deducted as having been reinsured. But now the old Springfield promises to become a serious contender for marine risks, for it has appointed as its general marine managers the well-known New York firm of Talbot, Bird & Company, of 63 Beaver street, who have a secure place among the leaders and already are the general marine agents for the Aetna, the Franklin of Philadelphia, the National of Copenhagen, and the Union Hispano-Americana of Havana. It is anticipated on the street that the association of this office with so notable a company as the Springfield will prove mutually advantageous.

No less interesting is the issuance of a marine license to the Eagle, Star & British Dominions, for this is one of the prominent marine writers on the other side, and has for its managing director none other than the redoubtable Sir Edward Mountain, a student of the highest grade. Fred S. James & Company are the United States managers of this office. They have not as yet made public their intentions so far as marine writing goes. It is understood that the entering of the company for marine business in New York was rather to provide for difficulties arising from the writing of automobile insurance, which is classed in some states with marine. It may do a direct marine business, but nothing definite will be known before Sir Edward Mountain arrives in this country, which will probably be soon.

British Expert's Views

Any reference to Sir Edward Mountain nowadays is certain to elicit complimentary references to his admirable address before the general meeting of the Eagle, Star & British Dominions, which was an unusually fine piece of analysis and has come to be regarded as the foremost expression of marine insurance views made in England this year. In it he expressly deplored the heavy and growing cost of repairs, and urged shipowners and underwriters to combine to prevent these excessive charges. Profit on hull insurance, in his opinion, depends almost entirely upon the item of repairs, as the great majority of claims are of this nature. Ever since the outbreak of the war, the cost of repairs has steadily increased, until it has reached at least 180 per cent. Various shipping repair yards in Great Britain have combined to maintain and even increase these costs. Owing to the demand for tonnage and the scarcity of docking accommodations, a large number of steamers that had met with accidents have had their repairs delayed, and this has had the effect of making it impossible for underwriters to form any estimate as to whether they are making a profit or loss on hull writings, and it will probably be two or three years before they will know just where they stand on the last few years' business. In the matter of cargo insurance, disruption has resulted from the underwriters' war-habit of including a great many extra risks which they had not accepted in the past, but as the premium for cargo and war risk combined was large, they included them without extra charge. But now, with the return to normal conditions, it is found that merchants have become accustomed to these inclusions, and competition is so keen that underwriters find themselves unable to get rid of the extra risks or to obtain reasonable additional premium for covering them. Marine conditions are certainly changed. Claims for theft have become heavier than they ever were before; in some quarters they are alarmingly great. Bills of lading are being utilized by shippers and shipowners to contract themselves out of liabilities that formerly were theirs, throwing the entire burden on the underwriters. To meet this, underwriters are seriously considering the insistence

SURANCE COMPANY
ights and Disbursements
TS, SAN FRANCISCO, CALIFORNIA
V. H. WOODRUFF, Special Agent
230 BYRNE BUILDING
LOS ANGELES
F. H. & C. R. OSBORN, Managers
ATLANTIC MARINE DEPARTMENT
69 WALL STREET NEW YORK
RITISH COLUMBIA, 264 COLMAN BUILDING, SEATTLE, WASHINGTON

upon a standard bill of lading which would make the shipowner stand his fair proportion of liability. Another point is the probable future shrinkage of business owing to the fall in the value of cargo, and, with it, the increase in particular average claims during the decline in prices. It is also to the detriment of the underwriters that good ships are being replaced with vessels of inferior class, owing to war losses, and that steamers are being distributed over many trades instead of being kept in the one for which they were built.

The recent observations of Mr. Henry Timmis, of the New York brokerage firm of O'Keefe & Lynch, on conditions along the St. Lawrence and the Great Lakes, have been received with much interest. Mr. Timmis points out that the canal system which is used by practically all the freighters on the Great Lakes explains in a large measure the troubles of the lake hull underwriters. Minor accidents are continually happening, resulting in the breaking of rudders and propellers and the bending of plates. The form on which the lake hulls are written is so broad that at the end of the season the hull underwriter will usually find that his premium income has to a large extent leaked away through small particular average claims during the season's operations, and if the season is one which brings some serious stranding, general averages and a total loss or two, his underwriting account will be very much on the wrong side. The lake hull form is so broad that it practically obliges the underwriters to pay for the ordinary wear and tear or upkeeping of the freighters. Another serious objection is the system of insuring the hull and machinery at the lowest possible valuation on the full form, and providing at a very much reduced rate insurance against total loss, general average and salvage charges on a disbursements or excess form. So long as these conditions prevail, underwriters will naturally have a decided preference for the cargo risks and make their commitments on the hulls as light as possible.

National Board

The thirty-seventh annual meeting of the National Board of Marine Underwriters was held at the board rooms, in New York City, on May 21. The attendance was large. President William H. McGee presided. Reports of the various committees showed the board to be in a flourishing condition. The membership is now made up of thirty-six companies and organizations. Officers were elected for the ensuing year, as follows: President, H. K. Fowler; vice-president, H. Bird; secretary, Louis F. Burke; treasurer, E. W. S. Morren; assistant treasurer, S. W. Shipway. A vote of thanks was given the retiring president and Assistant Secretary E. G. Driver for their services during the past year.

Faith Sold

Marine insurance men are interested in the recent sale of the famous concrete steamer Faith to the French-American Line by the Pacific Freighters' Association. Although no official announcement has been made as to the price paid, it is understood that the vessel brought between $300,000 and $400,000—a figure well under the cost of her production. Reports that serious trouble had been encountered with the hull have met with vigorous denial on the owners' part. They state that the recent visit of the Faith to a repair yard was for the sole purpose of having wooden deck houses replaced with ones of reinforced concrete. These changes were made, it is said, at the instance of underwriters who believed that wooden deck houses would not be sufficiently strong to stand the storms that might be encountered in the trans-Atlantic service. The Faith has covered some 18,000 miles, chiefly in the South American trade. Her skipper is loud in praise of her performance, and insists that she has not been pumped out since the day she was launched—and that was in March of last year.

Fire Loss in Shipyards

There is much of interest to marine underwriters in the report just rendered by General Fire Marshal James McFall of the plant protection section of the Emergency Fleet Corporation, on fire losses in shipyards and plants of that great organization. The total for the fourteen months up to May 1 was only $360,000, which is about 2/100 of 1 per cent of the $1,500,000,000 valuation placed on hulls, yards and plants. The known amount of fire and marine insurance in the United States for 1918 was $100,000,000,000, and the known fire loss was $290,000,000, or about 3/10 of 1 per cent. The fire-fighting and prevention equipment of the government shipyards is admirable. It includes chemical engines, water mains and hose, fire brigades and drills, elaborate warnings against the tossing about of lighted cigarettes and cigars, the use of watchmen on ships ready for launching, etc. There are in all some two hundred yards and plants in the corporation's construction department, and the excellence of Marshal McFall's work may be seen when it is realized that during the fourteen months covered by his report, 1908 keels were laid, 1217 hulls were launched, and 716 ships were delivered. Private yards might well take a leaf out of the marshal's book to their own advantage.

Great Lakes Losses

The sinking of the D. R. Hanna by the Quincy A. Shaw has opened the first month of Lake underwriting with a loss to the underwriters of about $1,000,000, and has cast a decided pall of gloom over this branch of the business. For the past four years there has been practically no profit in lake hull insurance, and it looks as though 1919 were going to beat many past bad records. It is estimated that the total of lake hull premiums runs between $2,000,000 and $2,250,000 for a season, and the Hanna-Shaw loss, added to several others that have already occurred, effectually puts the lake hull business out of the possible profit column for this year. The cargo premiums are looked to to help pull the underwriters out of some of their distress, but it is a slender hope.

The Rate Dispute

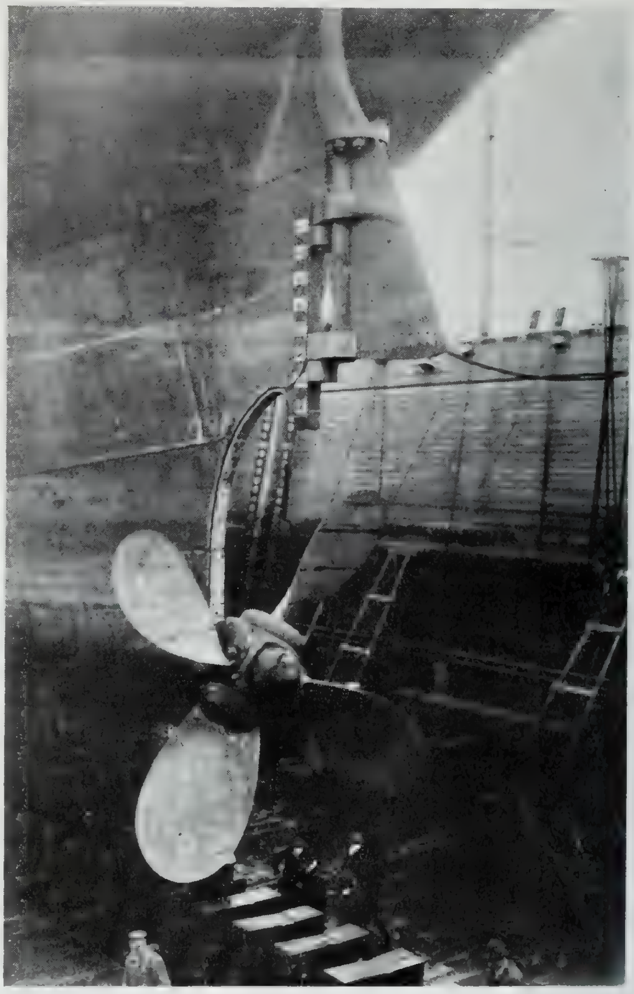
A rather spirited discussion of the question of whether or not British marine underwriters cut rates in this country is in progress between an English and an American insurance paper. The Englishman maintains that American hulls are too cheap and that it is not England that keeps the rates down; particular objection being taken to the use of the Standard Oil fleet as an illustration of foreign questionable rating practices. The London paper insists that what really happened was that the English underwriters outbid the Americans, but that it is as yet too early to say that the Standard Oil fleet was written too cheaply. Results to date, it maintains, justify the figure set by the British insurers; and closes its side of the case with the following general observations: "As a matter of fact, the quoting of any fleet or steamer as an instance of good, bad or indifferent underwriting is a practice strongly to be deprecated, and only the necessity of showing the false thesis which has been developed in this case has led me from my usual discretion in this direction. . . . The thing that counts is the general run of business."

Another illustration of the futility of writing auxiliary vessels at the ridiculously low rates now being quoted is supplied by the burning of the City of Orange to the water's edge in Cette, France. She was insured for about half a million dollars and was built at Orange, Texas. In type she was an auxiliary barkentine. It is said that the auxiliary vessels that have been constructed in Texas have met with unusually bad experiences, and hope is freely expressed by the more conservative underwriters that this latest lesson will be taken to heart.

The Washington Conference

Benjamin Rush, R. F. Talbert, William H. McGee and W. H. LaBoyteaux represented marine insurance interests at the series of Shipping Board conferences that have been held at Washington. These conferences extended during the closing days of May and the beginning of June, and, among other important matters considered, the subject of co-operation between employers, employes and the government with regard to the development of an American merchant marine has been studied.

Governor Smith of New York has signed the amendment to Section 48 of the laws of this state, which was passed by the recently adjourned legislature. It relates to the contents of advertisements and strikes out the clause that exempts domestic or foreign insurance companies engaged solely in the business of marine transportation or automobile insurance from the provisions that require all advertisements or public announcements of such corporations purporting to make known their financial standing. They must exhibit the amount of actual cash capital, assets, liabilities and net surplus. Before this change was effected, the law prohibited a foreign company from making use of its home office assets in any statements regarding its financial strength in this country. It was found that several companies were taking advantage of this opportunity, especially marine companies, which, for some reason or other, were exempted, and in order to prevent abuse of this privilege, it has been found desirable to keep a curb on this phase of the business.



S. S. Yomei Maru of Shinhama on dock at Seattle, showing broken rudder and stern frame

ACCIDENT TO YOMEI MARU

About a thousand miles off the Pacific Coast a huge wave carried away the stern frame and the bulk of the rudder of the Japanese steamer Yomei Maru of Shinhama. The captain, Matsuo, after a thorough investigation, ordered his crew to trim cargo and to submerge the remainder of the rudder so that he could maneuver his ship. He brought her into port at Seattle without further incident. She was there docked and the stern frame of cast steel was found to have a fracture showing decided crystalline structure, probably due to improper annealing. It was decided to remove this stern frame and substitute one of forged steel, which is now being installed.

Pacific Coast Shipbuilding Returns

Albina Engine and Machine Works, Inc., Portland Ore.

Purchasing Agent, **W. L. Deute.**

Hulls Nos. 11 to 19, 300 by 44 by 21.5; engines 22-36-60, 1400-h. p.

Doylestown launched June 12.

Allen Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **G. E. Hunt.**

Two Allen type vessels, 274.6 B. P. by 44.9 by 26.4.

American Concrete Pipe & Shipbuilding Co., Seattle, Wash.

One 7,500-ton concrete steamship.

One 150-foot steam concrete tugboat.

Two concrete scows, 120 feet long.

American Marine Iron Works, Portland, Oregon

Purchasing Agent, **Carl R. Jones.**

Contracts covering cast iron fittings for steel and wood yards of G. M. Standifer Construction Corporation, Vancouver, Wash.

Ames Shipbuilding and Dry Dock Co., Seattle, Wash.

Purchasing Agent, **Mr. C. A. Barron.**

Twenty-seven vessels under contract, mostly 8800- ton freighters.

West Islay, launched April 26.

Anacortes Shipbuilding Co., Anacortes, Wash.

Purchasing Agent, **Will W. Dunn.**

Two wooden vessels, Ferris type, 281 by 46 by 23.6; engines 19-36-56; 1500-h. p. watertube boilers. Delivery August, 1919.

Leota launched May 28.

Anderson Shipbuilding Corporation, 602 Alaska Building, Seattle, Wash.

Purchasing Agent, **W. G. Hall.**

Nos. 8 and 9, full powered motorships, 260 by 46 by 26, 3250 deadweight tons, twin screws, 1000-h. p. engines.

Apex Manufacturing Company, Emeryville, Cal.

Purchasing Agent, **A. Youngholm.**

Three hundred metallic life boats for U. S. Shipping Board.

Twenty metallic life boats for shipyards.

Astoria Marine Iron Works, Astoria, Ore.

Purchasing Agent, **Mr. J. A. Jackson.**

Completely outfitting 27 Hough and Ferris type wooden vessels.

Contractors for United States and French governments.

Overhauling and repair of ships a specialty.

Babare Bros., Old Town, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. Babare.**

Four wooden freighters, Ferris type.

Imufka launched May 29.

Ballard Shipbuilding Co., Ballard, Wash.

Purchasing Agent, **Mr. T. W. Smith.**

Three wooden steamers, 215 by 40 by 18.

Ballin Water Tube Boiler Co., Portland, Ore.

Sixteen Ballin type water-tube boilers for eight steamers. For the Supple & Ballin Shipbuilding Co.

Twelve Ballin type water-tube boilers for six steamers building at the G. M. Standifer Construction Corporation.

Barnes & Tibbitts, Alameda, Cal.

Purchasing Agent, **Mr. J. J. Barnes.**

Installation of machinery and fitting out nine vessels for Emergency Fleet Corporation.

General repair and dry-docking business.

Benicia Shipbuilding Corporation, Benicia, Cal.

Purchasing Agent, **L. S. Jones,** Alaska Commercial Bldg., San Francisco, Cal.

Bethlehem Shipbuilding Corporation, Ltd. (Union Works Alameda Plant), San Francisco, Cal.

Purchasing Agent, **Mr. A. H. Williams.**

Three 12,000-ton steel freighters; hulls 170, 215 and 216.

Eighteen 12,000-ton dw. steel tankers.

Contracts for six additional freighters.

Howard, launched April 26.

Cameron-Genoa Mills Shipbuilders, Ltd., Victoria, B. C.

Purchasing Agent, **Mr. P. D. Bannerman.**

Four Wooden freighters, 250 by 43.6 by 25, 950 h. p., 2800 tons dw.

Ralph J. Chandler Shipbuilding Co., Wilmington, Cal.

Six wooden vessels, Ferris type, 281 ft. 6 ins. by 46 ft. by 26; engines 19 by 32 by 56 by 3; 1400 h. p. Two tubular boilers. For U. S. Shipping Board.

Chilman's Shipyard, Hoquiam, Wash.

Purchasing Agent, **Mr. Iver Chilman.**

Two 3-mast auxiliary schooners 130 by 33 by 14. One 300-h. p. engine, for Belgian interests.

Coast Shipbuilding Company, Portland, Ore.

Four wooden freighters, Ferris type, 281.6 and 268 by 46 by 26, 1400 h. p.

Columbia Engineering Works (Linnton), Portland, Ore.

Purchasing Agent, **Mr. C. W. Steele.**

No. 14, motorship, 173 by 36 by 15.5; single screw Avance 320-h. p. oil engine. Delivery March, 1919. For Chr. Christensen, Jr.

No. 15, topsail schooner, 178 by 36 by 15. Delivery April, 1919.

Capacity of yard: 5 vessels at one time

Prepared to build any type of wooden ship. Specialize in schooners of 1000 to 3000 tons deadweight.

Columbia River Shipbuilding Corp., Portland, Ore.

Purchasing Agent, **Mr. H. A. Killam.**

Fifteen steel merchant ships, 8800 tons dw., General Electric and De Laval turbines, Scotch marine boilers. Deliveries 1919. Five of above now on ways.

Mount Evans launched June 5.

Commercial Boiler Works, Seattle, Wash.

Purchasing Agent, **Mr. J. H. Fox.**

Contracts for:

Fifty Scotch marine boilers, 14.9 inside dia. by 11 ft. long, H. S. 2695.5 sq. ft., W. P. 210 lbs., for vessels building on Pacific Coast. Delivery, twelve completed boilers per month.

Coos Bay Shipbuilding Company, Marshfield, Ore.

Manager, **Mr. J. H. Polhemus.**

Contracts for one Ferris type vessel. Length over all 281.6, 3500 dw. tons.

J. Coughlan & Sons, Vancouver, B. C.

Purchasing Agent, **J. Joseph.**

Four 8100-ton dw. freighters, 400 by 52 by 31, 3000-h. p., three Scotch marine boilers. For Dominion Government.

Crowley Launch & Tugboat Co., San Francisco, Cal.

..Purchasing Agent, **John L. Crowley.**

Six 28-foot launches with 10-h. p. engines.

Four 45-foot launches with 50-h. p. engines.

Eight covered barges, 125 by 40 by 12.

Derrick barge, 75-ton lifts, 125 by 50 by 12.

J. F. Duthie & Co., Shipbuilders & Engineers, Seattle, Wash.

Purchasing Agent, **E. C. Gaumnitz.**

Fifteen 8800-ton cargo vessels, 2800-h. p., 425 feet by 54 feet x 29.9; Scotch boilers.

West Henshaw launched June 2, 1919.

Elliott Bay Dry Dock Company, Seattle, Wash.

Local repair work, cleaning, painting and overhauling.

Elliott Bay Shipbuilding Co., Seattle, Wash.

Purchasing Dept., **C. A. Morrow.**

Six vessels, 260 by 46 by 26.

Contracts for five 3500-ton carriers.

Elliott Bay Yacht & Engine Co., Seattle, Wash.

Large amount of repair work.

Feeney-Bremer Company, Tillamook, Ore.

Contracts for three wooden ships, Ferris type, 281.6 by 46 by 26.

Foundation Company of British Columbia, Ltd., Victoria, B. C.

Purchasing Agent, **Mr. D. D. Long.**

Twenty 3000-ton dw. twin screw wooden steamers, 293.2 by 47.6 by 23.6, two Scotch marine boilers.

Winnipeg, launched April 26.

Foundation Co., Portland, Ore.

Local Purchasing Agent, **G. M. Raymond.**

Foundation Co., Tacoma, Wash.

Purchasing Agent, **Mr. Whiteside.**

Seattle Office: Smith Building.

Fulton Shipbuilding Company, Wilmington, Cal.

Purchasing Agent, **A. H. MacFarland.**

Four Hough design wooden steamers.

Nine Ferris design wooden steamers, 3500-ton, engines 19 by 32 by 56, 1400-h. p., two tubular boilers.

Admete launched May 29.

Grant Smith-Porter Ship Company, Aberdeen Shipyard, Aberdeen, Wash.

Purchasing Agent, **Mr. Z. A. Toye.**

Contracts for eleven Ferris type steamers.

The Grant-Smith-Porter Ship Co., Portland, Ore.

Purchasing Agent, **Mr. P. S. Sinnock.**

Contract for twelve Ferris type ships; length 286 feet, beam 46 feet, depth 28 feet; two standard E. F. C. boilers.

Acedma launched May 30.

Grays Harbor Motorship Corporation, Aberdeen, Wash.

Purchasing Agent, **Mr. H. L. Rich.**

Twelve 4000-ton ships of Ward type. For Emergency Fleet Corporation. Deliveries about two a month.

Eight building ships, maximum length 350 feet.

Complete machine shop for installing machinery.

Agron launched June 1.

Heylla launched June 7.

Great Northern Concrete Shipbuilding Company, Vancouver, Wash.

Purchasing Agent, **Mr. Pacquet.**

Three concrete hulls, Nos. 4, 5 and 6, 100 by 25 by 12.6.

Hammond Lumber Co., Eureka, Cal.

Purchasing Agent, **W. R. McMillan.**

Three steamers, Ferris type.

Hanlon Dry Dock & Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **C. J. Foard.**

Twelve cargo vessels, 320.9 by 46 by 26.9; three water-tube boilers. For Emergency Fleet Corporation.

Harrison & Lamond, South Vancouver, B. C.

One auxiliary schooner.

Helser Machine Works, Inc., Portland, Ore.

20 large size hawser reels for Pacific Coast Shipbuilding Co.
12 same as above for Pensacola Shipbuilding Co.
30 same as above for J. F. Duthie & Co.
44 same as above for The Columbia River Shipbuilding Co.
56 8¼ by 8 single geared winches, single gypsey.
28 8¼ by 8 single geared winches, double gypsey.
56 9 by 9 single geared winches, single gypsey.
All of above winches for Southwestern Shipbuilding Co.
180 cargo winches for Schaw-Batcher Shipbuilding Co.
200 9 by 9 cargo winches.
300 8¼ by 8 cargo winches.
80 9 by 9 cargo winches for Southwestern Shipbuilding Company.

Hesse-Martin Iron Works, Portland, Ore.

Purchasing Agent, **Mr. R. M. Hoffman.**

All auxiliary machinery for ten wooden steamers building by the G. M. Standifer Construction Co.

All auxiliary machinery for twenty-four wooden steamers building by the Grant-Smith-Porter Ship Co., at Aberdeen.

Anchor windlasses, cargo winches, steam capstans and steam steering gears for eight wooden steamers building by Supple & Ballin at Portland.

Forty steam cargo winches for ten steel steamers building by the Northwest Steel Company.

One hundred and thirty anchor windlasses, forty steam steering gears and fifty hand steering gears.

Herzog Electric & Engineering Company, San Francisco

Purchasing Agent, **H. C. Toumey.**

One Herzog double electric steering gear on M. S. "Katherine" at Hanlon Shipyard.

G. W. Kneass, San Francisco, Cal.

Purchasing Agent, **G. W. Kneass.**

Two tow boats, 60x15, 125-h. p. engine. For Peterson Tow Boat & Lighterage Company.

Three hundred metal life boats for Bethlehem Shipbuilding Corporation, Union Plant.

Kiernan & Kern Shipbuilding Co., Portland, Ore.

Purchasing Agent, **Mr. McCall.**

Four composite steamers of Ballin design.

Kruse & Banks, North Bend, Ore.

Purchasing Agent, **Robert Banks.**

Six hulls, Ferris design, 286 by 46 by 28.

Llewellyn Iron Works, Los Angeles, Calif.

Builders of Marine Engines, Boilers, Tanks, etc., for Emergency Fleet Corporation.

Present contracts include 1400-h. p. and 2800-h. p. marine engines with marine boilers for same, for most of the ships being built on the Pacific Coast.

Also reinforced concrete bars for concrete ships being built for the Emergency Fleet Corporation at the San Francisco Shipbuilding Company's yard in Oakland and at the Pacific Marine & Construction Company's yards in San Diego.

Long Beach Shipbuilding Company, Long Beach, Calif.

Purchasing Agent, **Mr. John Craig.**

Ten steel vessels of 9000 tons.

Eight steel steamers, 8,800 deadweight tons each.

Wallingford, 2302 gross tons; 244 by 42 by 26; 900 h. p.; engines 18 by 30 by 44 by 30; two watertube boilers. For U. S. Shipping Board.

W. Keene, launched April 26, 1919.

Los Angeles Shipbuilding & Dry Dock Co., Los Angeles, Cal.

Thirty 8800 - ton dw. vessels, 410 by 54 by 29.9, 3500 I. H. P. three Foster water-tube boilers. For Emergency Fleet Corporation. Delivery 1919-1920.

Equipment ample to build passenger, freight and naval vessels of any size and type, including machinery and equipment.

West Hika launched May 12.

West Conox launched May 20.

The Wm. Lyall Shipbuilding Co., Ltd., North Vancouver, B. C.

Three auxiliary schooners, 235 W. L. by 44.6 by 20.6 moulded.

Two 200-h. p. Fairbanks Morse Semi-Diesel engines for these boats.

Eight full-powered steamers, 1500 tons deadweight. For Republic of France.

Main Iron Works, San Francisco, Cal.

Four ocean-going tugs; engines 17 by 25 by 42 by 30; complete for Emergency Fleet Corporation.

Machinery for two tugs for Rolph Shipbuilding Company.

Shafting for concrete ships for Emergency Fleet Corporation.

Installation of machinery for Emergency Fleet Corporation.

Repairs to vessels for Emergency Fleet Corporation.

Marine Pipe and Machine Works, Inc., Seattle, Wash.

Purchasing Agent, **Mr. E. A. Lamb.**

One 6-cylinder Sumner type heavy oil engine, 650-h. p. For Chilean Government.

Two 1200-h. p. triple exp. steam engines.

Special marine repair department.

Martinolich Shipbuilding Co., 306 California Bldg., Tacoma Wash.; Yard at Dockton, Wash.

Purchasing Agent, **Mr. Martinolich.**

Three wooden 4-masted auxiliary schooners, 250 by 43 by 21; twin 240-h. p. Skandia engines. For Norwegian interests.

Matthews Shipbuilding Company, Hoquiam, Wash.

Purchasing Agent, **G. F. Matthews.**

Lumber carrier for Hart-Wood Lumber Company, 250 ft. long, capacity 1,500,000 ft.

Two auxiliary 4-masted schooners, 250 by 43 by 21. Twin 240-h. p. Skandia engines. For M. Isaakson, Norway.

McAteer Shipbuilding Company, Seattle, Wash.

Purchasing Agent, **Mr. Ramm.**

One steel vessel, 160 by 30 by 16.

Two four-masted schooners, 250 by 44 by 21; Skandia engines.

McEachern Ship Co., Astoria, Ore.

Purchasing Agent, **Mr. O. E. Draper.**

Three steamers, 286 by 46 by 28; Hough design.

Aroturous launched May 27.

Meacham & Babcock Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **Mr. W. N. Voegtly, Jr.**

Ten hulls, Ferris type.

Corus launched June 12.

Moore Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **M. G. Waites.**

Fifteen 9400-ton dw. steel freighters, 402 feet by 6 inches by 53 feet by 34 feet 6 inches; 2800 h. p. For U. S. Shipping Board.

Nine 10,000-ton dw. steel tankers, 425 feet by 57 feet by 33 feet; 2800 h. p. For U. S. Shipping Board.

Fitting out:

Hulls 1015 to 1022, inclusive, 1025 and 1026.

Motorship Construction Co., Vancouver, Wash.

Purchasing Agent, **J. W. Dougherty.**

Large number of wooden and metal lifeboats and Columbia River fishing boats.

Also contract for 750 lifeboats for Emergency Fleet Corporation.

National Engineering Corporation, Wilmington, Calif.

Outfitting ships for Emergency Fleet Corporation.

New Westminster Construction & Engineering Co., New Westminster, B. C.

Purchasing Agent, **Mr. H. M. Fullerton.**

Four 2800 dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

Five 1500-ton dw. wooden freighters, 204 by 40.6 by 17, 550-h. p. twin engines, watertube boilers.

Nilson & Kelez, Seattle, Wash.

Purchasing Agent, **Mr. Kelez.**

Eight wooden hulls, Ferris type.

Northwest Steel Company, Portland, Ore.

Purchasing Agent, **Mr. W. C. Smith.**

Six freighters, 2500 I. H. P., 423 feet 9 inches by 54 feet by 29 feet 9 inches, 8800 tons dw., geared turbine drive, oil burners.

Four freighters, 2800 I. H. P., dimensions same as above; three Scotch marine boilers, oil burners.

West Chatala launched May 3; 37½ days of 16 hours.

West Segovia, launched May 21; 41½ days of 16 hours.

Pacific American Fisheries, South Bellingham, Wash.

Purchasing Agent, **Mr. B. U. Slyster.**

Pacific Boat & Iron Works, Portland, Ore.

Two hundred metal lifeboats and 100 liferafts for steel yard in this district.

Contract for Corser's one-man simultaneous releasing hooks on all lifeboats.

Capacity: Three boats a day.

Pacific Coast Shipbuilding Co., 317 First National Bank Bldg., San Francisco, Cal.; Plant, Bay Point, Cal.

Purchasing Agent, **Mr. J. M. Duke.**

Four 9400-ton dw. steamers.

Pacific Construction Co., Ltd., Coquitlam, B. C.

Purchasing Agent, **Mr. R. W. Holland.**

Two 2800-ton dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

No. 3, Wooden steamer, 250 by 43.6 by 25, 1000-h. p. watertube boilers.

No. 4, Same as No. 3.

Nos. 5 and 6, 1500-ton full-power barges, 204.8 by 39.8 by 17, 275 I. H. P. engines, 5 water-tube boilers.

Pacific Marine and Construction Company (Scofield Engineering Company) San Diego, Cal.

Contracts for two concrete ships of 7500 tons.

Pacific Marine Iron Works, Portland, Ore.

Purchasing Agent, **Mr. V. L. Hamlin.**

Contracts for four 1600-h. p. triple expansion engines.

Contracts for six 1400-h. p. triple expansion engines.

Patterson-MacDonald Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **W. J. Thomas.**

Ten wooden steamers, 281.6 by 46.10 by 27, twin screw, triple expansion engines, 1550-h. p. 30-15½-25½-42. Two Heine boilers.

Pacific Shipbuilding Corpn., Seattle, Wash.

Purchasing Agent, **C. H. Jones.**

Yard designed with six building ways.

Peninsula Shipbuilding Co., Portland, Ore.

Purchasing Agent, **Mr. H. H. Fisher.**

Seven steamers, 287 by 49.8 by 27.6. To be equipped with Westinghouse turbines.

Four sailing vessels.

Capacity of yard: Four ways, wood construction, installation wharf.

Puget Sound Boiler Works, Seattle, Wash.

One Scott Patent Water Tube Boiler, 200-h. p. pressure, for Anderson Shipbuilding Co.

Contracts for condensers, water feed tanks, boiler casings and smoke stacks.

Large amount of local marine repair work.

Puget Sound Bridge & Dredging Co., Seattle, Wash.

Purchasing Agent, **Mr. Moore.**

Complete installation of machinery for twenty-four wooden vessels.

Two wooden hulls, Grays Harbor Motorship type.

Six 5,000-ton wooden hulls.

Geo. F. Rodgers & Co., Astoria, Ore.

Purchasing Agent, J. P. O'Connor.

Six hulls, Ferris type, 3500 tons dw., 281.6 by 46 by 26. For U. S. Shipping Board.

Four-way yard. Construct Ferris type hulls.

Rolph Shipbuilding Company, Eureka, Cal.

Purchasing Agent, **John D. Stelling.**

Nine steamers, Ferris type, for U. S. Shipping Board.

Two four-masted barkentines, 1,650,000 feet lumber capacity. To builders' account.

One tug-boat, 750 h. p., for Rolph Navigation & Coal Company.

Sanderson & Porter, Raymond, Wash.

Two wooden hulls, Ferris type, standard wood steamships. Delivery 1919.

Five-way yard. No plant equipment for outfitting of hulls.

S. S. Black Wolf launched May 26, 1919.

San Diego Marine Construction Co., San Diego, Cal.

Purchasing Agent, **C. W. Stose.**

No. 136, Tow-boat "Pullet," 55 by 12 by 7.6; 100 h. p. Leary oil engines. Delivery April, 1919. For San Diego Tow Boat Company.

San Francisco Shipbuilding Co., 310 California St., San Francisco, Cal,

Purchasing Agent, **Mr. J. M. Cummins.**

Two 7500-ton dw. bulk oil steamers and one 7500-ton dw. freighter, reinforced concrete, at Government Island Plant, Oakland, Cal.

Palo Alto launched May 29.

Schaw-Batcher Company, South San Francisco

Purchasing Agent, **K. I. Dazey.**

Three single-screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2500-h. p. Curtis turbines, 4 Heinie boilers.

Ten single-screw freighters, 8800-ton dw., 427 by 54 by 29.9; 2800-i. h. p. reciprocating engines, 24½ by 41½ by 72 by 48; three Scotch boilers. Deliveries 1919.

Seaborn Shipyards Company, Tacoma, Wash.

Purchasing Agent, **P. J. Anderson.**

Fourteen hulls, Ferris type. Deliveries by April, 1919.

Four-way yard prepared for any kind of wood construction.

Oelwein launched June 4.

Seattle Machine Works, Inc., Seattle, Wash.

Purchasing Agents, **Frank H. Wheelon** and **D. Crause.**

Three 2700-h. p. triple-expansion engines for Skinner & Eddy Corporation.

Two 750-h. p. triple-expansion engines for Pacific American Fisheries.

One 500-h. p. triple expansion engine for McAteer Shipbuilding Co.

Two 2500-h. p. triple-expansion engines for Ames Shipbuilding & Dry Dock Company.

Seattle-North Pacific Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **F. H. Magune.**

Ten freighters, 402.5 by 53 by 34.5. Parson turbine, three Foster boilers. Deliveries 1919.

Askawake launched June 12.

Skandia Pacific Oil Engine Co., Oakland, Cal.

Purchasing Agent, **Mr. L. M. Bliss.**

Twenty 825 B. H. P. Werkspoor Diesel engines for installation in 5600 tons steel fabricated motorships.

Six 500-h. p. Skandia oil engines; four 240 h. p. and six 120 h. p. engines.

Additional engines of smaller capacity.

Skinner & Eddy Corporation, Seattle, Wash

Purchasing Agent, **Ray Anderson.**

Contracts for twenty 9600-ton dw. freighters for U. S. Shipping Board.

City of Spokane launched June 14.

Colorado Springs launched June 26.

Sloan Shipyards Corporation, Olympia, Wash.

Purchasing Agent, **Mr. L. P. Byrne.**

Sixteen freighters, 281.6 by 46 by 26, 19-32-56 by 36; 1400-h. p.

Smith & Watson Iron Works, Portland, Ore.

Purchasing Agent, **Mr. H. W. Bates.**

Contracts to furnish all castings, fittings, condensers and auxiliary machinery for thirty ships building by Columbia River Shipbuilding Corporation.

Somarstrom Shipbuilding Co., Columbia City, Ore.

Four wooden steamers, Hough design, 288 feet long.

Four wooden steamers, Ferris type.

Southwestern Shipbuilding Co., Los Angeles, Cal.

Twenty-three single screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2800 i. h. p. reciprocating engines; three Scotch boilers. For U. S. Shipping Board.

West Chetac launched May 14, 1919.

Standard Vault & Metal Works, Portland, Ore.

Purchasing Agent, **Mr. R. G. E. Cornish.**

Life boats, life rafts.

Sheet metal equipment for ships.

G. M. Standifer Construction Corp., North Portland, Ore., and Vancouver, Wash.

Purchasing Agent, **Mr. H. Luckett**, Vancouver, Wash.

Four wooden freighters, 281 by 46 by 26; 1700-h. p., Ferris type.

Five composite steamers, Ballin design, 4500 tons.

Fifteen steel steamers, 9500 tons. Delivery early in 1919.

Akanaquent, launched April 26.

Three shipyards, fifteen building berths.

Stephens Bros., Stockton, Cal.

Two wooden towboats, 50 by 13 by 8, for Island Transportation Co.

One 65 ft. by 14 ft. butcher boat, equipped with 6-cylinder Wisconsin motor. For Pollard Brothers.

One 40 ft. by 7½ ft. raised deck runabout cruiser, equipped with 6-cylinder Wisconsin motor. For Mr. W. Q. Wright, of the Bay & River Dredging Company.

St. Helens Shipbuilding Co., St. Helens, Ore.

Purchasing Agent, **Mr. Barnett.**

No. 42, schooner, 286 o. a. by 48 by 27; to the order of Chas. R. McCormick & Co.

W. F. Stone Shipbuilding Co., Oakland, Cal.

Purchasing Agent, **Mr. Lester F. Stone....**

Four 150-foot wooden hulls for seagoing tugs, 30-foot molded beam by 17 ft. depth.

Miscellaneous repair work.

Supple & Ballin Shipbuilding Corporation, Portland, Ore.

Purchasing Agent, **Mr. Charles Burton.**

Four 4500-ton steamers, Ballin design, 309 feet o. a. by 44 by 26, diagonal planked, steel reinforcing on top sides, single screw; 1500-h. p.

Nos. 9 to 12.

Tacoma Shipbuilding Company, Tacoma, Wash.

Purchasing Agent, **Mr. D. D. McKay.**

Contracts for six Ferris type vessels. For U. S. Shipping Board.

Motorship Ambassador, 120 by 22 by 12 feet for W. H. Rust. Delivery August 1, 1919.

T. R. Trahey, Ballard, Wash.

One oil barge, 110 feet long and 32 feet wide, capacity 150,000 gallons. For General Petroleum Company

Tregoning Boat Co., Seattle, Wash.

Purchasing Agent, **Mr. C .Tregoning.**

A large number of lifeboats and ship power launches.

Todd Dry Dock & Shipbuilding Co., Tacoma, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

Eight cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 watertube boilers.

Twenty-four cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 S. E. S. boilers.

All of above for Emergency Fleet Corporation. Deliveries by January, 1920.

Todd DryDocks, Inc., Harbor Island, Seattle, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

General drydock and repair work.

Zarembo launched June 4, 1919.

Union Construction Company, Oakland, Cal.

Purchasing Agent, **Mr. Chas. L. Froding.**

Contracts for 10 steel ships of 9400 tons, Isherwood type, 402.5 by 53 by 34.5; three watertube boilers, 2800-h. p. turbines. For the U. S. Shipping Board.

Hatchie, launched April 26.

City of Berkeley launched June 14.

Vancouver Shipyards & Engine Works, Ltd., Vancouver, B. C.

Contracts in hand for two wooden vessels.

Wallace Shipyards, Ltd., North Vancouver, B. C.

Purchasing Agent, **Mr. C. Wallace.**

Three steamers, 300 by 45 by 27, single screw, reciprocating engines.

Contracts for four 8,100 dw. steel vessels.

Western Canada Shipyards, Ltd., Vancouver, B. C.

Five 195 by 39.8 by 17 watertube boilers.

Willamette Iron & Steel Works, Portland, Ore.

Purchasing Agent, **Mr. S. F. Woodbury.**

Installing new boilers and breechings in S. S. Oleum, Union Oil Company tanker.

Twenty 13-ft. 9-in. by 11-ft. 3½-in. Scotch marine boilers for Foundation Company, Victoria, B. C.

Sixty-three 3-furnace Scotch marine boilers for vessels building in Pacific Coast yards for Emergency Fleet Corporation.

Twelve 15-ft. 3-in. by 11-ft. 4-in. 3-furnace Scotch marine boilers, for Kiangnan Dry Dock & Engine Company, Shanghai, China.

Wilson Shipbuilding Company, Astoria, Ore.

Purchasing Agent, **W. G. Wray.**

Four wooden vessels, 281.6 by 46 by 26; Ferris type. For Emergency Fleet Corporation. Delivery March 1 to August 1, 1919.

Wilson Shipyards, Inc., Seattle, Wash.

Three building-ways ready for constructing wooden vessels up to 3500 tons.

Wright Shipyards, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. P. Wright.**

Two wooden steamers, "Elissa" and "Endymion," 3500 tons each, length 282 feet, beam 46, depth 26. For U. S. Shipping Board.

Yarrows, Ltd., Esquimalt, B. C.

Two shipways suitable for building vessels up to 350 feet in length.

Marine repairs a specialty.

OTHER SHIPBUILDING COMPANIES

American Shipbuilding Company, Warrenton, Ore.
Ballard Marine Railway Company, Seattle, Wash.
Chico Shipbuilding Co., 4185 Arcade Building, Seattle, Wash.
Clapp & Reed Shipbuilding Company, Seattle, Wash.
Columbia River Shipbuilding Co., Vancouver, Wash.
Craig-Wilde Ship Company, Los Angeles, Cal.
Wm. Cryer & Son, Oakland, Cal. W. E. Cryer, Purchasing Agent.
Fellows & Stewart, Inc. V. B. Stewart, Purchasing Agent, Wilmington, Cal.
French-American Shipbuilding Corp., 418-420 Marsh-Strong Bldg., Los Angeles.
Halstrom Shipbuilding Co., Inc., Seattle, Wash.
International Shipbuilding Company, Columbia City, Ore.
King & Winge Shipbuilding Co., C. B. Winge, Purchasing Agent, Seattle, Wash.
Marine Iron Works, Seattle, Wash.
Mare Island Navy Yard, Mare Island, Cal.
Muller Shipbuilding Company, 410 I. N. Van Nuys Building, Los Angeles, Cal.
Oceanic Shipbuilding Co., Milwaukee, Ore.
John E. Price & Company, Hoge Building, Seattle, Wash.
Port Blakeley Shipyard, Port Blakeley, Wash.
Puget Sound Navy Yard, Bremerton, Wash.
T. B. Puck & Co., Honolulu, T. H.
Raymond Shipbuilding Co., Raymond, Wash.
Sehrs Shipyard, Port Townsend, Wash.
South Bend Shipbuilding Co., South Bend., Wash.
Southern California Shipbuilding Corporation, 405 Trust & Savings Bldg., Los Angeles, Cal.
H. D. Stewart Shipbuilding Company, American Bank Building, Seattle, Wash.
Union Timber & Products Co., O. L. Craven, Pres., Port Towsend, Wash.
United Shipbuilding Corporation, Hoge Bldg., Seattle, Wash.
U. S. Steel Shipbuilding Corp., Ltd., Los Angeles, Cal.
Varney Shipbuilding Corporation, Seattle, Wash.
Washington Shipbuilding Corp., C. E. McMasters, Pres., Burke Bldg., Seattle, Wash.
West Coast Shipbuilding Co., H. W. Hellman Bldg., Los Angeles, Cal.

Book Reviews

TECHNICAL LITERATURE

Practical Ship Production. By Lieutenant-Commander A. W. Carmichael, United States Navy, Naval Architect and Marine Engineer. Ten chapters, 243 pages, 101 illustrations. Published by the McGraw-Hill Book Company, Inc., 239 West Thirty-ninth street, New York City.

This book presents in convenient form the most important general principles of ship design, and describes the various processes in connection with the building of ships. A very handy volume as an introduction to the study of naval architecture.

The Elements of Wood Ship Construction. By W. H. Curtis, Naval Architect and Marine Engineer. Five chapters, 229 pages, 199 illustrations. Published by the McGraw-Hill Book Company, Inc., 239 West Thirty-ninth street, New York City.

This volume collects in compact form a series of pamphlets prepared by the author for the education and training section of the Emergency Fleet Corporation. It is intended for the use of carpenters who, though skilled in their trade, lack the special knowledge necessary to enable them to work efficiently as ship carpenters.

Marine Insurance, Its Principles and Practice. By William D. Winter, LL.B. 433 pages. McGraw-Hill Book Company, 239 West Thirty-ninth street, New York City.

The author of this very interesting and timely volume is third vice-president of the Atlantic Mutual Insurance Company of New York and special lecturer on marine insurance at New York University. The book is a compilation of his lecture course on marine insurance and covers that subject comprehensively in a very interesting way. The introductory chapters on "History of Marine Insurance," "Physical Geography in Its Relation to Marine Insurance," "Commercial Geography," "Ships and Shipbuilding," and "The Ship as a Cargo Carrier," are especially good and alone make the book worth while. American underwriting of risks is assuming large proportions and an authoritative American treatise on this subject is very welcome.

Compressed Air for the Metal Worker. By Charles A. Hirschberg. Three hundred and twenty-five pages, numerous illustrations, tables and drawings. Clark Book Company, Inc., New York.

A very practical handbook of information, covering the industrial uses of compressed air and the history thereof from the earliest times.

The subject is classified under the following heads: Power plants, forge shops, foundries, boiler and structural shops, machine shops, miscellany. The chief uses cited are: Agitating, transferring and operating liquids; aerating liquids and metals; conveying, handling and hoisting; cleaning machinery; drying; metal spraying; painting, enameling and whitewashing; pumping water and other liquids; starting; testing; operating various tools; operating heavy machines.

TRADE PUBLICATIONS AND CATALOGS

The normal flood of trade literature is beginning to arrive. The following descriptive list gives some idea of the amount of this material that has reached our office during the last two months. Many of these books are of great value to the particular lines that they represent and contain up-to-date information not to be found elsewhere in literature. They will all be sent free on request by the respective publishers.

C. H. Wheeler Manufacturing Company, Philadelphia, Pennsylvania.

An attractive booklet, covering the design of condensers and their use, especially with regard to marine high pressure steam turbine installations.

Fuel Oil Uses, Economy, Efficiency and the Apparatus Necessary for Its Use. Fifty pages, with many charts, diagrams and illustrations. Tide Water Oil Company, New York.

A fascinating subject treated in a very interesting way, and very tastefully draped by the printer.

Shipping Guide, 1919. Twelve pages. Published by the Maritime Navigation Company, A. C. Worthington, vice-president, San Francisco, California.

A very useful booklet, giving the cubic measurement of all commodities exported or imported and directions for applying same in figuring ocean freight tariffs.

Structural Steel for Ships. Sixty pages, with diagrams, half-tones and tables. Published by Carnegie Steel Company, Pittsburgh, Pennsylvania.

This little volume gives the standard practice for steel shapes and plates as adopted by the Emergency Fleet Corporation of the United States Shipping Board.

The American Thompson Improved Indicator. Thirty-two pages, with cuts, drawings and tables. Published by the American Steam Gauge & Valve Manufacturing Company, Boston, Massachusetts.

A neat catalog of this popular indicator, describing the many improvements and incorporating a very useful manual of instructions covering the use of the indicator and the calculation of cards.

Steam Specialties That Have Won Their Way by Merit. Thirty-five page catalog published by Green, Tweed & Company, 109 Duane street, New York.

An attractive description of this firm's line of packing, including the well-known Palmetto, Manhattan, Royal, Crescent and Union brands, together with a few special tools developed by them.

Structural and Plate Workers' Tools. Eighty-page catalog, No. 8, 1919. Published by the Cleveland Steel Tool Company, Cleveland, Ohio.

A very useful handbook of this company's standard line of chisels, coupling nuts, punches, dies, die sockets, punch holders, rivet sets, shear blades and markers, giving dimensions and suggestions for use.

Williams' Dependable Drop-Forged Machine Tools. Thirty pages, profusely illustrated. Published by J. H. Williams & Company, Brooklyn, New York City.

A neat catalog of the Agrippa line of tools and tool holders and of other specialties manufactured by this well-known firm.

Bolt, Nut and Forging Machinery. Two hundred and twenty pages, with many illustrations and tables. Published by the Acme Machinery Company, Cleveland, Ohio.

A very complete, descriptive catalog of the Acme line of forging, tapping and threading machinery.

Lidgerwood Marine Machinery. Sixty pages, with numerous half-tones. Published by the Lidgerwood Manufacturing Company, New York.

This large catalog gives a comprehensive description of the ship cargo winches, steering engines, dock winches, cableways, and towing machines. The line of winches is very extensive and includes electric, steam or gas drive.

Derricks and Cranes. Eighty pages, illustrations, descriptive matter and tables. Published by the Edward F. Terry Manufacturing Company, New York.

An artistic catalog of shipyard cranes, steel derricks, derrick irons, contractors' equipment, erectors' tools and structural steel manufactured under Edward F. Terry patents.

Brownhoist Locomotive Cranes. Ninety-eight pages. Catalog K, 1919, of the Brown Hoisting Machinery Company, Cleveland, Ohio.

A beautifully illustrated booklet. Brownhoist cranes of all types and sizes are shown pictorially in their various uses.

Boiler Logic. Ninety pages, numerous cuts, drawings and tables. Published by the Heine Safety Boiler Company, St. Louis, Missouri.

An excellent treatise on boiler design, with special reference to water-tube boilers, and followed by detailed description of the Heine boilers as adapted for different fuels, firing and services.

Direct Current Generating Sets: Thirty-two pages, with drawings and half-tones. Published by Engberg's Electrical & Mechanical Works, St. Joseph, Michigan.

The notable typographical feature of this booklet is the blueprint repro duction of drawings. It describes direct connected steam engine driven, direct current generating sets from one to fifty kilowatt capacity, designed and constructed especially for marine requirements.

Milwaukee Gasolene Locomotives. Thirty-five pages. Publication No. 117 of the Milwaukee Locomotive Manufacturing Company, Milwaukee, Wisconsin.

Describes a complete line of standard and special gauge locomotives for applying gasolene motive power to industrial track haulage.

Transportation via the P. & H. Line. A sixteen-page leaflet, illustrating the P. & H. system of hoists, cranes and monorail carriage. Published by the Pawling & Harnischfeger Company, Milwaukee, Wisconsin.

Contains many useful hints for the users of cranes and much information on economical speeds in hoisting and crane bridge travel.

S. D. S. "Stampings! Drawings! Spinnings! All quickly accomplished on a high-quality basis at a price that is fair to you." A dozen short stories of the Pressed Steel Products Division of the Benjamin Electric Manufacturing Company, Chicago.

A vest pocket edition, setting forth a few of the shapes to be obtained in thin pressed steel and showing how these may be finished to your order in porcelain, enamel, paint enamel, japanned, or retinned.

Grey Iron Ship Castings. A tasteful loose-leaf folder catalog. Form A, 1919, of the Central Foundry Company, 80 West street, New York.

This catalog describes mooring fixtures and general ship castings, such as sheaves, scuttles, pipes and pipe flanges.

Holding Power. An interesting brochure on the Dunn stockless anchor, written by D. W. Phillips and issued by A. Trevor Jones, sales agent for the American Steel Foundries, Chicago, Illinois.

"Manganese Bronze Ingots" and **"Manganese Bronze, The Legitimate Metal for Propellers."**

Two neat booklets, describing the uses of this metal in the industries and in marine engineering.

Armco Iron Rods and Wire for Oxy-Acetylene and Electric Welding. Published by Page Steel & Wire Company, 30 Church street, New York City.

A sixty-page book of very convenient pocket size, containing enough data and information to make it a very useful handbook for welders. Sixteen pages of blank cross-section ruled paper at back of book add to its convenience and value.

The Steam Motor. Bulletin No. 5 of the Steam Motors Company, Springfield, Massachusetts.

The steam motor is radically different from other types of steam turbine in that it is not in itself a complete machine. It is manufactured with one bearing only, and when connected to the driven apparatus becomes an integral part of the complete set, making a unit of the two bearing overall type.

The bulletin calls attention to the various advantageous points of the design and the illustrations cover many of its applications. Hundreds of these efficient small turbines have been installed, driving pumps, generating sets and blowers on vessels built for the Emergency Fleet Corporation and for the French government.

Semi-Centennial Souvenir, 1868-1918. The Yale & Towne Manufacturing Company.

The trade-name "Yale" has for many years held an enviable reputation for excellence in design and construction of locks of all kinds, and this book sets forth the reasons therefor in the life-history of the men at the head of the organization, which justly lays claim to being the largest manufacturer of locks in the world. In marine engineering circles the name stands out on an excellent chain block which may be found in almost every shipyard.

Modern Methods for the Speedy and Economical Handling of Materials. The 1919 edition of the cranes and handling equipment catalog of the Colby Steel & Engineering Company, Seattle, Washington.

How the "Samson" crane and Colby tractors and trailers and overhead monorail systems are proving their worth in the shipyards and lumber yards and on the docks of the Pacific Coast is convincingly told in this twenty-five page booklet.

Chain Drives. A pamphlet catalog of the Morse Chain Company, Ithaca, New York, describing the construction and uses of the Morse frictionless, rocker-joint steel chain belting for power transmission.

The National Association of Cotton Manufacturers has advised the adoption of chain drive as standard practice in the textile industry. There are now in daily service in the United States, Morse chain drives transmitting an aggregate of upwards of 3,000,000 horsepower.

Harrison's Marine Paints. Catalog and color cards of the marine line of the Harrison works of E. I. du Pont de Nemours & Company, Wilmington, Delaware.

This booklet is divided into two sections, part one dealing with those paints especially suitable for industrial use, and part two with those for private owners' use. Products applicable to the two classes are listed under both heads, and in the second section there is a wide choice of colors in interior and engine enamels.

Propeller Tail-Shafts of Ships. By Alexander McNab, M. E. Published by the McNab Company, Bridgeport, Connecticut.

Describes the method of constructing the housing and bearings for and lubricating of the propeller tail-shafts, known as the McNab-Vickers patent stern tube appliance. For many years sea water or a mixture of sand and grit and sea water was depended on for stern shaft lubrication, necessitating expensive lignum vitae bushings and bronze liners. The patent system here described uses a gravity feed oil supply, cast iron bushings, and excludes the sea water by a series of composition and felt washers and grooved rings. This system has been approved by the British Admiralty and Ministry of Shipping and by the Emergency Fleet Corporation.

Foster Marine Superheaters. Bulletin M-2. A manual of general instructions. Published by the Power Specialty Company, 111 Broadway, New York.

A very concise, practical manual for the operation and maintenance of superheaters and the avoidance of waste in the use of steam.

A Short Course in Oxy-Acetylene Welding. By Professor S. Kinsey, Stevens Institute of Technology. Published by Air Reduction Sales Company, New York.

This booklet is issued by the publishers as a suggestive course in oxy-acetylene welding and cutting for colleges and technical schools. Assembled in loose-leaf form, with blank pages for notes, this little volume should make a welcome addition to the library of any student of the welding process.

Irving Subway, the Fireproof Ventilating Flooring. A thirty-six-page catalog issued by the Irving Iron Works Company, Long Island City, New York.

A well-illustrated booklet showing the different types of Irving metallic flooring and its various applications in the industrial world.

The Valve World. Published monthly by the Crane Company, 836 South Michigan avenue, Chicago.

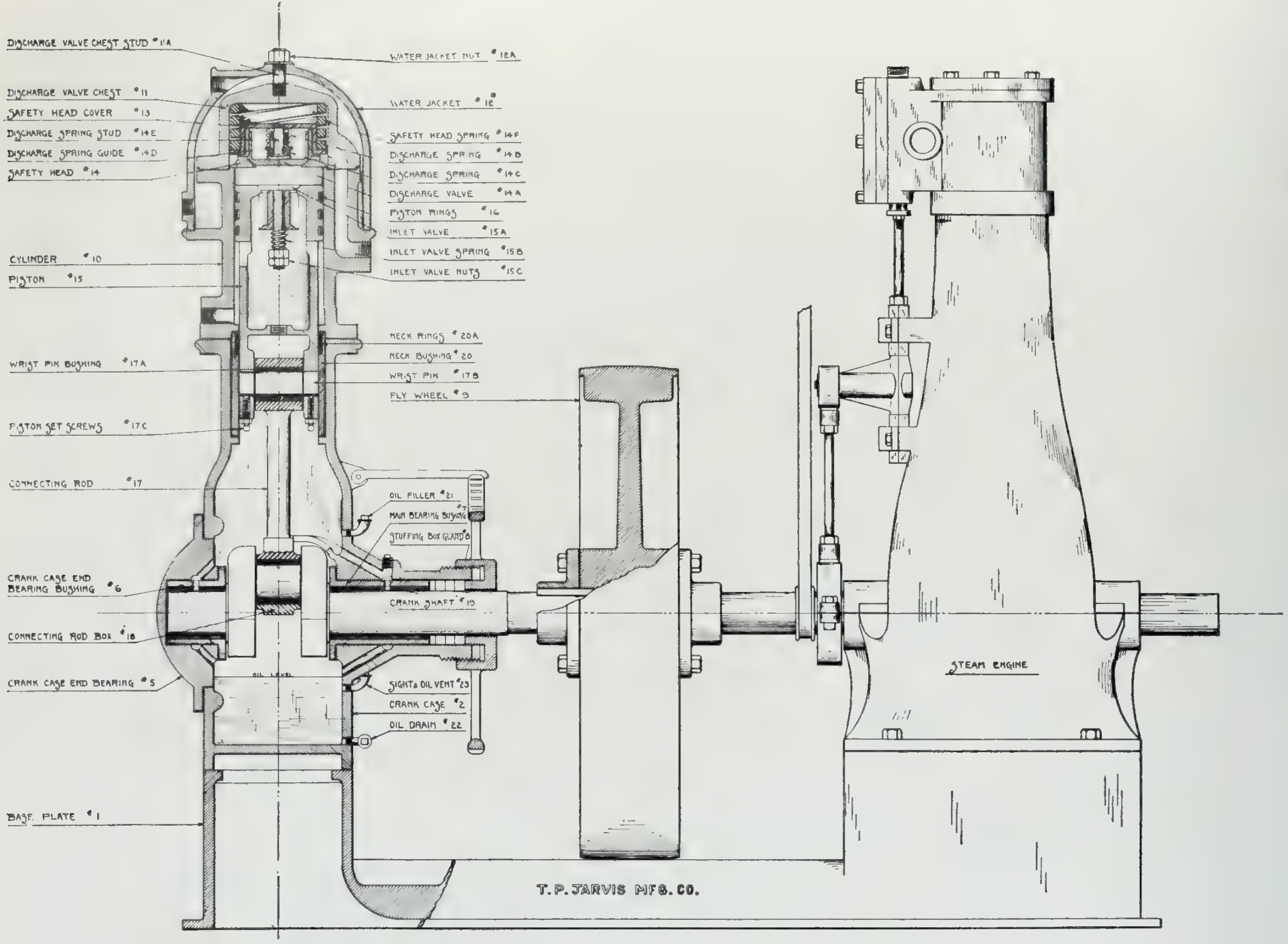
A thirty-page magazine full of interesting material from all parts of the world, together with up-to-date information on industrial developments. The illustrations are good and few magazines that have come to our notice can compare with this for the variety of subjects treated in small compass.

MALLEABLE IRON

At last an authentic treatise on "malleable iron" has been published. It is entitled "Malleable Iron" and is issued gratuitously by the American Malleable Castings Association, with headquarters at Cleveland, Ohio.

The latest booklet, although only a forerunner for a very comprehensive volume to be issued later by the association, is filled with valuable data. It is divided into three parts: First—What is Malleable Iron? Second—The American Malleable Castings Association. Third—The Uses of the Malleable Iron Castings; Can Heavy Sections of Malleable Iron be Completely Annealed?; The Skin of a Malleable Iron Casting; Malleable Iron Castings Resist Rust.

The Jarvis System of Mechanical Refrigeration



Direct connected steam driven compressor for Jarvis ice machine and marine refrigerating plants

THE Jarvis ice machine and complete equipment for mechanical refrigeration are manufactured in San Francisco by the T. P. Jarvis Manufacturing Company. These engineers have found that the most efficient method of mechanical refrigeration is the direct expansion system. The principal advantages of the Jarvis system are its simplicity, economy, ease of operation and compactness. The Jarvis system has earned an enviable reputation with such ship operators as the McCormick Steamship Company, the Gulf Mail Steamship Company, the E. K. Wood Lumber Company, the J. H. Baxter Company and other ship owners. The Jarvis company has specialized in small mechines of marine design in sizes of one-half to two tons, refrigeration capacity, either direct connected steam driven, or electric motor driven.

One of the prime principles of construction in the Jarvis plant is to build their machines with great strength and durability. It is interesting to note that cylinders, bedplates, out-board bearings, etc., are all cast separately. This is expensive construction, but was adopted to permit renewal of any part at small expense. The performance of these sturdy little machines has proved that quality construction in the last analysis is the best.

The illustration herewith of the direct connected steam driven marine type ice machine shows that the mechanical features and other factors have been very carefully worked out by the Jarvis engineers.

With the Jarvis system, the commissary department finds itself independent of any port of call. The steward may lay in his stores for weeks ahead and yet always serve fresh meats, vegetables and dairy products. The cost of mechanical refrigeration remains the same, irrespective of the price of ice. As the refrigerators remain dry and they will last longer, and a constant and much lower temperature may be maintained than is possible with melting ice.

The chief engineer on the steamship Wahkeena expressed himself as follows regarding refrigeration aboard ship:

"We made a voyage from San Francisco to Seattle and Victoria, thence to Mexican and Peruvian ports, returning via California ports to San Francisco, a total of eighty-seven days. We took on meat at San Francisco for the entire voyage, and on our arrival in San Francisco the meat on hand was as fresh and clean as when it came on board. We kept the meat room at an average temperature of fourteen degrees. The temperature of the sea water varied from fifty degrees to eighty-eight degrees. We had no trouble in making ice, so that we had ice water during the entire trip.

"On the regular Coast run, where we do not freeze our meat, it is only necessary to run the machine four hours in twenty-four to keep the meat in perfect condition."

The Jarvis engineers have found that, no matter how high the quality of the refrigeration equipment, the plant will not give satisfaction if it is not properly installed. They have found that skilled mechanics who are competent and dependable should handle the installation, and in cases where the delay of the ship is an important factor, they have often put their men aboard the boat to install a plant while the vessel is proceeding on its voyage.

A COMPACT LIGHTING PLANT FOR TUGS

A LITTLE electric lighting turbogenerator, that literally can be put out of the way on a shelf, is being installed in a number of tug boats and other small harbor, river and coast vessels.

Impulse-Type Steam Turbine

It consists of an impulse-type steam turbine and an electric generator, combined to form a single, compact unit. It is easily installed, for all that is necessary is to bolt it to a light foundation, attach the steam and exhaust pipes, and connect the leads to the electric wiring system.

The set has only two bearings, both of the ball type. All parts are readily accessible and very little attention is required during operation.

(This section continued on Page 160)

TWIN

Oil Strainers

FUEL OIL commonly contains enough sediment and trash to clog the burners. It becomes a serious menace to the efficiency of the plant.

There is no question as to the absolute necessity of straining the oil. And good judgment must acknowledge that it is only consistent to employ a strainer which is never off duty. One which is of double-unit construction. Two strainers within one casing; one working and the other READY.

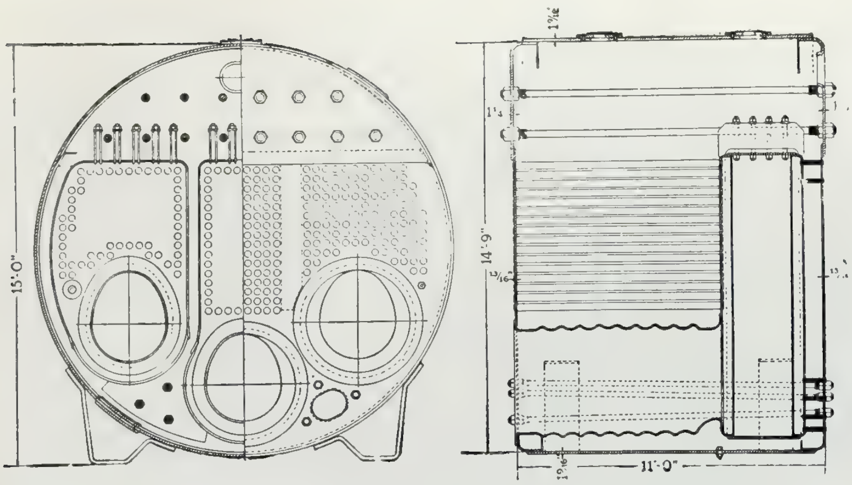
This without further specification means TWIN Oil Strainers.

One unit is always in service, while the other is being cleaned and held ready for emergency. Simply turning two valves throws the flow from one to the other.

TWIN Oil Strainers are wisely chosen by the builders of ships for the U. S. Merchant Marine and are part of the standard equipment of the latest type of U. S. Destroyers and Submarines.

TWIN Oil Strainers are furnished in sizes from one inch to five inch, with baskets having perforations of any size from 1/64 inch up. For detailed description see Bulletin "AA", which will be sent on request.

ELLIOTT COMPANY
443 Grant Street, Pittsburgh, Penn.



Diagrammatic sketch of Scotch marine boiler. Same capacity as Heine water tube boiler illustrated below

Scotch Marine Boilers Versus Heine Water-Tube Marine Boilers

An interesting comparison between the old Scotch marine boiler and the Heine water-tube marine boiler has recently been written by Charles H. Stoddard, consulting marine engineer for the Heine Safety Boiler Company, St. Louis, Missouri.

Herewith are shown two boilers of approximately the same capacity. One is a Scotch marine boiler, 14 feet 9 inches in diameter, containing 2700 square feet of heating surface and built for 210 pounds' working pressure. The other is a Heine marine water-tube boiler, also containing 2700 square feet of heating surface, and built for a working pressure of 225 pounds a square inch.

The Scotch boiler is fitted with 3-inch tubes and the Heine boiler with 3½-inch tubes. Both are suitable for either coal or oil fuel, but here are considered as fitted for oil burners.

To the weights given for the Scotch boiler must be added seven tons to cover the difference in weight of breechings, fire fronts, boiler mountings, lagging, retarders, etc., which are either included in the weights given for the Heine marine boiler or are unnecessary.

Cargo steamers, such as have been recently built for the Emergency Fleet Corporation, are equipped with three boilers each. The weights involved are therefore 253½ tons for the Scotch boiler installation against 162 tons for the Heine water-tube installation—a saving in fire-room weight by the use of Heine marine boilers of 91½ tons. An actual possible increase of paying cargo capacity of approximately one hundred tons should be of interest to any steamship owner.

The Scotch boiler is held in esteem by many engineers because of the large volume of water it contains ready to turn into steam the instant a greater demand for steam is made upon it. This is a reservoir of power that tends to reduce fluctuations of pressure in operation.

The manufacturers of the Heine boiler recognize the value of this "reservoir of power." They do not approve boilers of the "ultra light weight" type; therefore, they fit their boilers with waterlegs eleven inches deep instead of five inches or six inches. These waterlegs have not been stinted either in height or width, nor are they broken up into numerous "headers," nor is their capacity reduced by partitions and obstructions. The capacious waterlegs are stayed with screwed stay-bolts from which, within the water space, the screw threads have been carefully removed.

As for comparative cost, one has but to look at the illustrations. Note the 1-9/16-inch and 1¼-inch plates, the great weight of high-priced steel, and the many costly flanged heads used in the construction of the Scotch boiler, and note that the few plates used in the water-tube boiler for higher working pressure are but ½ inch and ⅝ inch thick. After noting these points one realizes why the cost of the Scotch installation exceeds often by as much as 50 per cent the cost of a water-tube installation.

SEA SLEDS

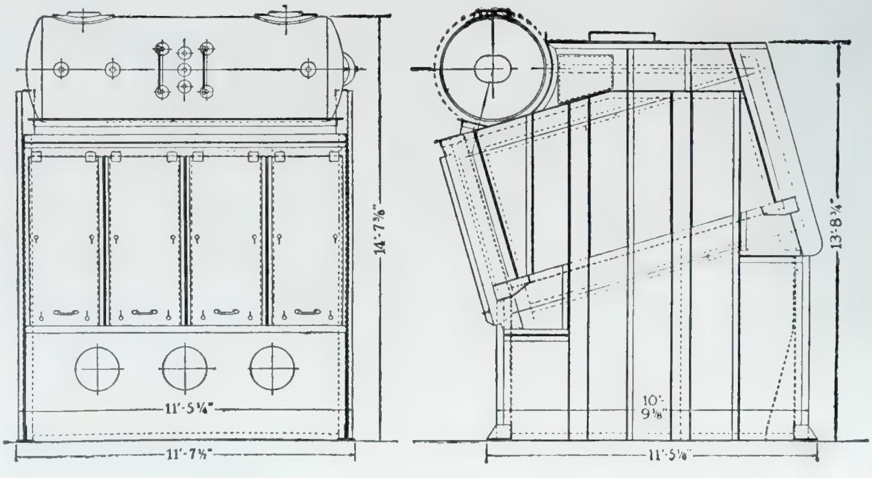
The revival of motor-boating and yachting lends additional interest to the announcement made by the Boeing Airplane Company of Seattle that they will manufacture for distribution on the Pacific Coast the famous sea sleds model motorboats.

The deck is cambered and has practically the same width forward as amidships. The bottom is shaped into a tunnel which at the bow takes the form of an inverted widely-spaced V and tapers toward the stern into a flat concave curve. This shape gives the model its wonderful gliding qualities. With ordinary models it is not possible to skim or glide on the surface with weights of over forty pounds per horsepower. With the sea sleds, weights of from seventy to eighty pounds per horsepower are easily managed. Another advantage gained is the elimination of side spray, vibration and pitching, thereby increasing immensely the enjoyment of motor-boating.

The sea sled will be built in lengths of 16, 18, 20, 22, 24, 26, 28, 32, 36 and 40 feet, with weights ranging from 1600 pounds to ten tons, in powers ranging from thirty to 750 horsepower, and in speeds from twenty-five to forty miles an hour and over. The speed is limited only by the power, the 16-foot sea sled making twenty-five miles an hour and some of the navy types with big power developing nearly sixty miles an hour.

The Boeing Airplane Company, which will manufacture the sea sleds, have been made the licensees and exclusive manufacturers and sellers for the entire Pacific Coast, including the Insular possessions. Their plant, which is located at Georgetown Station, Seattle, covers five and one-fourth acres of ground and has 110,000 feet of floor space, being the largest factory in the West devoted to airplane manufacture. It has all necessary equipment and every modern facility at hand to manufacture the sea sleds on a large scale for the Pacific Coast market, and there is every reason to believe that the production of these boats will develop into an important industry.

The sea sleds should not only prove popular for cruising and recreational purposes, but also should develop a practical value as livery boats for those who wish to get from one place to another quickly by water. They should appeal especially to those who run back and forth in the summer from the cities to homes in the islands and to cannerymen and others who need fast boats for dispatch service in connection with their business.



Diagrammatic sketch of Heine water tube boiler. Same capacity as Scotch marine boiler illustrated above

GENERAL WELDING & EQUIPMENT CO

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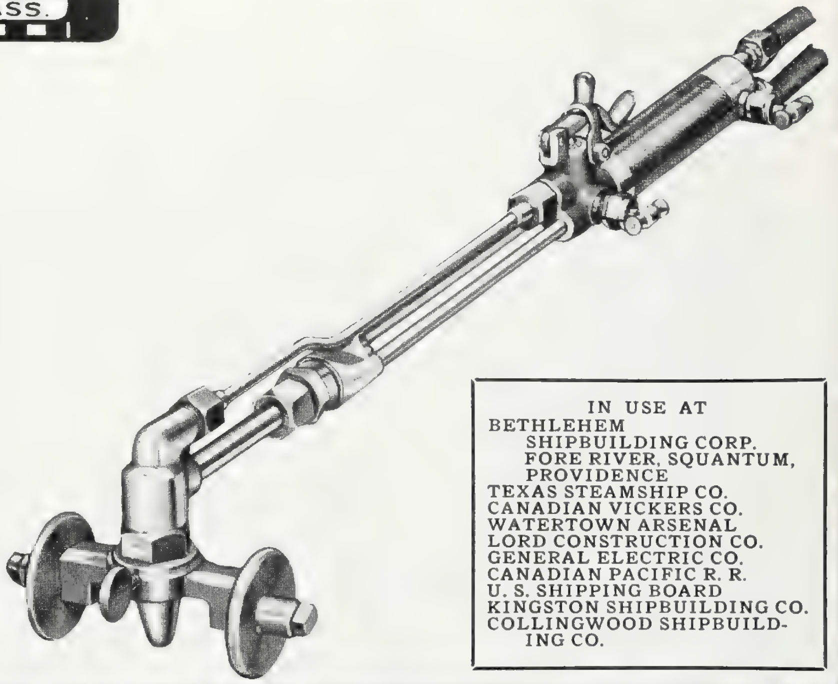

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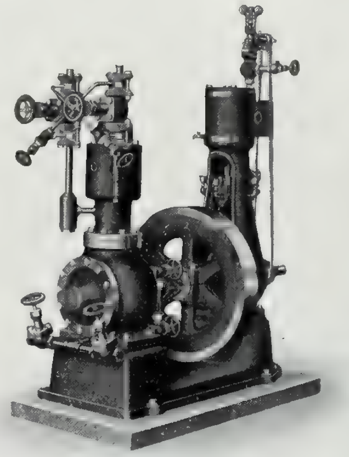

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A SIMPLE and practical auxiliary hoist for attaching to any standard overhead electric traveling crane, as shown by the illustration, has recently been developed by the N. B. Payne & Company, 25 Church street, New York City. The crane lends itself to quick and easy attachment, as it is asserted by the makers that it can be attached "the day it arrives."

The hoist does not take up any more room overhead, does not require an extra trolley, does not shorten the travel of the trolley on the bridge, and does not interfere with the accessibility of the main hoist. It is apparent that these advantages involve a considerable money saving.

Many Light Loads Handled

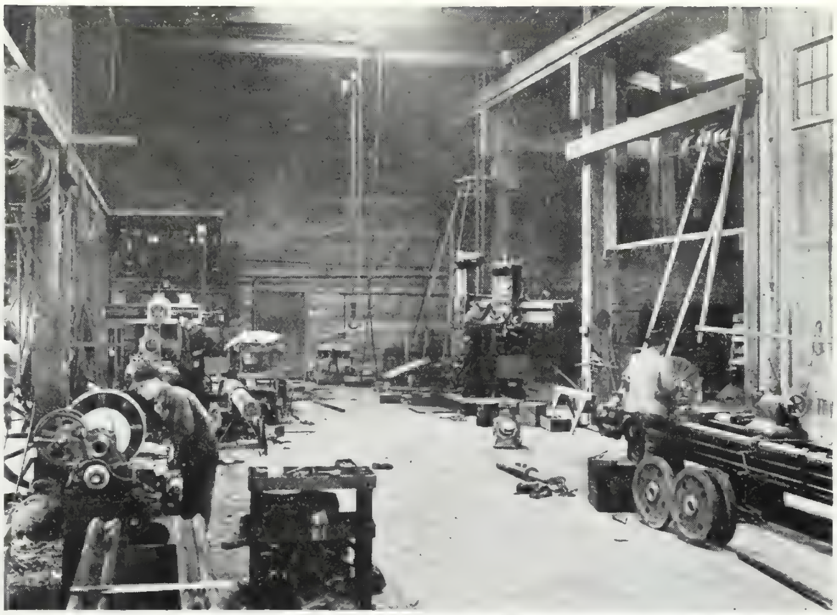
It is pointed out by the manufacturers that the average traveling crane in a day's work usually handles a far greater number of light loads than heavy loads, and this is an important point worthy of investigation. Since cranes for lifting heavy loads are slow-moving, their use results in a serious loss of time if they also handle the light loads. Thus a twenty-ton crane, direct-current, with a hoisting speed of twelve feet a minute a load, will handle a three-ton load at only slightly greater speed. But with the auxiliary hoist a light load of, say, three tons may be handled at the very much higher speed—two to ten times as great as the speed of the main crane.

Attachment of this auxiliary also effects an important power saving. Very often the hook and block of the main crane together weigh more than some loads frequently handled. The auxiliary hook and block being much lighter, it is evident that the power saving in a year's time becomes a worthwhile item. The labor saving with the auxiliary hoist also is important, especially when a gang of men must wait for a small piece being slowly moved by a large crane. This is a vexing circumstance with which many foremen are well familiar. The auxiliary eliminates this labor loss.

Ordinarily from one to five-ton standard auxiliary hoists are supplied by the makers to meet the usual requirements. Larger special sizes, however, are furnished where specified.

For Drop Bucket Service

Also, by the application of this auxiliary attachment, any standard single hoist electric traveling crane may be equipped with two lines for drop bucket service. The control may be arranged from cage, floor or pulpit, to suit the crane to which it is applied. It is stated that this auxiliary can be attached by the purchaser, but to assist the manufacturers such information as this should be given: Kind of service; make and types of crane; span; lift; alternating or direct current motors; voltage; phases; cycles; cage, floor or pulpit control; speed in feet a minute of main hoist at full load and no load; approximate weight of average crane load; number of lifts a day; maximum capacity of auxiliary hoist desired; speed in feed a minute desired at full load.



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Thayer-Shaver Gulley Machine Company of Portland, Oregon, have made an enviable reputation in turning out accurate machine work and following up their service with prompt deliveries.

Sam H. Shaver is a well-known marine engineer in Portland. Having worked along the waterfront for over thirty years, he understands thoroughly the requirements of marine machine jobs.

J. Gulley another member of the concern, is a practical mechanic who has specialized in automobile construction and repair work.

One of the factors of the success of this firm is that each one of the executives is a practical man and capable of handling any machine work which the shop may be called upon to perform.

Many of the shipyards have found the Thayer-Shaver-Gulley Machine Company an important ally in turning out heavy-flanged valves, rudder posts, propeller shafts, and other details.

The machine shop is located in a modern concrete building, which is served by a ten-ton overhead crane. The machine and tool equipment are modern, with a capacity sufficiently large to handle the average machine job. An American radial drill of 7 feet radius and the 30-foot engine lathe with a swing of 49 inches indicate the scope of work that can be undertaken.

ELECTRO GALVANIZING PLANT

Installation of an electro-galvanizing equipment in the West Berkeley plant of the California Corrugated Culvert Company is one of the progressive steps in Pacific Coast industrial development, recently announced.

The Meaker process, which has become widely recognized as the standard for high-grade electro-galvanizing, is used. It is a recently perfected method, using a self-sustaining chemical solution, which does away with the inexact results, from the use of undependable, rapidly deteriorating salt solutions. Pure zinc is deposited on the objects being coated in a fine, even, ductile coat of great density. By the use of this process all necessity for cleaning the zinc amodes, or of adding additional zinc, or toning salts, is eliminated. The efficiency of the unit is always up to the highest standard, and an exact control of results and time is possible by the regulation of the electric current used in the process.

As constituted at present, the plant will take lengths of rods, bars, etc., up to twenty-five feet. It is especially efficient for galvanizing such articles as machine screws, nuts, bolts, and all parts whose measurements must remain without material change, and for surfaces of steel and iron, requiring a coating of fine texture and smoothness for the application of enamels, paint, etc. As this electro-galvanizing plant is the only one of its kind on the Pacific Coast, it is an important addition to industrial progress in the West, and will undoubtedly prove of growing value to all metal parts manufacturers who must turn out properly protected galvanized metal parts.

Proposals for the purchase of the shipbuilding plant at Morgan City, Louisiana, now operated by the Union Bridge & Construction Company, its equipment and tools, are invited by the United States Shipping Board Emergency Fleet Corporation.

This shipyard is located eighty miles west of New Orleans on the main line of the Southern Pacific Railroad, and has been one of the most efficient shipyards in the Gulf district in the building of wooden ships of 3500 deadweight ton capacity.

Detailed inventory, blueprints and photographs and other data of the shipyard have been filed in the office of the district manager, 1316 Carter Building, Houston, Texas; in the district plant engineer's office, 1016 Hibernia Bank Building, New Orleans; in the office of the manager of the shipyards plant division, Emergency Fleet Corporation, 140 North Broad street, Philadelphia, Pennsylvania, and at the yard. An abstract of inventory may be obtained on application to any of the above on deposit of $10 to guarantee return.

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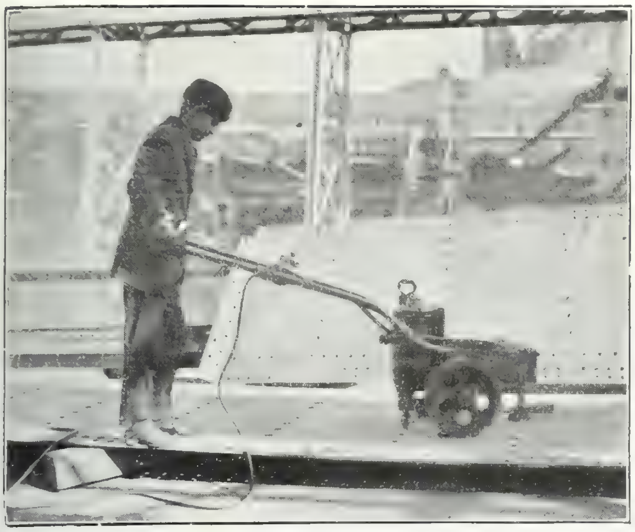

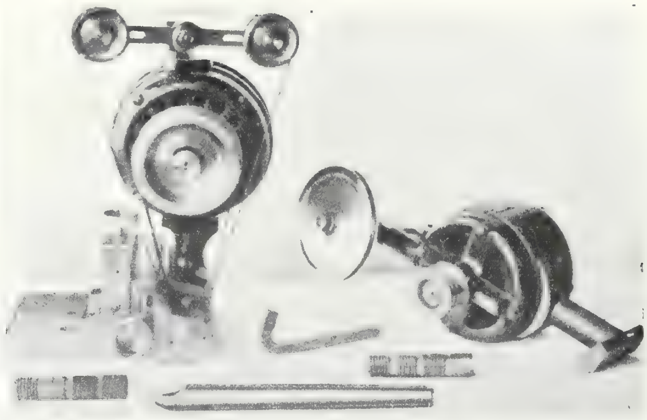

On left Vandorn Portable Electric Countersinking Machine. On right a Precision Grinding Attachment for Lathes.

VAN DORN ELECTRIC DRILL

A portable electric drilling machine has recently been advantageously employed in countersinking ship plates at a number of fabricating shops engaged in work for the Emergency Fleet Corporation. A wall radial drill has usually been used for this purpose, but the portable electric drilling machine attached to a buggy designed for the purpose has resulted in greater speed and a reduction of labor cost.

The buggy shown in the illustration was supplied by the Louis F. Shoemaker Company, Pottstown, Pennsylvania. This company has supplied a similar buggy to the Hog Island Yard of the American International Shipbuilding Corporation. Buggies similar in design have been built by other fabricating shops.

For use with this buggy the Van Dorn Electric Tool Company of Cleveland has recently designed a portable drilling machine, very powerful and of heavy, rigid construction. The machine is fastened into the buggy by two studs, these studs being screwed to trunnion bosses on the housing and fastened to the handles of the buggy. The buggy is counterweighted in front, leverage being provided by pressure applied to the handles. As the plates are laid out on the shop floor, it requires only an instant to move the machine from one hole to another.

The Van Dorn portable electric machine is ball-bearing throughout. The top head and gear housing are bolted to the motor housing, eliminating tapped holes and worn out threads. A double row of ball-bearings withstand both thrust and radial load.

This particular machine is for use with direct current at 230 volts, but the Van Dorn people will also furnish machines for alternating current. Its maximum speed is 425 R. P. M. and 160 R. P. M. under full load. Its spindle output at 20 amperes is 4½ horsepower.

The machine measures twenty-two inches over all in length and weighs 125 pounds. It is equipped with No. 4 Morse taper socket and will countersink a hole up to one inch in diameter. It is claimed that the buggy enables this machine to countersink a seven-eighth-inch hole in seven seconds.

NEW GRINDING ATTACHMENT

A graduated precision grinding attachment is now being made by the Precision & Thread Grinder Manufacturing Company, 1932 Arch street, Philadelphia, Pennsylvania. It is adapted for use on lathes, milling machines, and other types of machine tools, and can be employed for the performance of a great variety of grinding operations. The grinding of thread gages to correct the distortion produced in hardening is one of the important applications of this attachment; but it may be employed for a variety of other grinding operations on threaded work, such as hardened steel screws used in precision and scientific instruments, taps, thread milling cutters, hobs, and other parts of a like nature. The machine is also well adapted for use on milling machines for the performance of surface grinding operations, and it can be set up on lathes or other types of machine tools to provide for grinding the interior of holes in dies, and other work. It has also been suggested that this equipment could be used to excellent advantage for grinding the commutators of electrical machines in order to refinish them and remove roughness resulting from service. The whole grinding attachment weights only fifty pounds, so that it may be readily transported from place to place, which is an important feature when engaged in grinding such work as the commutators of electrical machinery, which require the grinding equipment to be taken to the machine.

It will be seen that provision is made for bolting the attachment to the lathe carriage (or to any type of machine on which it is used) and that an individual driving motor is employed from which the speed is increased sufficiently to furnish the required peripheral cutting speed for the grinding wheel. Speeds up to 15,000 revolutions per minute are available. An important feature of the driving mechanism is that vibration cannot be transmitted from the machine tool to the grinding wheel of the attachment, because the driving shaft is made independent of the main bearing shaft, allowing the wheel perfect freedom of operation. The grinding spindle is carried in Norma ball bearings mounted in dust-proof cases. Owing to the helix angle of the thread on gages and similar work that is to be ground, it is necessary to set the grinding wheel spindle at different angles according to the pitch of the thread on the work. Such adjustment is made by having the grinder head carried on a bracket pivoted to the body of the attachment. Three graduated adjustments are provided on the attachment for use in setting the wheel-spindle to conform with the helix angle of the thread to be ground, for raising or lowering the wheel spindle, and for securing longitudinal adjustment of the wheel. In addition, there is a graduated wheel-truing device which may be set to control the direction of travel of the diamond point relative to the wheel, to provide for grinding any desired form of thread.

NELSECO COMES WEST AGAIN

The New London Ship & Engine Company announces the sale to the Chichagoff Mining Company of Tacoma of a 360-horsepower direct reversible "Nelseco" Diesel engine, for installation in a freight and passenger vessel now building and to be used in Alaskan waters.

This sale marks the resumption of endeavor on the part of the New London Company in the commercial field on this coast, the commercial work having been greatly interrupted through the entire activity of the great engine works at Groton, Connecticut, being devoted to construction of engines for the United States and the Allies during the war period.

In 1915, on the Pacific Coast, the New London Company engined the first passenger vessel and the first cannery boat in which Diesels were used in America, and it suffices to say in evidence of fine performance that the vessels in which these engines were placed have gone steadily along with their duties, standing squarely up to their work; and this statement also applies to other Pacific Coast installations and the many Atlantic Coast vessels in which the trade name "Nelseco" is translated to mean efficiency.

The four years that this factory devoted to helping in the world war have been filled with an experience so variegated, with respect to the development of the Diesel engine, that this experience must reflect itself in betterments and improved commercial work.

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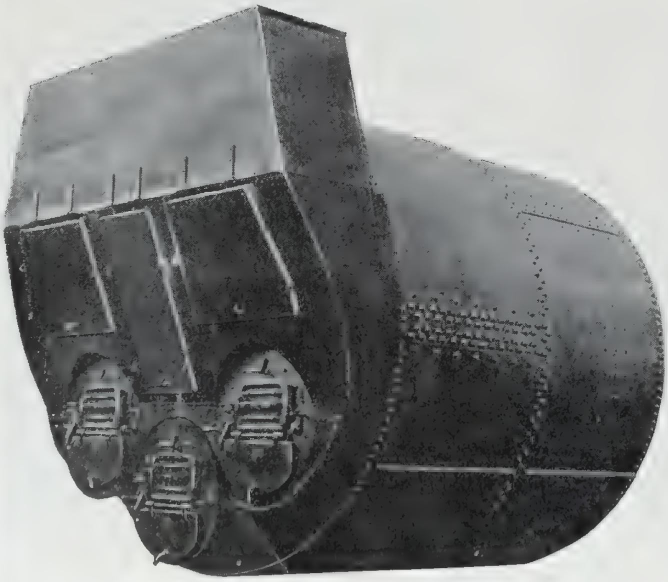

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ORIENTAL EDITION
August 1919

Pacific Marine Review, Vol. 16, No. 8. Published monthly at San Francisco. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. $3.00 a year.

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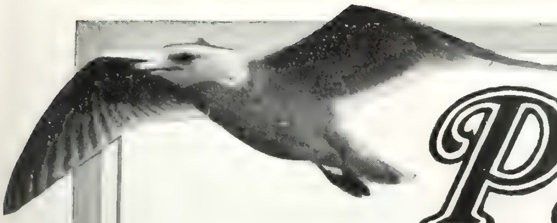

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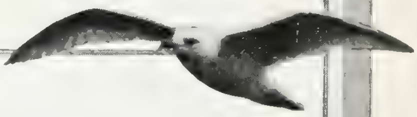

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The National Magazine of Shipping

August, 1919

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1853—A Brief History of Japanese Shipbuilding—1919

By Andrew Farrell

IT is a curious and striking fact that Japan, now one of the leading maritime nations of the world, endured for centuries practical prohibition of shipbuilding. The third Tokugawa shogun forbade the building of vessels in excess of 500 koku, about fifty tons gross, and this law was enforced for 218 years, from 1635 to the last days of the Tokugawa shogunate, in 1853.

Professor Chamberlain attributes this restriction to the alarm of the Japanese at the progress made by Spanish monks and the fear that the Spanish soldier would follow hard on the heels of the Jesuits. Will Adams, an English mariner, who landed in Japan in 1600, had built ships for the shogun, Ieyasu, one of which voyaged to Manila and Mexico; and, long before this, the Japanese had been famed sea-farers, both as traders and buccaneers, as were the Danes and Norsemen of the Middle Ages. Nevertheless, the Tokugawa shogunate expelled all foreign priests, restricted foreign merchants to Nagasaki and Hirado, and forbade Japanese subjects to quit the empire, under penalty of death. All vessels of European type and large native vessels were destroyed. As a matter of course, Japanese shipbuilding was practically nil.

Commodore Perry in 1853 awakened Japan in more ways than one; his ships, for example, naturally aroused surprise and emulation, and the shogunate repealed the law prohibiting vessels in excess of 500 koku. Some of the daimyos built vessels after the Occidental fashion, which was principally limited to imitation of the outer design. But, in 1854, Russia, quite accidentally, gave the Japanese the lead they needed; for, a Russian man-of-war being wrecked at Shimoda by tidal waves, the shogun gave permission for the building of a wooden schooner at Heda, in Izu. Japanese shipwrights assisted in the construction of this vessel, and thus they gained the opportunity to learn more of Occidental methods. In one prime essential they caught the plan of erecting the framing first. Japanese junks were built without framing, the shell-planking being quite thick and affording, with beams, the necessary strength.

The shogunate government soon had six Occidental-style vessels built to these dimensions:

Length over all, 81.2 feet.
Length on keel, 62.5 feet.
Extreme breadth, 23.2 feet.
Molded depth, 9.9 feet.

That modern navy of Japan, no inconsiderable factor in the Eastern seas during the war with Germany, and a factor of immense consequence in the war with Russia, had its birth in 1855, when the Dutch government presented the shogun with a warship. Two years later, another man-of-war, having a screw propeller, was bought from the Dutch. Having ships, it was necessary to provide shipyards and ironworks, and the first yard was built at Nagasaki in 1857. It was natural that Dutch engineers and builders should be employed

Illumination of Cranes at the formal opening of the Asano Yards

Panorama of part of the Waterfront of the Ishikawajima Shipbuilding and Engineering Company at Tokyo

and that machinery should be bought in Holland. This plant endures to this day in the great Mitsubishi yard at Nagasaki. It is noteworthy that only four years had elapsed since the arrival of Commodore Perry until the foundation of this first establishment. In 1864 an iron works was established at Yokohama (possibly the Yokohama Engine & Iron Works, although the date of foundation of that company, as given by the Uchida Shipbuilding & Engineering Company, its successor, was the third year of Meiji, or 1870). In the same year, 1864, a shipyard was started at Yokosuka; its completion required four years, and, the Japanese having learned from the Americans, Russians and Dutch in increasing measure, they now turned also to France, a French engineer planning the Yokosuka yard. The first wooden steamship, built entirely by Japanese, was constructed, however, at Ishikawajima, Tokyo, in 1861-1863, at a yard founded by the Prince of Mito. Her name was the Chiyodagata. Thus early, the imitative and adaptive genius of the Japanese carried them into the current of Occidental civilization, for it had been only eight years since the appearance of Commodore Perry and the construction of the famous mud forts of Tokyo Bay, which stand to this day.

In 1861, the general public was given rights to own large vessels. The government was to furnish officers and crews—an early appearance of the Japanese policy of fostering shipping, expressed today in subsidies. In 1862 Japanese ports were opened to foreign trade and the restrictions on departing from the country were lifted, after having been in force almost 220 years.

Internal strife, attendant upon the overthrow of the shogun and the complete assumption of power by the Imperial house, which took place in 1867, hindered the development of the merchant marine. At the restoration of the emperor, the Yokosuka, Yokohama and Ishikawajima yards were turned over to the Imperial navy department, and the industrial department took the Nagasaki yard and also founded a shipyard and engine works at Kobe. In 1876 the Ishikawajima engine works' site was leased to a private company, which became the Ishikawajima Shipbuilding & Engineering Company—the first modern private yard of the empire.

Drayage by Man Power. Uchida Works, Yamashita-cho

The defects of Japanese designs, and the advantages of the improved Occidental vessels, were pointed out in merchant marine regulations, issued in 1870. Ships of a maximum size of about 300 gross tons were built regularly, after the commencement of the Meiji era, suitable timber being abundant. The Kosuge Maru, of 1496 tons and 240 feet long, built at the Mitsubishi yard, Nagasaki, in 1883, was the only home-built vessel of more than 1000 tons up to the Sino-Japanese war of 1894.

Completely reversing the centuries-old policy of discouraging large vessels, the government, in 1885, prohibited the construction of Japanese junks of more than fifty tons gross—this in order to encourage the building of Occidental-style vessels; and survey regulations were promulgated at the same time. Soon thereafter, a plan of converting old junks into "ainoko-sen" (half-caste boats) was devised. Framing, planking and rigging approached the Occidental design, with greater strength and seaworthiness resulting; but in 1898 the government extended the inspection regulations to cover junks of more than twenty tons gross, whereupon the number of these vessels fell off.

The lack of iron and steel forced the Japanese to build small coasters of wood; the larger metal vessels were built abroad; for the wooden ship had begun to disappear in Europe. Of 800 vessels, steam and sail, built from 1870 to 1884, all were wood. Wooden shipbuilding continued side by side with steel, two wooden steamers, of 1208 and 1526 tons, being built in 1902. In 1900 the government issued regulations for the construction of wooden vessels, which raised the quality of the product.

Although some iron steamships had been built in the early seventies, the first pretentious construction began in 1884, when the Osaka Shosen Kaisha ordered an iron, screw-propeller steamer of some 500 tons gross; and this soon was followed by an order for three others. But, as the chronicler puts it, "Japan has been spared the iron age," since only about twenty iron steamers, from fifty to 500 tons in size, were built, the last in 1893.

In 1890 steel appeared; and Japan was fairly on the road of modern building. The first steel steamship was the Chikugogawa Maru, 610 tons, laid down at the Mitsubishi works at Nagasaki for the Osaka Shosen Kaisha, which thus has the distinction of leading the way in both iron and steel. Two sister ships followed. The Suma Maru, 1592 tons gross, was launched by the Mitsubishi yard in 1895. "She was the largest steel merchant ship built prior to the promulgation of the Shipbuilding Encouragement Act, and was the first ship fitted with a complete cellular double bottom."

Large vessels continued to be built abroad, however; in 1879 seven vessels of an aggregate tonnage of 13,382 were bought, followed by fifteen steamers of about 700 tons each in 1881. The Miike Maru, 3300 tons, a record, and the largest vessel of Japan up to the war with China, was bought in 1888.

Subsidies for dockyards began to receive consideration, for repairing facilities were limited principally to Nagasaki and the naval bases, but nothing was done up to the war with China.

When this war broke out, the government was able to get 240,000 tons at home for its use. The withdrawal of relatively so much tonnage led to much buying abroad; so that sixty-one new vessels of 100,000 tons in all had been purchased by the end of 1895, and, in 1896, 528 vessels of an aggregate of about 330,000 tons, had been bought, doubling the mercantile marine in two years.

The annexation of Formosa widened the horizon greatly, and shipbuilding, shipping and general commerce grew rapidly.

Prior to the war with China, the Japanese shipyards were short of equipment and material; both builders and engineers lacked experience—with consequent high costs. Bills for the encouragement of the merchant marine accordingly were passed by the ninth session of the Diet and promulgated in March, 1896, to be effective for fifteen years from October 1, 1896. A committee drew up building regulations, based principally on Lloyds' rules, which became effective in September, 1896, and have been revised since.

As a result of the governmental policy, new routes to Europe, Australia and America were opened; trade with the East Coast of Asia expanded, and shipbuilding waxed. At the end of 1899 there were 753 steamers of an aggregate tonnage of 498,000, a doubling of number and a trebling of tonnage as compared with 1893—and this meant, of course, an increase in the average size.

The act of 1896 granted a subsidy of twenty yen a gross ton for iron and steel steamers and sailers of 1000 tons and more, and twelve yen a ton for vessels between 700 and 1000 tons. There was also a bounty for machinery of five yen each I. H. P. developed at the official trial trip. It must be understood that this was altogether a building subsidy, entirely distinct from navigation subsidies. Only two sailers, it may be interesting to note, were built under this act.

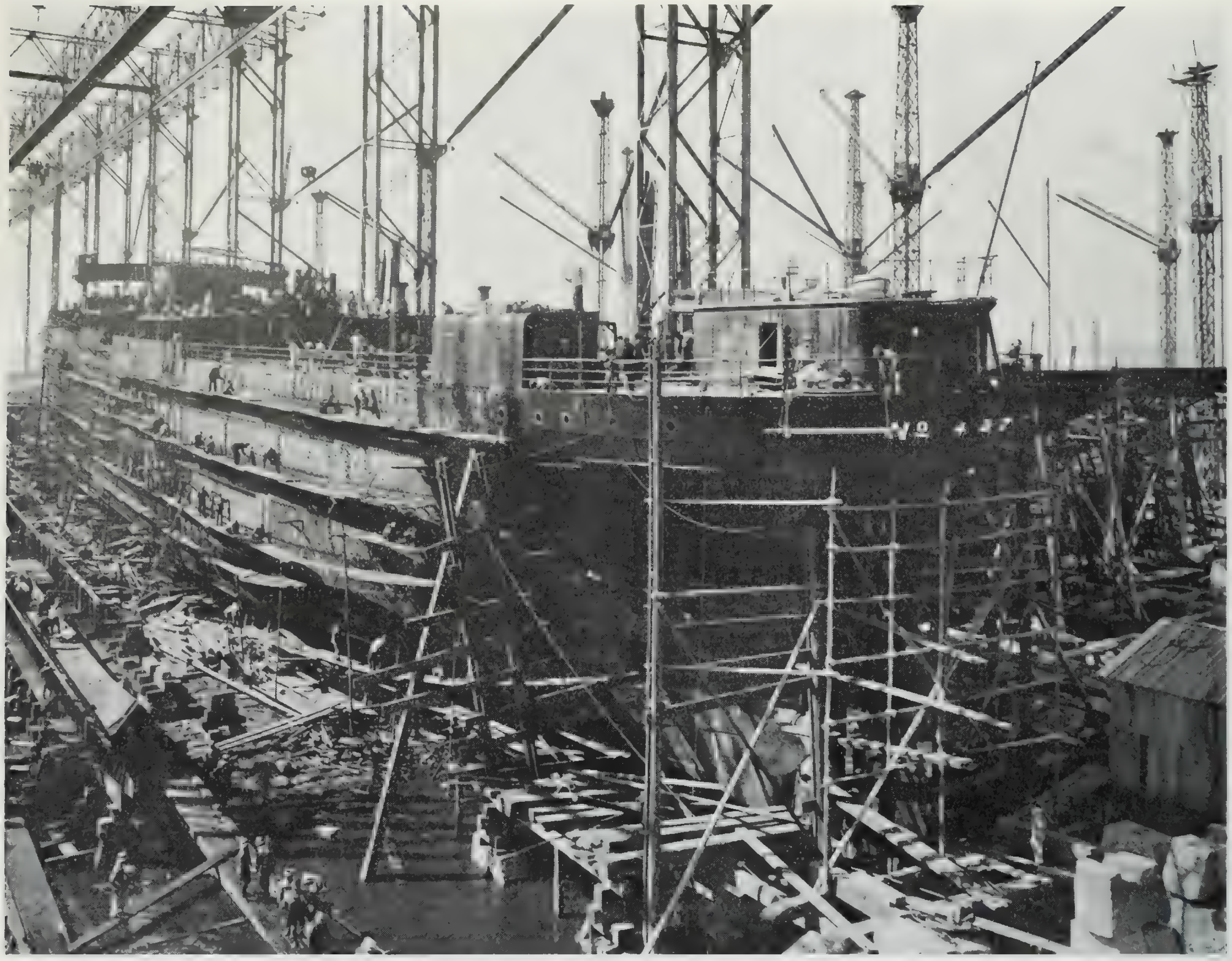
A Human Pile Driver. Yokohama Dock

It was the intent of the law to reduce the cost of imported materials and thus to enable Japanese yards to compete with foreign, inasmuch as labor was cheaper at home than abroad. But other nations could build more cheaply, lack of experience and cost of materials still being great handicaps, so that many vessels still were ordered abroad. The Kitami Maru, 727 tons gross, launched in 1897, was the first vessel built under the act. The Nippon Yusen Kaisha, in 1898, gave the Mitsubishi yard an order for the Hitachi Maru, 6172 tons gross, which was torpedoed by the Russians in June, 1904. At the same time, however, the N. Y. K. ordered twelve vessels of the same size in England. The Awa Maru, of the same size as the Hitachi, followed her.

The effect of the act of 1896 not being all that was expected, it was revised in 1899. The bounty for foreign-built vessels was cut to half that of home-built, and this resulted in the placing of orders at home, because the higher cost was more than compensated for by the government subsidy. At first the Mitsubishi yard at Nagasaki and the Kawasaki yard at Kobe were the only plants receiving building bounties; after the revision of the law, others were added. Although navigation bounties were not given to vessels of less than 1000 tons gross, the growth of the coasting trade and the greater efficiency in building led to an increase in the number of smaller ships.

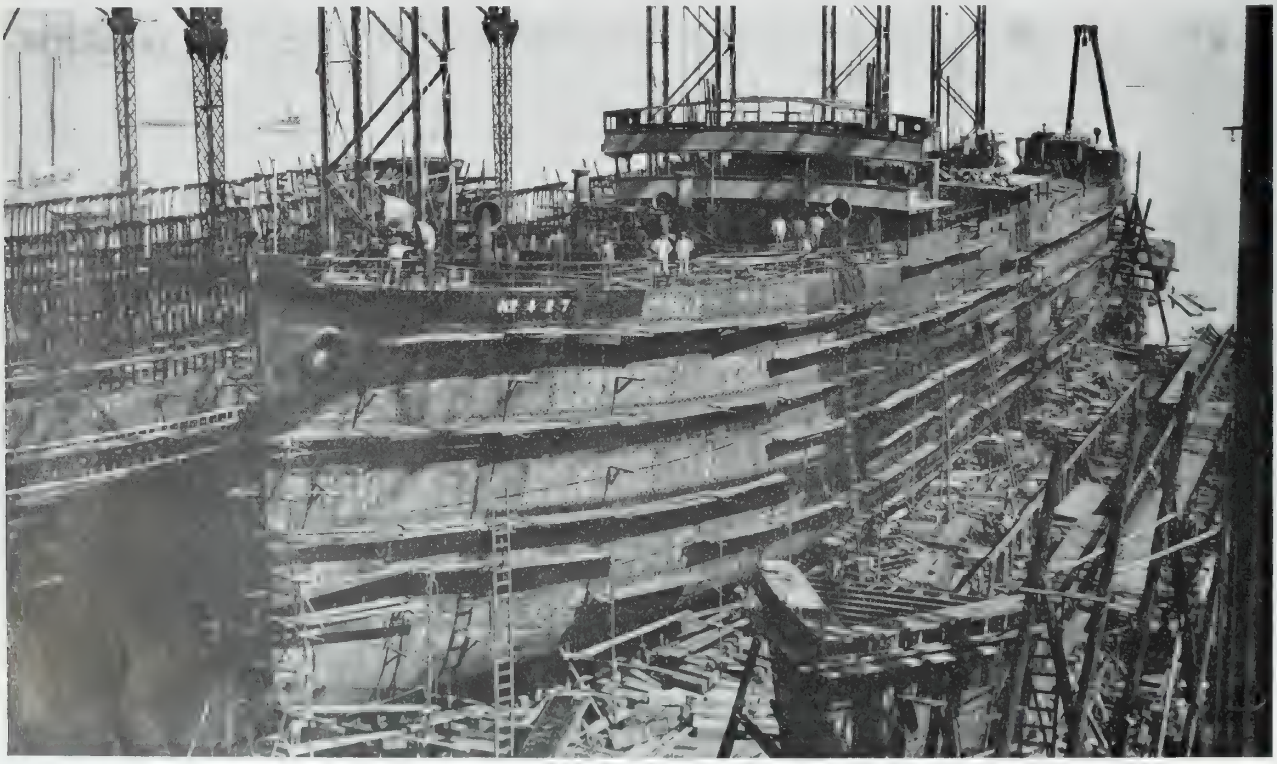
Panorama of Yard and Shops of the Uchida Shipbuilding and Engineering Company, Ltd.

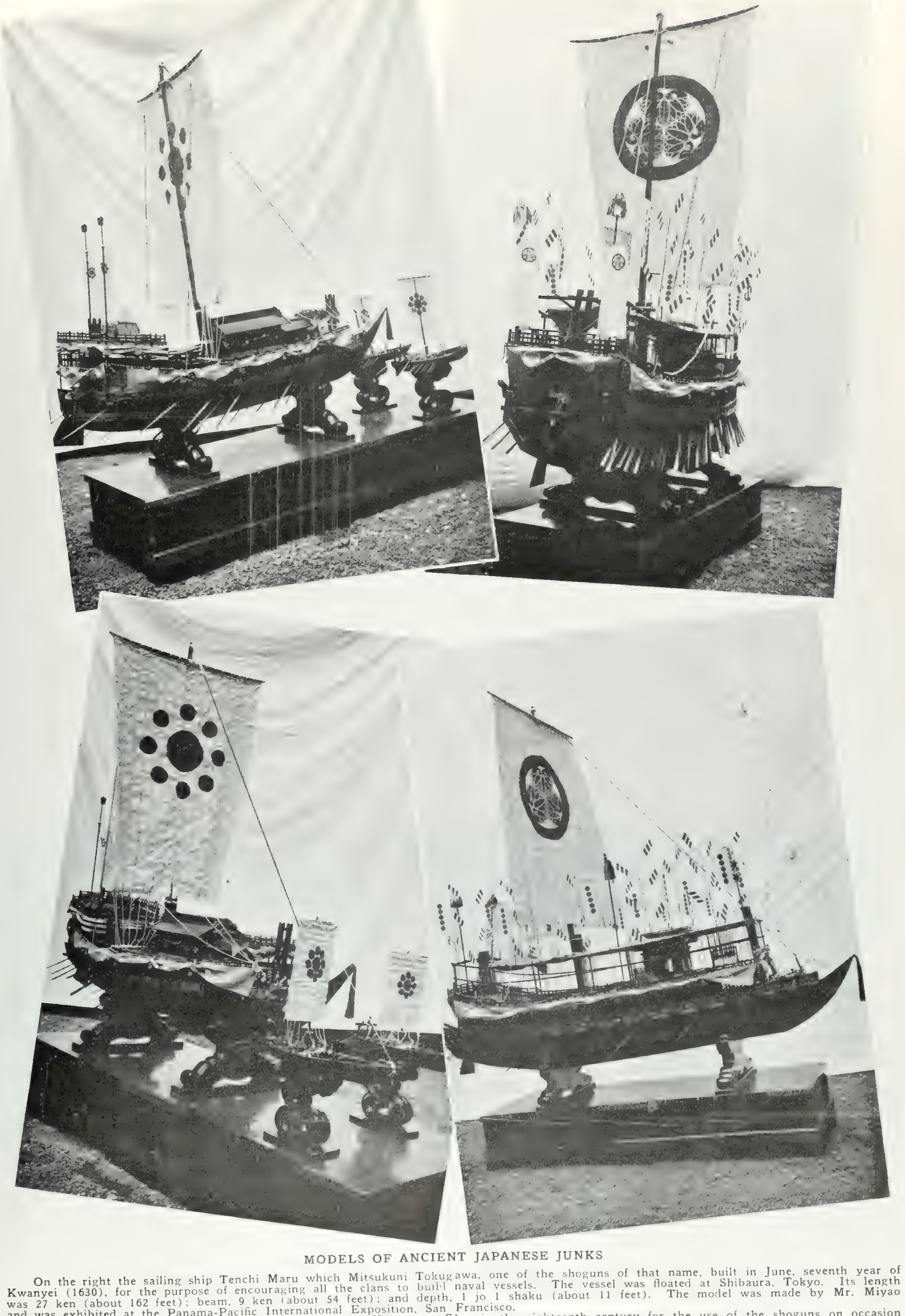
Japan's Record Ship



The two views on this page show the Arifuku Maru during construction. Keel of this steamer was laid down at 7:00 a. m. on October seventh. The vessel was launched at 6:00 a. m. October thirtieth. The official trials were successfully carried out on November fifth, and within a few days she sailed for South America.

The length of this vessel is 385 feet, her beam is 51 feet, and her moulded depth is 28 feet. She attained a mean speed of 14.39 knots on the two trial runs of three miles each and she received an A 1 rating on Lloyds' Register, with a measurement of 5800 tons gross, or the equivalent of 9000 tons d.w. This at present stands as a Japanese record for speedy construction.





MODELS OF ANCIENT JAPANESE JUNKS

On the right the sailing ship Tenchi Maru which Mitsukuni Tokugawa, one of the shoguns of that name, built in June, seventh year of Kwanyei (1630), for the purpose of encouraging all the clans to build naval vessels. The vessel was floated at Shibaura, Tokyo. Its length was 27 ken (about 162 feet); beam, 9 ken (about 54 feet); and depth, 1 jo 1 shaku (about 11 feet). The model was made by Mr. Miyao and was exhibited at the Panama-Pacific International Exposition, San Francisco.

On the left the Taiho Maru, which was built by the Kumamoto Clan in the eighteenth century for the use of the shoguns on occasion of the local lords' temporary stay at Yedo (now Tokyo). The ship was manned with oars. The length was 11 ken (about 66 feet); beam, 4 ken 2 shaku (about 26 feet); and depth, 7 shaku 5 sun (about 7½ feet). The number of oars was thirty-two. The model was made by Mr. Miyao and was exhibited at the Panama-Pacific International Exposition.

The Russo-Japanese war had much the same effect on shipping as the Sino-Japanese: Government requisitions were so heavy that many new steamers were purchased, so that, at the end of 1905, there were 1390 registered steamers of 932,000 tons, as compared with 1088 of 657,000 tons two years before. There was much repair work during the war, both at private and government yards, and the Tango Maru, 7460 gross tons, launched at Nagasaki in 1904, was the only important vessel built during war times.

Peace brought an enormous expansion. The Toyo Kisen Kaisha had been operating three steamers, of 6000 gross tons each and seventeen knots speed, between San Francisco and Japan and China; it ordered the three sisters, Shinyo Maru, Tenyo Maru and Chiyo Maru, which remain among the largest and fastest liners of the Western Ocean. The first two, Tenyo and Chiyo, were delivered in 1908. The Chiyo was lost at Hongkong in 1916.

The Nippon Yusen Kaisha added, to its European service, six steamers of 8600 tons each and sixteen knots. Four were built by the Mitsubishi yard at Nagasaki and two by the Kawasaki yard. The Osaka Shosen Kaisha, up to this time largely engaged in the coasting trade, ordered six 6000-ton vessels, fourteen knots, from Mitsubishi and Kawasaki for a new line to the States. Other builders received orders for smaller vessels, and the Imperial navy expanded, four private firms assisting the government yards. Prosperity prevailed; the yards, led by Mitsubishi and Kawasaki, built new ways and shops and added much equipment. The development of the coasting trade also caused many small steamers to be built, principally of steel, because wood was becoming scarce. There were very few large steel sailing vessels: the nautical school furnished virtually the only demand.

The old subsidy law was revised again, in 1910. No subsidy was granted for vessels of less than 1000 gross tons, the principle being that the larger vessels, which must meet foreign competition, were more in need of assistance. Aid was extended to sailing vessels as well as steamships, iron as well as steel, but no sailers have been built. The subsidies given to the different classes were:

Passenger Vessels

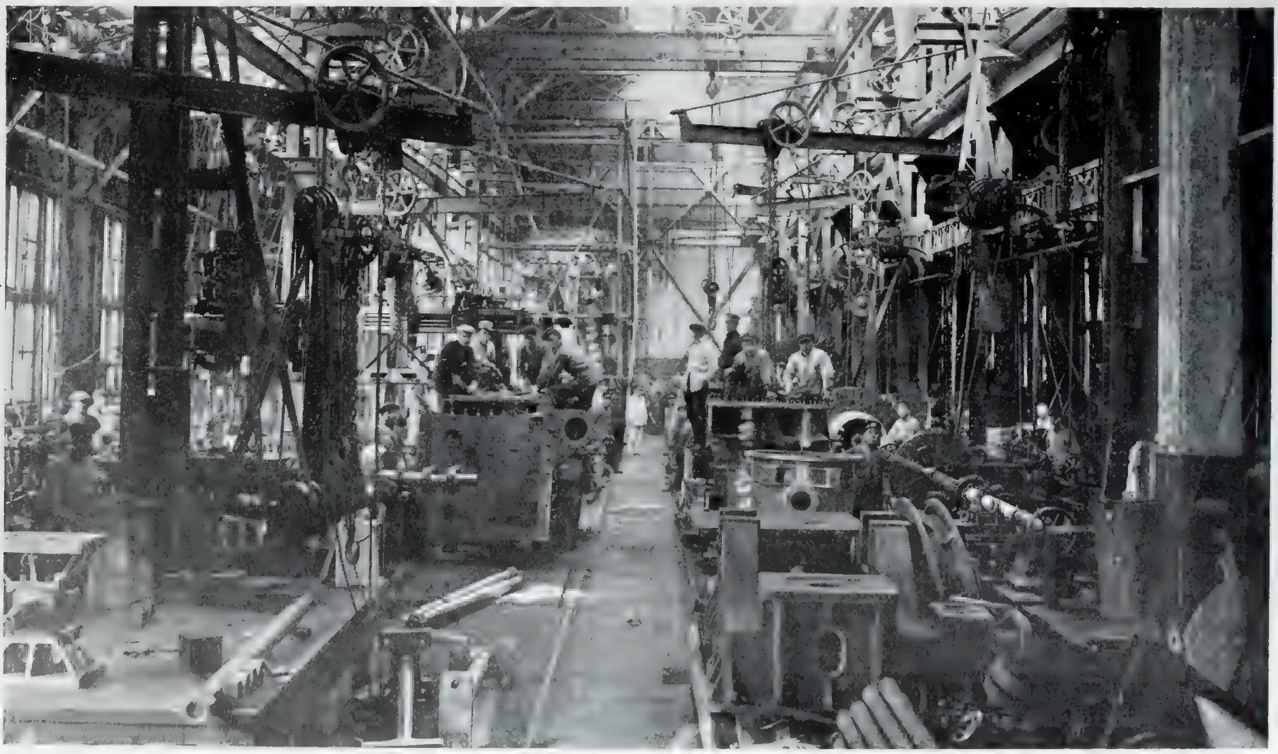
Ocean-going, 100 A1 Lloyds, 22 yen a gross ton.
Home trade, built to ply to Kamtchatka on the north and Hongkong on the south, between 63 north and 21 north latitude and between 113 east and 170 east longitude, 21 yen a gross ton.
Coasting trade, 19 yen a gross ton.
Smooth-water trade, 14 yen a gross ton.

Cargo Vessels

(The bases of classification are the same.)
Ocean-going, 19 yen a gross ton.
Home trade, 18 yen a gross ton.
Coasting trade, 16 yen a gross ton.
Smooth-water trade, 11 yen a gross ton.

The machinery subsidy remained the same—five yen an indicated horsepower. Vessels built under the law were to use home-made auxiliaries and fittings, so far as practicable. The classification of vessels in the above table was determined principally by construction.

On December 31, 1919, this law lapses, but, under the act of June, 1916, the Department of Communications was authorized to suspend the granting of subsidy certificates, which were given after the approval of plans, and none has been issued since July 24, 1916, because shipbuilders, it was held, did not need the assistance; so that there is no building subsidy in Japan today. It is to be anticipated, however, that serious consideration will be given the situation, as it will be under normal competitive conditions, with a view to restoring a subsidy.



A Typical Japanese Machine Shop

Panoramic view of the waterfront of the main yard of the Uraga Dock Company

On September 28, 1916, the war ship-control ordinance was issued, effective October 1, to expire one year after the signing of the peace treaty. This forbade the building of vessels in Japanese yards for foreign account without specific permission in each case, which was granted the United States Shipping Board. Various inquiries were made—notably, by the French government—which, however, found costs too great. It appears improbable that any contracts actually offered were refused. It is the general belief that Japanese yards would be permitted to build for foreign account if contracts offered now.

The growth of the Japanese merchant marine since 1898 and the amounts of building subsidies paid each year since 1897 may be gathered from the following tables, furnished by the courtesy of Yukio Yamamoto, shipbuilding section, mercantile marine bureau, Department of Communications:

Table I

Number and gross tonnage of all Japanese merchant vessels above twenty gross tons registered at the end of each year:

Year	Steamers, Gross	Sailing Vessels, Gross	Total, Gross
1898	464,246	149,385	613,631
1899	498,376	270,162	768,538
1900	534,239	306,393	840,632
1901	577,660	326,619	904,279
1902	605,122	329,839	934,961
1903	657,269	322,154	979,423
1904	791,057	322,634	1,113,691
1905	932,740	329,806	1,262,546
1906	1,034,456	346,261	1,380,717
1907	1,109,444	357,275	1,466,716
1908	1,152,575	370,225	1,522,800
1909	1,189,957	385,779	1,575,736
1910	1,234,571	391,661	1,626,232
1911	1,388,663	415,041	1,803,704
1912	1,490,352	445,698	1,936,050
1913	1,722,970	492,276	2,215,246
1914	1,853,425	518,070	2,372,495
1915	1,872,859	550,037	2,422,896
1916	1,939,979	593,215	2,533,194
1917	2,021,036	696,585	2,717,621
1918	2,482,325	870,722	3,353,047

Table II

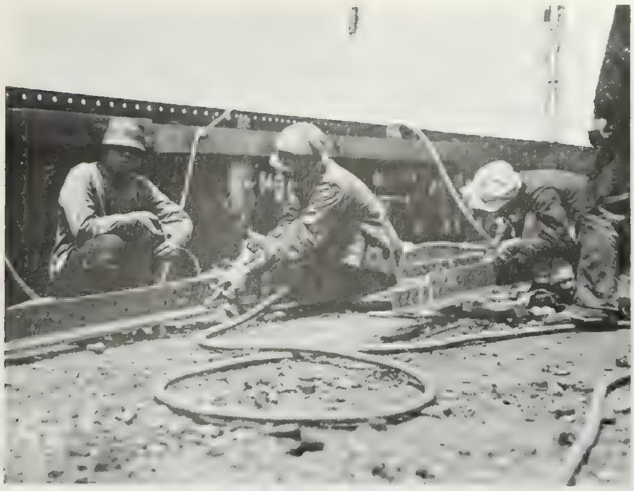
Shipbuilding subsidies paid each year, from from April 1 to March 31:

Year	Subsidies Paid, Yen	Year	Subsidies Paid, Yen
1897	13,109	1908	1,509,575
1898	213,875	1909	1,021,460
1899	187,780	1910	369,084
1900	152,930	1911	614,654
1901	581,094	1912	673,384
1902	411,348	1913	998,645
1903	437,810	1914	1,639,942
1904	202,786	1915	1,550,782
1905	574,132	1916	3,074,739
1906	494,428	1917	5,210,913
1907	677,348	1918	2,489,681

Table III

According to the Mercantile Marine Bureau of the Department of Communications, thirteen vessels of over 1000 tons each, aggregating 54,992

Launch of a a Five-thousand-ton Steamer



Chipping with American Pneumatic Tools

The First Japanese-built Car Ferry Steamer

tons, were launched during May. This brings the total launchings from the beginning of the year up to 239,613 tons. Particulars of May launchings are:

Name of Vessel	Gross Tonnage	Where Built	Ordered by
Hazeyama Maru	5,500	Asano Shipyard	Suzuki & Company
Shanghai Maru	4,500	Kawasaki Dockyard	Not to order
Tokai Maru, II	1,282	Ishikawajima Shipyard	Not to order
Koyo Maru	5,520	Uraga Dockyard	Asano Company
Yoten Maru	7,300	Osaka Ironworks	Nippon Kisen Kaisha
Harata Maru	1,300	Harata Shipyard	Not to order
Hankow Maru	4,100	Kawasaki Dockyard	Not to order
Yuei Maru	3,200	Ishikawajima Shipyard	Teikoku Kisen Kaisha
Sanjin Maru	2,500	Mitsui Shipyard	Not to order
Brazil Maru	5,860	Kawasaki Dockyard	Not to order
Aizawa Maru, II	1,200	Aizawa Shipyard	Not to order
Not yet named	4,700	Uraga Dockyard	Not to order
Amazon Maru	8,000	Osaka Ironworks	Osaka Shosen Kaisha

As to other types of vessels—dredges and light-draft river craft—the Osaka Iron Works specialized in them because the shallow water at the yard forced it to turn its attention to the smaller types. The first dredge, the Taishun Maru No. 2, was built by the Osaka Iron Works in 1894. The same firm also developed a special light-draft screw-propeller river steamer, having launched the first vessel, the Yuragawa Maru No. 1, 43 feet by 8 feet by 2 feet, 15 feet draft, in 1902. Side-wheel paddle steamers did not come into general use and stern-wheelers were not very successful.

With the object of improving the design of fishing vessels, the government passed an encouragement act in 1898, which was amended in 1905. Sealing schooners and whalers—some American-type barks and others Norse-type steamers—and later steam trawlers and vessels with refrigerator holds, were constructed; and vessels with internal-combustion oil engines soon followed, ranging from twenty to thirty tons gross and modeled somewhat after the British ketch. The first of these, the Fuji Maru, of twenty-five tons, was launched in 1906.

The earliest beginnings of marine engineering are obscure. In 1861, the first marine engine of which anything positive is known, was built for the Chiyodagata. This was a geared engine, horizontal, non-condensing, having two cylinders 16 inches in diameter and of 15⅞-inch stroke; three boilers 3 feet 10 inches in diameter and 13 feet 11 inches long; working pressure thirty-eight pounds a square inch. However, engines for the

A small repair job in a Japanese yard. Note the lashing of staging

A Locomotive Crane rubbing elbows with Junks at the Yokohama Docks earlier steamers usually were imported. The first compound engine, for the Kiyokawa Maru, was built in 1873 at Nagasaki. The cylinders were 12 and 21 inches in diameter and had an 18-inch stroke. Prior to 1880, most of the engines were single-expansion, of 300 horsepower or less. A large compound engine was built in 1883 for the Kosuge Maru—cylinders 36 and 63 inches in diameter; stroke 36 inches; steam pressure 60 pounds a square inch; indicated horsepower, 642.

Triple-expansion engines were imported from England in 1888 for the Osaka Shosen Kaisha steamship Ujikawa Maru, 270 tons, and others; and the Miike Maru and two other triple-expansion engined steamships were bought abroad at about that time. A year or so later the first triple-expansion engine was built for the Chikugogawa Maru, the cylinders being 15, 23 and 39 inches in diameter and having a stroke of 39 inches; the steam pressure was 155 pounds and the indicated horsepower 472. Larger engines were built after the shipbuilding encouragement act. The first quadruple-expansion engine was that of the Wakamatsu Maru, an ore-carrier, built in 1902 at Nagasaki. The indicated horsepower was 2400.

Iron boilers were built until 1887. In that year the Mitsubishi yard at Nagasaki made the first steel boiler for the tug Yugawo Maru, 206 tons. The steam pressure was eighty pounds a square inch. Japan's first effort to manufacture her own steel, then, as now, a vital matter to shipbuilding, was in the establishment of the government steel works at Wakamatsu in 1898.

Professor Chamberlain's short account of the founding of the first Japanese steamship company is full of interest. "Iwasaki Yataro, the celebrated millionaire, started steamers of his own somewhere about 1870; and the company which he worked with the aid of judiciously selected European directors and agents, European captains and European engineers, soon rose, under the name of the Mitsubishi Mail Steamship Company, to be the most important commercial undertaking in the empire. It even influenced politics; for to the facilities which the Mitsubishi afforded for carrying troops at the time of the Satsuma rebellion, was due in no small measure the triumph of the imperialists in their hour of need. Later on, another company, named the Kyodo Un-yu Kaisha, was formed to run against the Mitsubishi. But the rivalry between the two proving ruinous, they were amalgamated in 1885, under the name of the Nippon Yusen Kaisha, or Japan Mail Steamship Company."

[The data for this article were supplied in large measure by Yukio Yamamoto of the shipbuilding section, mercantile marine bureau, Department of Communications, who also lent an English manuscript, "On the Development of Merchant Shipbuilding in Japan," author unknown, from which most of the historical data are taken. Acknowledgment is made to the unknown author.]

Seventy-five-ton electric derrick at the Outfitting Wharf of a Japanese Yard

JAPANESE TRADEMARKS AND PATENTS

An article appearing in the Japan Advertiser of Tokyo on foreign trademarks, patents and copyrights will be of interest to American firms, particularly those engaged in foreign trade. The portion relating to patents and trademarks is reproduced below, that relating to copyrights being omitted:

The infringement of foreign trademarks and patents in Japan seems to the foreigner to be constant and flagrant, but in reality there is not so much violation in this respect as appears to the casual observer. According to one of the best foreign law firms in Yokohama, in many cases there has been no legal infringement, but merely an advantage taken of the delay or absolute neglect of a company or individual to take the proper steps to protect in this country a trademark or patent. That this often occurs through ignorance of the proper steps to take is evident.

American trademarks and patents are not protected in Japan against infringement simply because the proper registration or patent has been procured in America. It is necessary to take out registration or patent papers in Japan as well, and this is possible only if the trademark has not previously been registered in Japan by another person or a like invention patented.

Time Limit Allowed

There are, it is true, certain priorities by reason of a previous registration in America. For instance, if after a trademark has been registered in America an application for registration is made in Japan within four months, this constitutes a prior right over a previous application and the American trademark is entitled to registration. But if application be not made within four months, a Japanese subject will have a vested right in any trademark which he may register, and this right would be unimpeachable.

The penalty for infringement according to Japanese law is very rigid. In case a trademark has been registered or an invention patented in Japan within the legal limit and an infringement occurs, the offender is liable to fine and imprisonment, and he is also liable to a suit for damages. The Japanese law differs from American or English law, in that the remedy under English or American law provides only for a suit for damages.

Japanese Shipping Activities

An increased activity in the European charter market in the early summer led to better rates being paid for Japanese steamers, although prices remained low as compared with those prevailing prior to the armistice. The general cargo freight rates also threatened to rise. Most of the larger steamers available were chartered early, and consequently the beginning of June saw smaller vessels, of 3000 and 4000 tons, being taken. This tended generally to enliven the whole market. A fly in the ointment, however, was that little return cargo from Europe was being offered, and that most of the vessels were chartered for only one voyage and were to be returned in London.

The following table shows the changes in charter rates for a year:

			Ocean	
		Ordinary	Indian &	North
	Coasting	Ocean	Austral'n	Amer'n
1918—	Yen	Yen	Yen	Yen
June	25.50	37.00	41.50	46.80
July	25.00	34.00	36.00	41.00
August	27.33	31.00	36.00	40.00
September	25.57	33.00	35.00	42.00
October	24.00	33.00	38.00	35.00
November	23.00	20.00	30.00	35.00
December	19.50	20.00	25.00	30.00
			World Service	
1919—	Yen	Yen	Yen	
January	15.00	18.00	25.00	
February	8.00	10.00	15.00	
March	7.00	8.00	9.00	
April	7.00	8.50	10.00	
May	8.00	9.00	13.00	

By the middle of June the world voyage had gone to yen 15, and London to yen 18, one trip.

Up to June 1, forty-four vessels, aggregating more than 320,000 tons, had been taken for European cargoes, which consisted principally of foodstuffs. Just prior to the placing of these European orders, prospects were that there would be a drop in charters, inasmuch as more than 300,000 tons were to be released from old engagements. Europe, however, desired rice, sugar, flour, beans, bean oil and copra, and the market was assisted materially. Suzuki & Company led in the tonnage dispatched to Europe during the early days of summer, with 165,795 deadweight tons. Masuda & Company sent 39,750 tons; Taiyo Kaiun Kaisha, 37,695; Kodera Yoko, 27,300; Messageries Maritimes, 24,780; Mitsui Bussan Kaisha, 23,200; Yamashita Kisen Kaisha, 5628.

How long these good rates would prevail was uncertain, depending upon additional orders for foodstuffs and also upon releases of tonnage from old contracts, which would throw more vessels upon the market. July releases were estimated at twenty-four vessels of a total of 118,500 tons, and August releases at eight vessels, 61,816 tons. In addition to vessels chartered, nine steamers were being operated monthly to Europe—four N. Y. K., one O. S. K., and four Blue Funnel.

Coasting rates also advanced in June. Ocean steamers had invaded the coasting trade a short time previous, depressing it—a condition which changed completely when not only large but small vessels were chartered for offshore carrying, and Dairen and Hokkaido business began to pick up. A prolonged carrying out of the Chinese boycott of Japan, however, might affect that trade seriously.

There was considerable gossip in June relative to sales of Japanese bottoms to foreigners. Although negotiations for the sale of a vessel by the Uchida Kisen Kaisha to the Brazilian government did not materialize, there were reports that two steamers, of from 3000 to 4000 tons each, were to be sold to France; that America was in the market for ten vessels of from 6000 to 10,000 tons each and two of from 6000 to 9000 each, and that Great Britain wanted three vessels of from 6000 to 8000 tons each. It was reported that the Uraga Dock Company has contracted to sell a 6800-ton steamer, to be completed by November, at yen 320 ($160) a ton.

This European charter business reacted upon North America. It was stated that the Nippon Yusen Kaisha, Osaka Shosen Kaisha and Toyo Kisen Kaisha had decided to increase their rates and that the smaller lines also proposed to demand a rise. Freight rates to North America fell steadily after the armistice, to $4 and $5, and even, as regards some of the smaller companies, to $3. Europe's demand for tonnage diverted independent tramps from the North American route, with a resulting shortage of tonnage. Business with the States also improved. The three big lines were to raise their cereal and oil rates to $7 and $7.50 in unsubsidized steamers on the outward voyage to America, and the independents proposed a general rate of $12. Still further advances were the subject of rumor. The three big lines left their general rate unchanged at $9.

Vessels plying to Australia did not benefit from the general advances. Considerable interest was manifested by Japanese shipping men in the spirited competition between the Taiyo Kaiun Kaisha, on the one hand, and the N. Y. K. and O. S. K. on the other. The two latter, with the Toyo Kisen Kaisha, are known as "shasen" companies, as distinguished from the independent "shagaisen" lines. Prior to the war the shasen companies controlled most of Japan's overseas trade. Then the shagaisen lines entered the field, and the Taiyo Kaiun Kasha repeatedly cut the Australian rate, from about yen 25 to yen 5, as it stood the middle of June, which compelled the N. Y. K. and O. S. K. to reduce their rates, although they cut to only about yen 10. Because the companies had good cargoes offering homeward from Australia to Japan, it was expected that competition would continue for some time. The Taiyo Kaiun Kaisha had large contracts for ore and coal, from Newcastle to Java, and could endure the low Japan to Australia rates. The Japanese press stated that the O. S. K., N. Y. K. and East Australian Steamship Company had decided to dispatch steamers in turn each time the Taiyo Kaiun Kaisha sought freight for Australia—these steamers to offer direct competition by cutting rates, but the other vessels to maintain the 10-yen tariff. Return freights from Australia the middle of June were about 100 shillings on wheat and flour, due to the heavy shipments. Government officials were represented as deprecating such competition because it would tend to weaken Japanese shipping and give foreigners an opportunity to encroach.

Keen competition between the O. S. K., N. Y. K. and Mitsui Bussan Kaisha, in one group, and the Yamashita Kisen Kaisha for the Formosan sugar crop also was in the air. Sugar shipments will aggregate about 4,000,000 tons this season, the Yamashita Kisen Kaisha carrying 3,000,000 tons or more. For ten years, until 1918, the N. Y. K., O. S. K. and M. B. K. contracted with the Formosan sugar companies, who acted collectively, until the Yamashita Kisen Kaisha cut the rate and won the contract in 1918. This cut was intended to strengthen the Y. K. K.'s position in the Formosan and Javan routes. Spirited fighting for the 1920 contract was forecast, therefore. Contracts held by the N. Y. K. and O. S. K. for the carrying of fertilizers to Formosa on the outward voyage and for the carrying of salt homeward for the government, and a virtual monopoly on shipments of lumber and cereals from Formosa, were held to give these companies a strong position, but the Y. K. K. was expected to fight, and a cut from yen 1.75 a picul (133½ pounds) to about 70 sen (35 cents) was predicted.

Japanese Man Power loading Heavy Boxes into Goods Van. (There are no "freight cars" west of Honolulu)

Brick Godowns at the Yokohama Wharves

Negotiations between Japan tea exporters and the steamship companies fell through, and the latter decided to charge at least $8 during May and at least $7 from June to November. The same thing has happened as regards Formosan Oolong tea. The rate by subsidized liners will be not less than $8 and, by unsubsidized, not less than $10.

Canal Scene at Yokohama

BRITISH-JAPANESE COMPETITION

THOUSANDS of words have been published in the Japanese newspapers on what they term an attempt of the British authorities in India to drive Japanese vessels from their waters. The first article stated that the Indian government had decided to prohibit vessels not belonging to the Bengal Freight Conference from carrying sugar between Java and Calcutta, which would result in all Japanese lines except the Nippon Yusen Kaisha being barred; that the Osaka Shosen Kaisha had received notice to this effect, and even that the N. Y. K. saw in the release of three Asiatic Industrial Steamship Company's vessels by the British government, and their diversion to the Java-Calcutta trade, an attempt to exclude it also.

A Japanese government official was quoted by the Tokyo Asahi as saying that pressure had been brought upon Japanese vessels since January in regard to fuel, issuance of permits and otherwise. Attempts to get a settlement from the Indian government resulted in inquiries being referred to London, which referred them back to India, the official stated. Consequently, no settlement had been reached. He resented the action of the British authorities in view of the maintenance of services to India and Europe by Japanese lines during the war "in the face of great danger and at low freight rates."

Yokohama Waterfront

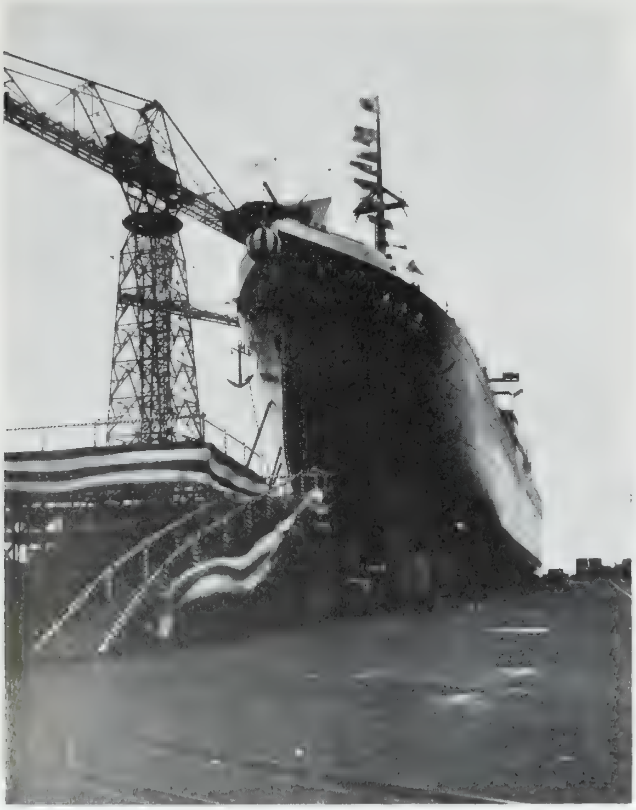
A Japanese Launching Ceremony

ONCE fairly on the high seas a Japanese merchantman differs not at all from one flying another flag. She competes with every comer for cargoes, from which her owners expect to profit (and do!), and her master navigates her quite according to Bowditch. She knows the universal language of the long ton and of yen, dollars and pounds, whether the port be San Francisco, Colombo, Liverpool or Kobe.

Moreover, she has been built as her sisters of America, Great Britain and Norway. Engineers and shipbuilders know the same world-language of power and stresses. But, in that brief interval that elapses between her completion on the ways and her admission to the sisterhood of cargo carriers—in other words, when she first feels salt water about her keel—the Japanese steamship is a thing apart, impressing upon the casual comer from the Occident that, although Japan may have drawn upon the West for much, she yet remains of the Orient, which possesses much that is old—that existed, indeed, long before the Isherwood system or even transverse framing.

Above the entrance to the Uraga yard, near Yokohama, two Japanese flags were crossed, but, inasmuch as it was the birthday of the empress, they may have been there in her honor and not merely because the Suez Maru was to be launched. From the gate two matted ways led, the left to the ground and the right to a covered stand. That stand had a strange appearance.

The Suez Maru—although the casual Occidental did not know then that she was the Suez Maru—had a few signal flags flying, but very few, compared with an American vessel about to be born. That aside, she was different. Now, the staging that the Japanese erect about a vessel—that they erect about everything under construction, for that matter, a new building as well—is merely of bamboo poles, lashed together, altogether impermanent and easily removed. Wherefore, instead of being hedged about by the thickest of scaffolding with which Americans are familiar, she stood, a bare hull, only a few derrick posts and other uprights remaining. From the stem to the framework of the bridge, her bulwarks were wreathed with pine branches, with which lilies, already wilting under the heat of a Japanese summer day, were intertwined. What resembled a bowsprit, also covered with pine twigs, projected from the forecastle head, this terminated in an upright plaque, which was evergreens fashioned into the character "iwai," which, of somewhat general and imprecise meaning, may be translated as "congratulation," "celebration" or "festive occasion." Below this plaque hung a bell-shape of green branches, and still below that a balloon-like paper bag.



Ready for launching at a Japanese Yard. Note the complete absence of staging alongside Ship

On the stern, about midway up from the keel, was a circular disk. This marked the precise spot where the bottle of champagne, suspended by a cord, was to strike.

Gradually, a few persons filled the stand. Foremost was a Shinto priest, whose garb, impressively simple, was the essence of dignity—plain white costume, with flowing sleeves; a black cap, not unlike a helmet, if one can imagine the spike arising from the back instead of the center, and a quivering black ornament curving from beneath the spike. A Shinto, not a Buddhist priest, it will be remarked. For ship launchings Japan holds to her older faith, which could be dismissed as "ancestor-worship" if there were not a score of major deities.

In the front of the stand was a small Shinto shrine of wood. Flanking it, on either side, were large rice cakes, conspicuous at quite a distance. Below the little shrine were food offerings—fruits; something that resembled a small dried squid and which probably was that, seaweed; a white stuff which, it was explained, was "vegetable"; and then clusters of garden vegetables, besides two bottles of "sake," and, on the left hand, rice and water. All had some significance; just what it would be difficult to ascertain—how difficult anyone knows who has tried to pry into what a Japanese wishes to keep concealed.

I do not recall that Homer described the launching of a Greek vessel, but such offerings well might have been made to Zeus, Poseiden and Hades; and perhaps that most ancient Egyptian boat, the worm-eaten fragments of which are in the Field museum, Chicago, took her plunge under not dissimilar auspices.

Rubbing his hands softly together once, and clapping them twice, and bowing profoundly before the little shrine, the priest uttered what seemed to be a prayer, chanting it, but not in a monotone, for there were rises and falls of key, somewhat as Chinese conversation, which runs through octaves. That done, he took a brush-like bunch of twigs, to which some shredded paper was tied, and, first passing it in front of himself, waved it before all his auditors. This was a ceremony of purification, perhaps resembling the use of holy water more than anything else.

Then the priest unfolded a written manuscript.

first having opened two wee doors of the shrine. This he read—goodspeed to the vessel.

For a distance of perhaps one hundred feet, no woman was to be seen. The owner christens a Japanese ship. The owner, in this case, Mr. Yamashita, also opened a written scroll, which he read, thus giving the vessel her name; a tap from a gold hammer on the cord released the champagne bottle, which swung down and broke against the disc.

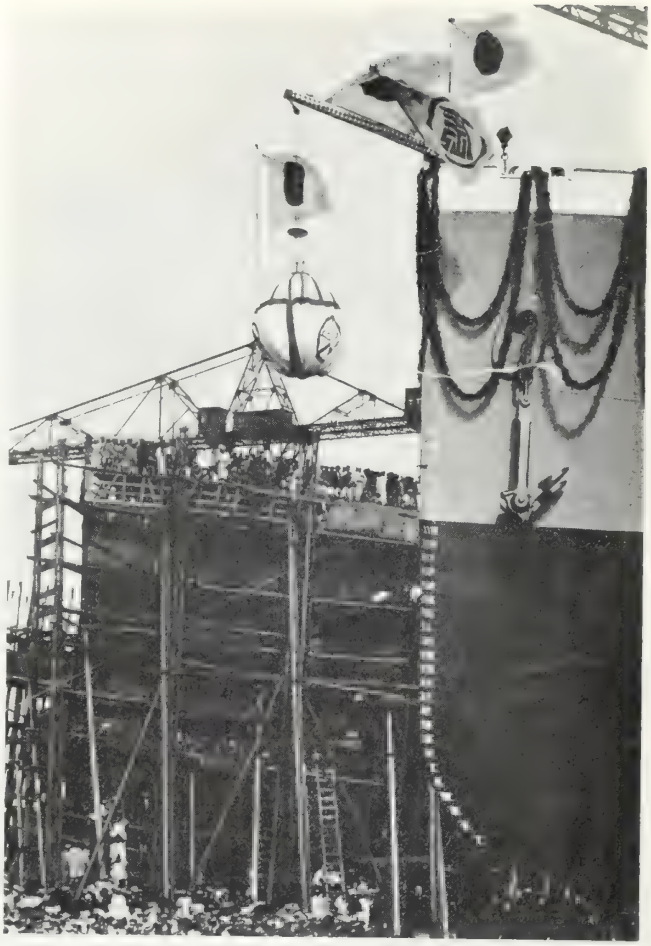
Two canvas covers, which had prevented the onlooker from ascertaining the name of the vessel, dropped from the bows, disclosing the "Suez Maru" and the ship began to move.

There was some slight clapping of hands, but nothing approaching the wildness of enthusiasm one sees at some American launchings. In her progress down the ways the ship, tugging at a cord tied to the paper bag at her stem, pulled it apart, and confetti fluttered about her bows. A cage, heretofore concealed by the bag, came into view, but no doves flew from it, as they properly should have done. They were "too tame," as a yard official explained. Three, five or seven (any of which is a lucky number) of doves may be released from the bag when the ship moves.

The single American touch, aside from the actual launching itself, came with the blowing of a whistle. It continued for a time after the hand-clapping had died away, but not for long.

An anchor was dropped and the Suez Maru had been launched. After some bowings, otherwise in a silence as deep as that in which they had observed the ceremony, the spectators departed.

But they say that the launching tea or dinner is conducted altogether as in the yards of America.



Bow of ship prepared for Japanese launching ceremony. Note the bottle suspended by a tightly stretched cord so as to swing against the fan-shaped shield on the stem when the cord is cut; also the bag suspended from jury bowsprit from which confetti and doves are released as the ship starts.

What Does "Maru" Mean?

From Basil H. Chamberlain in "Things Japanese"

It is often asked: What does the word Maru mean in the names of ships—as Tokyo Maru, Sagami Maru, Hiryu Maru, etc.? The answer is that the origin of the term is obscure. Maru means "round"; but how came ships by so inappropriate a name?

The first thing to note is that in former times ships had not a monopoly of the name. Swords, musical instruments of various kinds, pieces of armor, dogs, hawks, and the concentric sections of castles, were called Maru also. The probability is that two distinct words—maru and maro—have flowed into one, and so got confused. To name the concentric sections of a castle maru ("round") was but natural. The word maro, on the other hand, is an archaic term of endearment. Hence its use in such ancient proper names as Tamura-Maro, a great general who subdued the Ainos; Abe-no-Nakamaro, an eminent scholar of the eighth century; Okino-Maro, a favorite dog of the Emperor Ichijo, and so on. The warrior's pet sword, the sportsman's favorite dog or hawk, the oarsman's boat, would naturally come to be distinguished by the same half-personal name, much as the English sailor or engineer calls his ship or locomotive "she." When the ancient word maro ceased to be understood, it would easily slide into the more familiar maru, by the alteration of the final vowel, o and u being particularly apt to interchange in Japanese.

Observe that Maru is applied to merchant vessels only. Men-of-war take Kan instead, as Maya Kan, Asama Kan. Kan was originally a Chinese word, meaning "war-vessel." It is not pronounced kan in China itself, and is no longer there used in the same sense.

(Without venturing to take issue with an authority such as Mr. Chamberlain, it nevertheless is pertinent to cite the fact that some Japanese, at least, assert that the word maru was formerly applied to men-of-war as well, a practice which ceased many years ago. It will be seen that a final settlement of this vexed maritime-philological question is not likely, and that probably the Japanese is right when he says: "I do not know." If an American or Englishman could conceive of the word "steamship" disappearing completely from the language, leaving it only the prefix "S. S.," as "S. S. Mauretania," without any precise knowledge on the part of anyone as to the meaning or derivation of "S. S.," he probably would have a case analogous to that of "maru.")

Japanese Opinion of the Future of Shipbuilding

IN what follows, an attempt has been made to look into the future of Japanese shipbuilding through the eyes of well-informed yard officials, principally through the medium of interviews. It is not an attempt to search out the remote future, but merely to ascertain as well as may be, what is in the immediate prospect. The Japanese themselves are not at all prone to gloss over the weaknesses of their position; they are not, on the other hand, unduly pessimistic; and these interviews and statements, it is believed, fairly reflect representative Japanese thought.

It is a truism that there are two essentials in steel building—labor and iron—to reduce things to the elemental. Cheap iron and cheap, or efficient, labor, the same in the end, insure success. As either is costly, a handicap must be overcome.

Arthur K. Tomiyama, of the Asano yard, is a builder who is qualified to speak with authority. Education at the Universities of California and Glasgow and a wide knowledge of American and European yards give him an admirable basis for judgment. And he put his finger on iron as the pivotal point.

"Labor in Japan does not cost much," he said. "But iron does; and cheap labor does not help much if material is expensive."

Mr. Tomiyama cited the price of pig iron at the height of the frenzy in 1918, when, embargoes being in force in almost every iron-producing country, the stocks on hand in Japan rocketed. Pig iron was worth as much as 500 yen a ton, approximately $250. Shell plates were worth 1500 yen.

That fever of speculation has passed; there remains the fact that plates at 3 cents a pound, f. o. b. an American mill, cost about $100 a ton laid down in Japan, even though the old rail rates, prior to the advance of June, 1918, are guaranteed by the Shipping Board. And plates rolled in Japanese mills today, of Japanese ingots, cost about 500 yen a ton.

If, however, Japan could have access to an abundant supply of first-rate ore for her smelters, the problem virtually would be solved. Naturally, she hopes to get ore. Whether she does, and how and when, is a political question; so that Mr. Tomiyama hesitates to predict definitely what is in store. He was inclined to discount the probable importance of building for Japanese lines, the war losses of which have been very small, so that they have little to replace.

Tamatoro Tojo, Managing Director of Yokohama Dock Company

The Submarine Boat Corporation's offer to build vessels for the Shipping Board for $149 a deadweight ton was cited to Tamataro Tojo, managing director of the Yokohama Dock Company, and he was asked what Japan would be able to do toward cutting the cost of the vessels now building for the Shipping Board, which is $175 a deadweight ton. "By next year," he replied, "we should be able to build for $149 or $150."

And as a matter of course the question arose as to what prospect there was of Japan rolling her own plates and generally becoming independent of other countries. Mr. Toyo could not see any hope of immediate relief on any comprehensive scale. It is true, he said, that the Mitsubishi interests have opened an iron works at Kenjiho, Northern Korea, the first pigs having been received in Japan in August, 1918, although at the time of the interview no plates had been rolled. Two 150-ton blast furnaces were in operation. Yet the Mitsubishi yards at Nagasaki and Kobe do much government work and private building, and their own interests naturally have precedence. The Japanese ore, Mr. Tojo pointed out, is of poor grade; and China—well, China is a political question. Dependency on the States or, as it was before the war, on England, remains, therefore, a present and pressing fact.

Prior to the war, Mr. Tojo continued, there were some twenty or thirty ways in the empire; now there are more than one hundred. What, then, of the future?

Over-expansion, yes, a condition faced by builders the world over; above and beyond this, there remains this fact, that Japan has many old-established lines, which will need new vessels continually, if for nothing else than to maintain their tonnage against depreciation. For example, Mr. Tojo cited the Nippon Yusen Kaisha, one of the great lines of the world, now possessing a fleet of about 500,000 gross tonnage, which allows a depreciation period of twenty years. At that rate, the N. Y. K. alone would require some 25,000 gross tons a year. And Japan conceivably might get foreign contracts, despite the great variance in estimates of the world shortage in tonnage.

As to costs, aside from material—labor prices in Japan virtually have doubled since the beginning of the war, and Mr. Tojo looked for no drop. Living expenses have climbed, also—a bar to any great reduction in wages. However, when all is said and done, an increase of 100 per cent in wages is positively relative; consider the actual cost, and the Japanese still is paid, to the American way of thinking, almost nothing. A riveter now may earn 2 to 2½ yen a day (and the standard value of the yen is about 50 cents).

Japan's hope of cutting labor costs, as stated by Mr. Tojo, lies in greater efficiency. The enormous expansion in shipbuilding was attended by precisely the same phenomenon that the States witnessed—a dire shortage of skilled men. And the men are not yet what the builders desire.

Kakichi Uchida, former vice-minister of communications, possessed of a wide and thorough knowledge of shipbuilding and shipping, not only in the empire but the world over, believes that there is great prosperity in store for the yards of Japan. At the present time, Mr. Uchida said, materials remain expensive and shipbuilding costs are high, besides the general disorganization the world is experiencing before it settles into its peace grooves again. However, when steel falls more nearly to a normal price, Japan will be able to build for from $120 to $150 a ton, depending upon the cost of steel, which now is about $100 a ton laid down at the yard. Within a year or so, Mr. Uchida predicts a price of $60 to $80 at the yard. Prior to the war, British steel cost only £8, or about $40. American steel was more expensive. Japan turned to America during the war, as she had to do, and she will continue to buy from America in great measure if prices are as low as Britain's, Mr. Uchida continued. Inasmuch as American mills have turned to the rolling of steel for ship's plates, they should be in a position to compete with the United Kingdom. Another factor tending to lower steel costs will be the readjustment of trans-Pacific freight rates.

Left to right, Christopher C. Miles, United States Shipping Board Inspector, Alex Ewing, Lloyds' Surveyor, S. L. Ware, United States Shipping Board Inspector, and Arthur K. Tomiyama of the Asano Yard.

The Mercantile Marine School of Japan

ONE of the more vivid impressions gained from four years of somewhat close knowledge of shipping on the Pacific is the increasing rapidity with which Caucasian masters of Japanese steamships have been supplanted by Japanese. Within the last few years that process has been more marked as regards the liners of the Toyo Kisen Kaisha, which are less and less commanded by the Englishmen who took them to sea for years; and, as for the Nippon Yusen Kaisha, the change began much earlier. There particularly recurs to mind a conversation with a veteran British master of a Nippon Yusen Kaisha cargo carrier, whose long service began when all the commanders were Caucasian and who had seen them disappear one by one, their berths being taken by Japanese, and who knew that, although he would be retained as long as he wished to go to sea, another Caucasian would not occupy his quarters when he did retire.

The desire of the Japanese companies to see their vessels commanded by native masters is natural and easily comprehended, even commendable, for America, France and England would regret dependency on foreigners in this respect no less than the Japanese. By what means, through what agency, Japan has been enabled to supply its own officers, perhaps has escaped general observation.

Credit must go in greater part to the Shosen Gakko, the Imperial government training school for merchant marine officers, situated in Tokyo, which, established in 1875, has nearly 2000 graduates, of whom about 250 are dead. Approximately 1150 of the graduates were from the navigation course and 850 from the engineering. The Shosen Gakko has made it possible for Japan to meet the demand for mercantile officers, and it is the purpose of this article to tell of the history and present status of the school.

Forty-four years ago Baron Iwasaki, president of the Mitsubishi Mail Steamship Company, by direction of the government and with its aid, founded the mercantile marine school. In 1882 it passed into direct control of the Imperial authorities, who maintain it today. At the time of the visit to the school, during the summer, it had 789 students, of whom 392 were in the navigation branch and 397 in the engineering. In addition to the Imperial school there is one private school, founded by Mr. Kawasaki, the famous shipbuilder, and nine prefectural schools, maintained by the local governments. H. Ishibashi, superintendent of the school for nine years, and vice-admiral on the retired list of the Japanese navy, stated that there are vacancies for both officers and seamen on virtually every Japanese steamer, and that either the Shosen Gakko will have to be enlarged or another school founded.

The first deck cadets were graduated in 1878, after only a three-year course. After some irregularity, the length of the course was fixed at five years long ago. The first engineering cadets finished in 1882.

At the present time new classes are formed in May and November, sixty students in each course forming a class, or an aggregate of 240 a year. This increase in the size of classes dates only from May, 1919, prior to which forty were matriculated, or 160 a year, in all. Between 130 and 140 are graduated each year, which means a falling-out of between 10 and 20 per cent of those matriculating. Each month witnesses the graduation of a few, because each cadet must serve, not one approximate year, but 365 days, aboard a steamship, and naturally all do not complete this period at the same time.

Both navigation and engineering cadets require five years for graduation. Entrance examinations are physical and mental, the latter comprehending mathematics, English, Japanese and Chinese. Approximately the standard set for graduation from the middle schools (roughly equivalent to the American high school) is required in mathematics—algebra, trigonometry and geometry. Navigation cadets must be between sixteen and twenty years old, and engineering between sixteen and twenty-one.

Eighty scholarships a year are awarded by the government, twenty in each of the two classes of the two courses, so that one-third of the cadets are thus assisted. There is no tuition fee, the only expense being for board, clothing and books, amounting to between 600 and 700 yen for five years in the navigation school and between 700 and 800 in the engineering school. The government supplies food during the year on the training ship Taisei Maru and for six months at the naval gunnery school at Yokosuka and that navigation cadets live at the expense of the steamship companies during another year of training. The engineers are less fortunate, as they miss the year on the Taisei Maru.

Navigation Course

Two years are spent in the navigation classrooms. The next months are given to naval gunnery at Yokosuka, near Yokohama. Thus a naval reserve is being constantly augmented. Thereafter for eighteen months the cadet serves on the Taisei Maru and for one year on a steamship. During the last period they usually receive a small wage. Admiral Ishibashi proposes to reduce the length of the course to four and one-half years, taking six months from the Taisei Maru or steamship terms. Most of the cadets go to the Nippon Yusen Kaisha, Osaka Shosen Kaisha and Toyo Kisen Kaisha steamers, although other companies also receive them.

The class work in the navigation course includes navigation, seamanship, hydrographic survey, ocean meteorology, commercial, such as the making of contracts of importance to masters of vessels, etc.; commercial geography, maritime law, shipbuilding, general only; general engineering; electric mechanics; naval hygiene (first-aid, care of the health of men, etc.); English, physics, chemistry; mathematics—algebra, plane and solid geometry, plane and spherical trigonometry, integral and differential calculus, dynamics, rifle drill (best translated into our American term of "close-order" drill), and minor instruction, such as signals, handling row and sail boats, gymnastics. Then comes the naval gunnery.

Marine Engineering Course

Young engineers remain in the classrooms for two years. Admiral Ishibashi proposes to send them also to the naval gunnery school for a six months' term, beginning in November, 1919. After the gunnery course, they will spend eighteen months in shipyards, learning general blacksmith work and the building and repairing of engines, and one year on steamers. Heretofore, two years have been spent in the yards. Half the cadets go to government naval bases, where they receive no pay, and half to private yards, such as Mitsubishi at Nagasaki and Kobe, Kawasaki at Kobe, Yokohama Dock and Osaka Iron Works, which give a small wage. If the course is reduced to four and one-half years, the time in the yards will be cut another six months.

The engineering classroom work includes: Engineering, electric mechanics, drawing, shipbuilding, uaval hygiene, English, physics, chemistry, mathematics (much the same as the navigation course, except that there is no spherical trigonometry, mensuration replacing it); dynamics, rifle drill, determination of stresses and strength of materials.

These curricula are such as to compel admiration. They compare favorably with any in the world and surpass many.

There are only three foreign intructors—all teachers of English, one of whom is on the Taisei Maru. There are twenty-seven professors and assistant professors; twelve practical instructors, smiths, etc.; twelve lecturers—an aggregate of fifty-one, which does not include the administrative force. The continuance of English instruction on the Taisei Maru explains why many of the younger Japanese officers have the excellent command of English that they possess, for upon leaving the classrooms the cadets are by no means finished linguists.

Twice a year the Taisei Maru sails on a voyage of about four months. Usually she goes to San Pedro, San Francisco and Honolulu; at times to Australia, but never to Vancouver. Her average complement of cadets is 100, although she could carry a maximum of 120. She uses sail offshore, her steam auxiliary being only for harbors. She is a four-masted steel bark, built fifteen years ago at the Kawasaki yard; is 277 feet long over all, 42 feet beam, 24 depth of hold. Captain K. Asari has been her master for two years.

Upon graduation, cadets are awarded licenses as second officers and first assistant engineers, ocean, without examination.

There are about 200 graduates a year from the other ten schools mentioned above. The entrance requirements are not so severe as those of the Shosen Gakko the cadets generally not being middle school graduates, but the courses are six years in duration. Graduates of these schools are required to pass examinations for their licenses.

JAPANESE-MEXICAN SHIPPING AGREEMENT

"A PROPOSAL has been brought forward in Mexico to establish a shipping company under joint Japanese and Mexican management in order to bring Japan and Mexico into closer relations. The Mexican promoters are represented by the president of the National Bank of Mexico City, and they have already obtained the necessary permission from the government. I have come back to Japan to see Baron Shibusawa, Baron Okura and other influential business men in order to obtain their support for the proposed enterprise.

"Though there are six independent states in Central America, there is no regular Japanese steamship line to that part of the world. This is regrettable for Japan's shipping trade. The amount of the capital of the proposed company and other particulars cannot be published yet, but this much may be said, that it contemplates operating in the Pacific and along the coast of Mexico. It will at first employ eight vessels, and all these will be bought in Japan. Its headquarters will be established in Mexico City."

Japanese Shipping Merger

THAT great Japanese shipping merger, of which the States heard much last winter through the daily papers, is nearing consummation, and probably ere this is published the cables will have carried the news of its complete organization. It is, briefly, a corporation formed to take over the stock vessels now held by Japanese builders and to operate them, either directly or by chartering them to others. An American company, which would operate under a working agreement with the Japanese, is also projected. The name of the corporation will be the Kokusai Kisen Kaisha, or International Steamship Company.

Kakichi Uchida, who retired as vice-minister of communications in September, 1918, after more than a quarter-century in the service of the Imperial government, having held, besides his post in the communications department, the governorship of Formosa, conceived this plan. Impressed by the enormous expansion in the mercantile marines of America and Japan since the beginning of the war, and more especially by that of America, and desiring to avoid the cutthroat competition that might ensue when the American government-owned vessels were placed on the market, Mr. Uchida sailed for the States in November. In New York he conferred with President Vanderlip of the National City Bank and with Mr. Stone of the American International Corporation, which is behind the projected American company, and proposed to them his plan for a company somewhat after the International Mercantile Marine, which operates lines under both the American and British flags.

Kakichi Uchida

After those conferences, Mr. Uchida returned to Japan, to place his proposals before the Japanese builders. March, April and May were given over to the preliminary negotiations, until Mr. Uchida was able to announce this approximate formula: The company to be incorporated for 100,000,000 yen and to issue, in addition, bonds to the amount of 100,000,000 yen—this in preference to a total stock issue of 200,000,000 yen. Vessels to be taken over from the shipyards at 350 yen a deadweight ton (approximately $175—the price the United States Shipping Board is paying for thirty vessels being built in Japanese yards); half of this amount to be paid the builders in cash and half in stock. Thus, it will be seen, the shipyards would be the principal stockholders.

After a year, probably, the company would operate its own vessels. Three principal trading routes are proposed, the order named being that in which it is planned to establish them: Between Japan, India and North American ports—San Francisco, Portland, Tacoma or Seattle; second, around-the-world, New York to Liverpool or London, Marseilles, Suez, Western Asiatic ports, Japan, the West Coast of North America and back to New York; third, from Japan to South African ports by way of Good Hope, thence to South American ports of the East Coast, thence to New York and to Japan via the Panama Canal.

At the time of the interview, Mr. Uchida said that shipbuilding companies owning in the aggregate 250,000 deadweight tons, half the 500,000 tons which it is intended the company shall own, had agreed to join the merger. These were: Asano; Kawasaki; Suzuki, acting for the Toba and Harima yards; Kuhara, for the Osaka Iron Works; Uraga and Uchida. Others were expected to come in.

Formation of the American company would require further conferences, Mr. Uchida said. There would not be a precise parallel between the Japanese-American associated companies and the International Mercantile Marine, in that the Japanese corporation would operate home-built ships under the Japanese flag, as would the American corporation American ships; but there would be a close working agreement.

In addition to this shipping merger, Mr. Uchida also is the moving spirit behind a new Pacific cable line, to be incorporated for 50,000,000 yen. He and Baron Shibusawa were delegated, by a meeting of capitalists to whom the plan was broached, to appoint a committee to carry on the organization; and, as this is written, Mr. Uchida is conferring with experts regarding details.

He has three routes in mind: First, from the extreme northern point of Japan to Vancouver or Seattle by way of the Aleutian Islands, on one of which a station would be established; second, from Ogasawarajima, where the line of the Commercial Pacific Cable Company connects with the

Japanese government cable, to San Francisco by way of Midway, and Honolulu; third, the same route, but omitting Honolulu; fourth, from Ogasawarajima to one of the former German South Sea islands, which were seized by Japan early in the war, thence to Honolulu and San Francisco. Personally, Mr. Uchida favors the second, the Midway-Honolulu-San Francisco, route.

The northern route, by way of the Aleutians, would be shorter by far—about 5700 miles; its disadvantage would lie in the difficulty of making repairs, if necessary, in the winter, when there would be ice floes and bergs to contend with. The other lines would range between about 6600 and 7500 miles. The Aleutian line would cost approximately 37,000,000 yen and the longest 54,000,000 yen.

In explaining why a new cable was desired in spite of the competition two and one-half years ago of the Marconi trans-Pacific radio system between Tokyo and San Francisco, with relay at Honolulu, Mr. Uchida said that, during war times, no code messages could be sent by radio; and, although this condition probably would end when peace was restored fully, static electric conditions made it undesirable to have to rely too fully upon wireless.

When in New York, Mr. Uchida discussed the cable with members of the Japan Society and the Council of Foreign Relations, who saw the need of better communication between the two countries and urged that steps be taken toward that end. Upon his return to Japan, Mr. Uchida talked over his proposal with government officials and others. Among those who attended the first meeting to hear Mr. Uchida's proposal were: Baron Shibusawa, Baron Okura, Baron Go, President Inouye of the Bank of Japan, President Kushida of the Mitsubishi Bank, Messrs. Ariga, Fujise and Dan of Mitsui & Company; President Asano of the Toyo Kisen Kaisha, Mr. Suyenobu of the Tokyo Marine Insurance Company, President Fujiyama of the Tokyo Chamber of Commerce, President Otani of the Yokohama Chamber of Commerce, President Sasaki of the First National Bank; and representatives of the Osaka Shosen Kaisha and of the Furukawa, Sumitomo, Suzuki and Kuhara companies.

Baron Eiichi Shibusawa, Arbitrator

IN the reception room at the offices of a certain Japanese in Tokyo is an object so familiar that an American is likely to fail to grasp its significance. It stands on the right of an alcove, which overlooks tiled roofs and stone walls that hem in an inky, stagnant canal. Down this canal, one day at the beginning of the nyubai, or rainy season, slid a lighter, propelled by a solitary individual wearing a wide, mushroom-shaped straw hat and a qaint raincoat of straw. Everything outside was Japan of the Japanese; and, in contrast, the object within became very striking and full of meaning, for it was a large, gold-fringed American flag, the gift of an American, John Wanamaker, to a Japanese, Baron Eiichi Shibusawa, presented in the hope that it would prove another bond between the two individuals and the two nations.

Unmindful of what the jingoists of both Japan and America may do and say, Baron Shibusawa goes his way serenely, ceaselessly working to build up a better understanding between the nations, and is known at home and abroad as the first "hands-across-the-sea" exponent of the empire. Perhaps this had much to do with the signal and well-nigh unique honor conferred upon him by the United States government through the Shipping Board, for the baron was made final arbitrator in case of any disagreements between the board and the Japanese builders who contracted to construct thirty vessels for the States.

And, in the course of an interview with him, it was quite apparent that the baron was greatly pleased at the high compliment paid him. Through an interpreter the baron said that he had had an informal conversation with Ambassador Morris regarding his acting as arbitrator, after Commander Frederick J. Horne, U. S. N., naval attache of the American embassy, who was named in the contracts as arbitrator, had been called home; and that, after careful consideration, he had accepted the nomination. Should there be need of his services, the baron said, he hoped to be able to smooth out any difficulties that might arise. That should not be a hard task, for the Japanese builders acquiesced in his appointment.

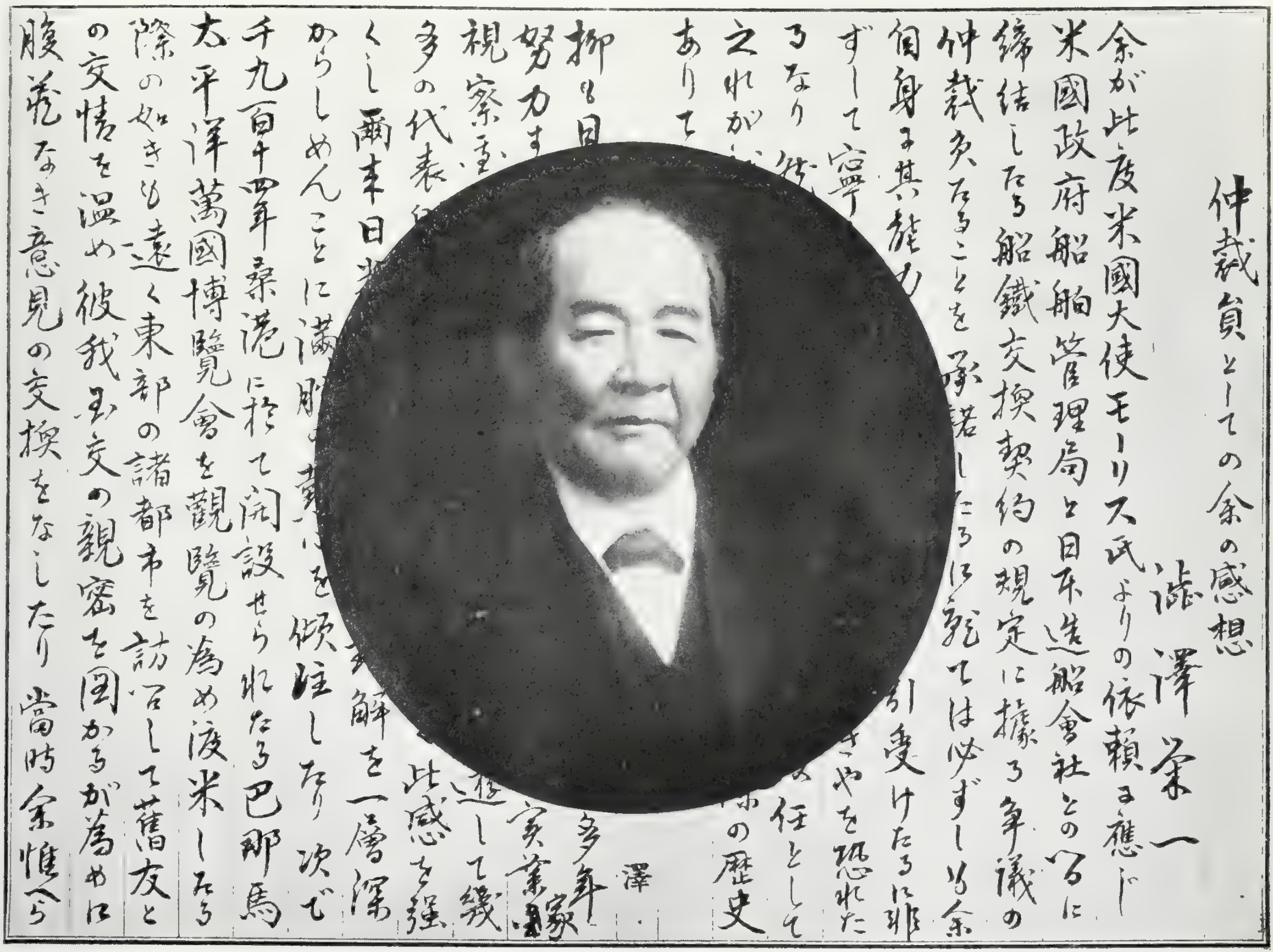
It is not the least noteworthy fact about this remarkable man of Japan that he has attained his present comprehension of America and has labored so assiduously to promote international good-will without being able to speak English, that he has become the friend of scores of American leaders and attained a high place in the regard of the whole country though shut off from direct communication by a barrier of language.

Born in February, 1840, in Saitama-ken, he served as a samurai in the declining days of the Tokugawa shogunate. In 1867-1868, he visited Europe as a companion to one of the Tokugawa princes. He was appointed junior vice-minister of the financial department in 1869, but quitted his post because of a difference of opinion with the minister over the budget for 1873; and thenceforth he declined all government posts, although frequently offered the portfolio of finance. He founded the First Bank, and, seeing the need of economic education, started the forerunner of the present Tokyo Higher Commercial School. After consulting with Count Okuma and the late Prince Ito, he organized the Tokyo Chamber of Commerce in 1878, serving as chairman until 1905, when he resigned because of ill health. He brought about the establishment of an almshouse by the Tokyo Municipal Council, and, when the assembly decided to close it, continued it as a private undertaking for several years, until it again came under the municipality in 1889. At that time he was appointed director. Prior to the outbreak of the Russo-Japanese war he became seriously ill and ended his connection with many business houses. He renewed them upon the revival of business after the war, but recently has severed most of them again, He visited Europe and America in 1902; visited the States in 1909 as head of the Japanese business men invited by the American chambers of commerce, and in October, 1915, went to the States again. The baron resigned as president of the First Bank, July 1, 1916. He was created baron in 1900, and has received the First Order of Merit.

My Impression as Shipbuilding Arbitrator

By Baron Eiichi Shibusawa

(Translated from the Japanese)



仲裁員としての余の感想

澁澤榮一

余が此度米國大使モーリス氏よりの依頼に應じ
米國政府船舶管理局と日本造船會社との間に
締結したる船鐵交換契約の規定に據る争議の
仲裁員たることを承諾したるに就ては必ずしも余
自身に其能力　引受けたるに非
ずして寧　きやを恐れた
るなり　然　任として
之れが　の歴史
ありて　澤
抑も日　多年
努力す　実業家
視察し　進して幾
多の代表　此感を強
くし爾来日米　解を一層深
からしめんことに満腔　を傾注したり　次で
千九百十四年桑港に於て開設せられたる巴那馬
太平洋萬國博覧會を観覧の為め渡米したる
際の如きも遠く東部の諸都市を訪問して舊友と
の交情を温め彼我國交の親密を図かるが為めに
腹蔵なき意見の交換をなしたり　當時余惟へら

Baron Eiichi Shibusawa and the original Japanese Manuscript of his message to Pacific Marine Review

WITH regard to my acceptance, at the instance of Mr. Morris, American ambassador, of the office of arbitrator of disputes as stipulated for in the steel and ship exchange contract concluded between the Shipping Board of the American government and the Japanese shipbuilding companies, it does not necessarily mean that I have accepted the responsibility, believing in my ability to discharge it successfully. On the contrary, I was afraid that I would not be equal to the responsibility. As regards my acceptance of the office, despite this fact, in succession to Commander Horne, there is an account worth relating.

The fact is, that for many years I have been working for the promotion of friendly relations between Japan and America. This wish was greatly strengthened when I traveled through various states of America in 1909 with a party of Japanese business men and met many representative Americans in the places we visited. Since that time I have been strenuously working for a better understanding between the Japanese and American people. Again, when the Panama-Pacific International Exposition was held at San Francisco in 1915. I proceeded to America to visit the exposition. At the time I also visited various cities in the Eastern states, saw many old friends and exchanged views with them unreservedly regarding the enhancement of friendship between the two countries. At the time I was of the opinion that permanent friendship between Japan and America should be based on a community of mutual economic interests. I brought this proposition to the notice of many influential American business men in New York and other places and insisted on the necessity of joint investment by the Japanese and American capitalists for the development of the natural wealth of China. It is a matter of satisfaction that my humble views have obtained the support of American business men and since then the economic chain between the two countries has been materially strengthened.

I am now arbitrator in connection with the ship and steel contract, but I do not expect that I shall ever be called upon to discharge my duty as arbitrator. In other words, I sincerely hope that no misunderstanding may arise between the parties concerned in the contract. It, unfortunately, however, a difference of views or opinion should arise between the parties, I shall be prepared to discharge my duty as arbitrator faithfully and impartially so that the interests of both countries may be maintained. Although I have received the appointment as arbitrator from the American government, I have no intention of purposely upholding the interests of the American side; nor have I any desire to protect the interest of the Japanese shipbuilders for the reason that I am a Japanese subject.

The World's Air and Ocean Routes

Misleading Maps—Illusions of Distance and Direction on Mercator's Chart

By B. J. S. Cahill, F. R. G. S.

SOME years ago a tramp steamer with a valuable cargo went ashore in the fog off Monterey. The underwriters' agents were consulted by its owners in New York and instructed to send a wrecker from the nearest point. One available wrecker was at Acapulco and another at Juneau. No time was to be lost, and the agent, hastily consulting a map, noted that Acapulco seemed nearer and wired accordingly. Now underwriters' agents and office managers are not necessarily navigators, or they would not have measured distance on Mercator's chart. The wrong wrecker was sent—that is, the one that had the longest distance to steam—and in the last few hours' time lost, a rising sea and a heavy surf had done their work, and what might have yielded a substantial salvage became a total loss.

Substitute names have been used in the above instance, but the facts have been closely paralleled.

The loss was due to the very misleading nature of Mercator's chart, whose scale of distance increases from the Equator to the Poles at an ever enlarging ratio. A glance at Figure 1 will show graphically the magnitude of this illusion. The distance from West Africa to East Yucatan on the twentieth parallel measures almost exactly the same distance as that from Norway to Labrador on the sixtieth parallel. Yet the actual distance of the former (4700 miles) is more than twice the actual distance of the latter (2300 miles).

When the Panama Pacific Exposition was first discussed, objection was made to San Francisco, on the ground that the city by the Golden Gate was a long way off the track of vessels going to the Orient through the Panama Canal. And a line drawn from Panama to Yokohama fails even at the nearest point to come within at least twelve hundred miles of San Francisco southwesterly by south. At least that is what Mercator's chart tells the layman, who reads this chart, as if it were a map or ground plan of the world. Therefore, when an expert or a navigator tells the facts, the average man is exceedingly astonished. And well he may be, because the direct air line to Yokohama for a dirigible airship does not go from Panama into the Pacific Ocean at all, but through the Gulf of Mexico via Yucatan to the neighborhood of Galveston, thence to Salt Lake and northeast of San Francisco several hundred miles and not out into the Pacific Ocean until as far north as Portland, thence up to the Aleutian Islands and down the West Coast of Asia, finally reaching Yokohama from the north-northeast.

Now it is obvious that if this is the shortest route for a dirigible, which regards neither land nor water, an ocean-going vessel should, on leaving the Canal at Panama, approximate this great circle route as nearly as possible, which would mean that it should hug the coast up as far as Portland before crossing the Pacific and getting in line with the ideal short route. It is clear from this that all coast cities from Panama to Portland are on the road to Japan and the Orient, a fact of immense importance to the whole Pacific Coast. Moreover, these revelations of the great circle route, the short air line, make it clear that any Alaskan port is nearer to the Orient than Prince Rupert, just as Prince Rupert is nearer than Vancouver, Vancouver than Seattle, Seattle than Portland, Portland than San Francisco, San Francisco than Los Angeles, and so on.

A hundred similar instances could be given. One will suffice. San Francisco is nearly the same latitude as Lisbon. An air route across Mercator's misleading chart would run due east through the United States to Chesapeake Bay, thence across the Atlantic to the Azores, and so on, to Lisbon. But the navigating officer of a helium inflated dirigible who wished to make quick time would steer from San Francisco due northeast to North Dakota, crossing the Canadian border just below Winnipeg, thence to the southern end of Hudson Bay and across Labrador to the North Atlantic seaboard some hundred miles north of the Belle Isle Straits; thence across the water, arriving at Lisbon from the northwest. Who would realize from Mercator's map that in the trip from San Francisco to Lisbon more of the land route would be over Canada than over the United States?

Of course, these instances are given to indicate the ideal short route or great circle line, regardless of the many other conditions of sea, land and air that may modify and deflect this course one way or the other.

The object of this article is to make clear that Mercator's map is not only inadequate, but utterly misleading and deceptive, in all matters relating to correct routes across the world, both as to distance and direction anywhere in the temperate zones. Writers on this subject have repeatedly deplored the growing use of Mercator's diagram as a map in schools, trading houses and transportation companies, and worst of all, perhaps, for statistical purposes. It should be used only as a chart for navigation, and even its use here is restricted to wind propulsion, a motive power fast tending to become commercially obsolete.

The reason for the general misuse of this sailing chart is that map publishers have a ready sale for Mercator's to navigators, and as the plates are costly to engrave, and as no other adequate projection has been available, the geographers have been compelled to use a picture of the whole world never really intended for them by the inventor of this chart himself, as the original Latin title of Gerhard Kremer or Gerardus Mercator amply testifies, "ad usum navigantium" (for the use of navigators). While Mercator's chart is essential for the pilot house of a "windjammer," it is a nuisance in the office of a shipbroker, a trading corporation, or a marine insurance company.

In Figure 2 the world is shown so closely identical to the outlines on a globe itself that the routes above described can be correctly traced as on a city map or plan by simply drawing a straight line between the points required when this line at once becomes the shortest route—i. e., part of a great circle or sufficiently so for all practical office purposes.

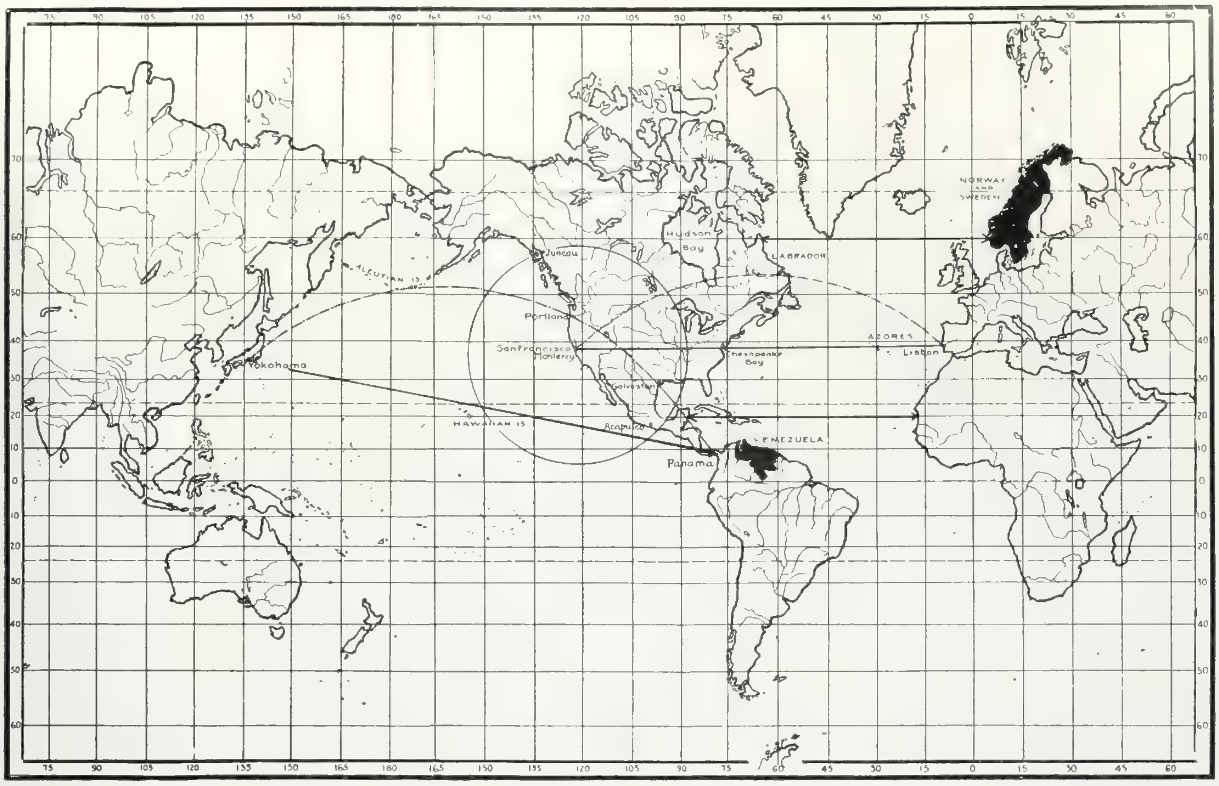


Figure 1.—Mercator's Chart of the World. Note on this misleading map that Acapulco, Mexico, seems to be nearer to Monterey, California, than does Juneau, Alaska; that Africa and Yucatan are as close to each other as Norway and Labrador; that the area of Venezuela seems to be only one-third as great as the area of Norway and Sweden. Then look at the butterfly may below and see how these impressions are corrected by a true map drawn to the same scale.

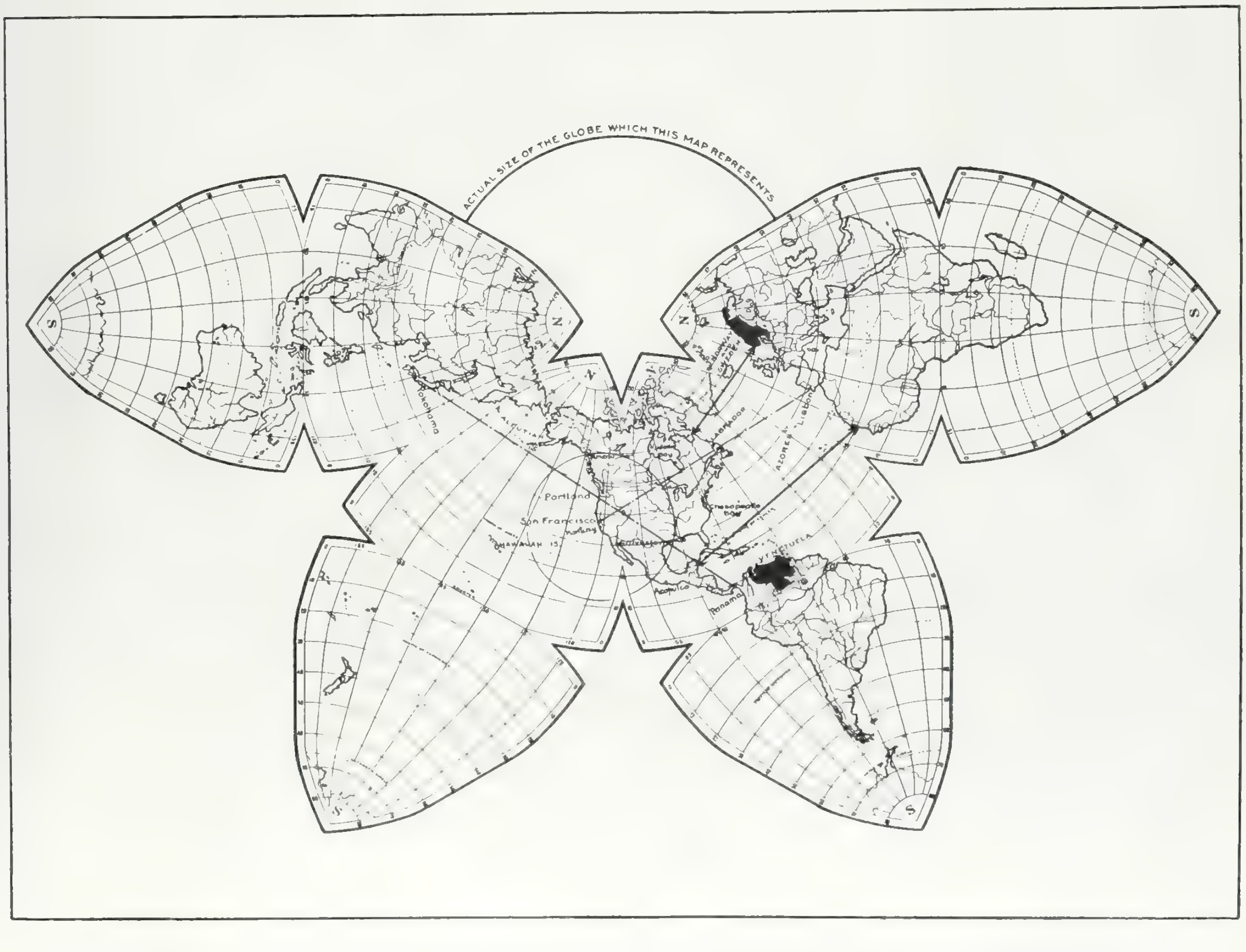


Figure 2.—Map of the World on the Butterfly projection drawn to the same scale as the Mercator Chart shown above. Note that when shown in their correct relations Juneau, Alaska, is much nearer to Monterey than is Acapulco; that relative distances are correct, and that straight lines follow the same path on the map as great circles drawn on Mercator's chart, and the area of Venecuela is in reality much larger than the combined area of Norway and Sweden.

Vladivostok

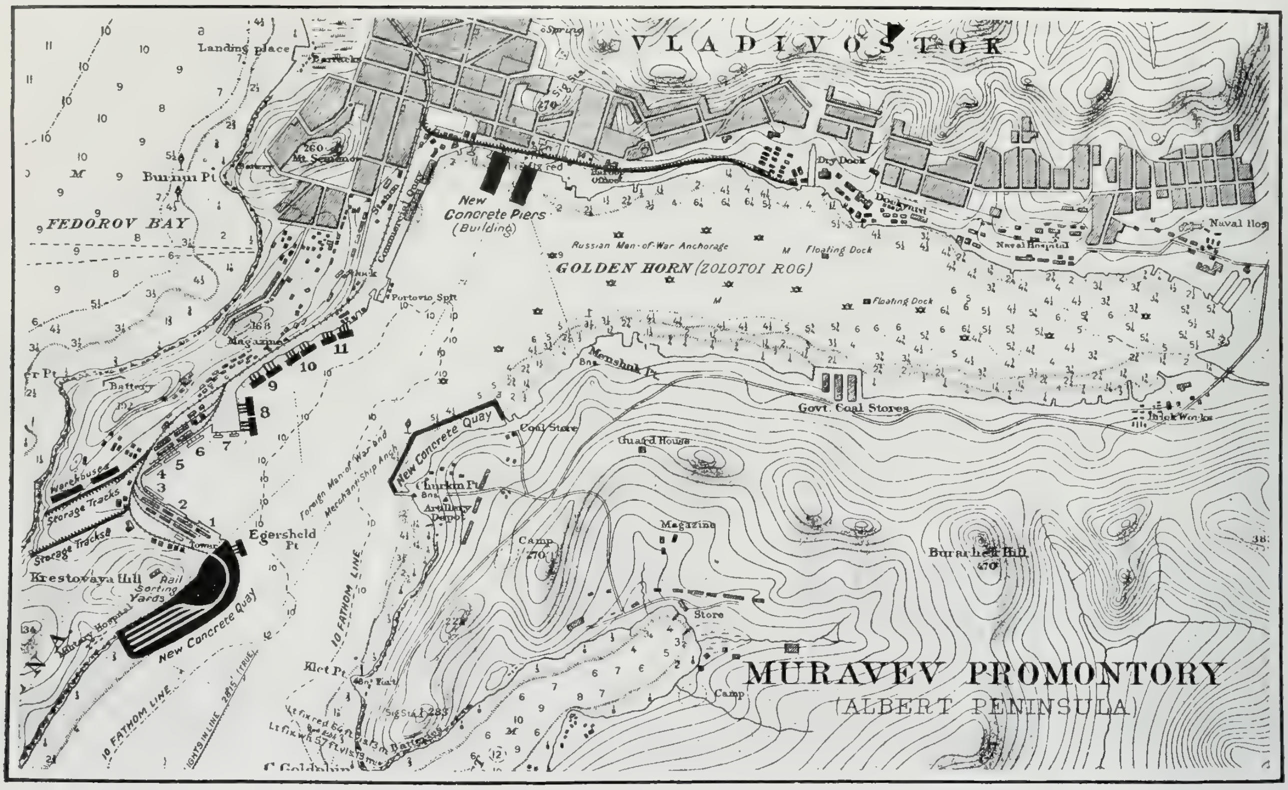


Chart showing the City of Vladivostok and its beautiful Harbor

THE city of Vladivostok is built on a range of hills surrounding the principal bay of the harbor. The harbor is enclosed by high hills giving shelter from all winds. The principal bay is called the Golden Horn, from its similarity to the harbor of Constantinople; its length is about four miles, and breadth nearly three thousand feet. There are other bays less in depth than the Golden Horn, all affording good anchorage for vessels.

In spite of its location on the Pacific Ocean, Vladivostok is cooler than Russian cities of the same latitude. The harbor is frozen from two to three months of the winter, but experience shows that it can be kept open by ice-breaking boats.

Vladivostok forms the principal entry port for the entire line of the Siberian Railway. It is connected with West Siberia by the Chinese Eastern Railway, leading directly across Manchuria and thence into Siberia; and also by the Amur Railway, following the line of the Amur River through Russian territory and joining the Siberian Railway line a short distance east of Chita. While connecting railroads run from Korea and Port Arthur and Dairen to connect with the Chinese Eastern Railway at Harbin, this line is longer than the distance from Harbin to Vladivostok, so that the latter has the advantage in shortness of railway haul.

The city has grown rapidly during the past thirty-five years, from a population of about four and one-half thousand to a pre-war figure of about eighty-five thousand. Since the beginning of the war the population has been largely increased by the military and naval establishments, by foreign and other traders locating in Vladivostok to attend to the dispatch of shipments that would otherwise come through the Baltic ports, and by Chinese, Japanese and Korean merchants and laborers. As a consequence, the city of Vladivostok is terribly overcrowded at present.

Vladivostok has been filled with goods of all kinds awaiting shipment to the interior points. The streets were at one time piled high with machinery, motor trucks, and war supplies of all kinds in cases exposed to the weather and rapidly undergoing damage. Some of these were finally moved westward, so that the streets are, in the main, clear at present; and other supplies were stored in hastily constructed go-downs or warehouses where they remain to this day.

According to revised figures from the Russian-American committee for the Far East, there were stored in the warehouses of Vladivostok, under charge of the Custom House, on May 30, 1919, about 330,000,000 pounds of goods awaiting shipment. These goods are all classes, ranging from matches to automobiles, machine tools, and agricultural machinery, the heaviest single item being about 54,000,000 pounds of tea.

In normal times Vladivostok and the Siberian Railway form the natural supply route for points east of Irkutsk only, while west of Irkutsk, the points on the Siberian Railway can be more easily and cheaply reached through European Russia from Baltic ports. The present disorganization and want throughout European Russia will make it impossible to supply West Siberia from the Baltic ports, and will greatly extend the distance to which goods can be economically shipped over the Siberian Railway. The importance of Vladivostok will, therefore, be magnified for several years to come.

The Port of Yokohama

DESPITE the great gains made by Kobe during recent years, which have placed it first among the ports of Japan, and one of the four largest of the extreme Orient, Yokohama still manages to retain the lead so far as the value of imports and exports is concerned. All nations and most cities report their foreign trade in terms of dollars, pounds or yen; however accurate these values may be for nations as a whole, the fallacy of the system for seaports is proved by the case of these two Japanese cities. Kobe admittedly leads in tonnage; but the immense value of the raw silk exported from Kokohama permits this port to cite larger figures in yen, regardless of the fact that a ton of cotton may go as far toward supporting the population of a port as a ton of silk. Yokohama is the first raw-silk port of Japan today, as it has been for years, but the development of other centers of worm culture may enable other cities to gain on it in that respect also.

A graphical chart prepared by the Yokohama Chamber of Commerce shows quite vividly by what leaps and bounds Yokohama has grown. The year 1914 felt the war depression slightly, and fell below 1913, both as to imports and exports; 1915's exports nearly recovered the ground lost, the imports falling still more, to a level almost that of 1909; but exports in 1915 and imports in 1916 began to climb rapidly, so that the graph shows wellnigh a perpendicular ascent.

Far and above any other country in the world, the United States buys from Yokohama. In 1918 the exports to America were valued at yen 410,351,252, and the imports from America at 263,409,625, the aggregate being 50.44 per cent of the total foreign trade. Great Britain's share was 8.10 per cent; France's, 7.93, and that of other countries was very small.

Despite America's substantial contribution to the prosperity of Yokohama as a port, relatively few American vessels entered the port during the year 1918. The number and tonnage of vessels entering and clearing were:

	Vessels	Tonnage
Japanese	2085	4,960,543
American	115	350,560
British	132	639,879
Dutch	124	393,809
Norse	24	80,200
French	8	29,617
Others	93	173,096

In 1918, to hark back to pre-war days, there were 835 British vessels of 3,051,247 tons entering and clearing, and 225 German vessels of 824,131 tons. In that year, too, America had 110 vessels of 811,636 tons—but that was before the large vessels of the Pacific Mail were withdrawn. Yokohama's aggregate tonnage, entered and cleared, fell off badly from 1913, in which there were 2744 vessels of 8,917,591 tons, to 1918, in which there were 2581 of 6,627,704 tons. All the above figures include both entrances and clearances. Japanese vessels entering and clearing have risen steadily. In 1904 there were 131 of 267,938 tons, as compared with 1393 foreign vessels of 4,268,986 tons; in 1918 there were 2085 Japanese, of 4,960,543 tons, and 496 foreign, of 1,667,161 tons. Japanese vessels, in numbers, exceeded the foreign in 1913, but not as to tonnage; the foreign vessels still remained in the lead, as to tonnage, in 1914, but the war and its many effects cost them first place in 1915, and both number and tonnage have declined since, while Japan's totals have climbed steadily.

To handle this important commerce, Yokohama admittedly is not so well equipped as she should be. Her different wharves can berth nineteen vessels, all told, at one time, but to accomplish this two would have to be moored at the ends of the wharves. Her wharfage facilities are limited also by the shed space, for it is useless to tie up a vessel at a wharf if the sheds already are filled with freight; so that it is common to see freighters discharging at anchor in the inner bay. This is not so bad as it might be, however, for some 70 per cent of the inbound freight is trans-shipped, much going to the great metropolis of Tokyo, and the lighters can move this cargo directly.

Statistics specially compiled by the Imperial customs, Yokohama, for this article are interesting as giving the relative volumes of goods landed at Yokohama wharves and on lighters, most of the latter going to Tokyo:

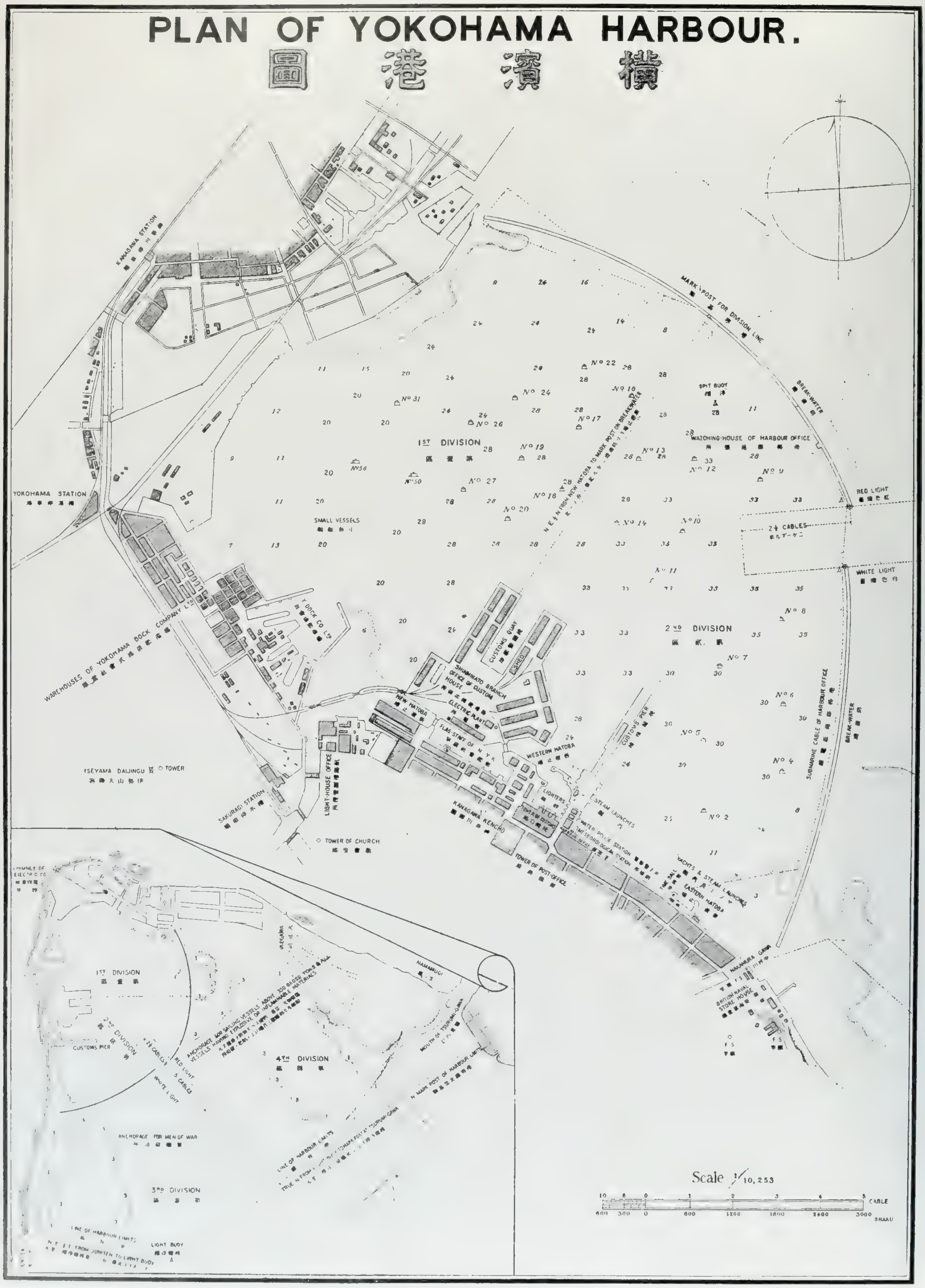
Tons of imported goods landed at customs compound from vessels: 1916, 358,929; 1917, 490,283; 1918, 595,664.

Tons of imported goods conveyed by lighters from vessels: 1916, 702,383; 1917, 933,033; 1918, 1,128,865.

The warehouse system, although inadequate, appears well planned and good. There are conspicuous brick godowns, owned by the Imperial government, and others of concrete. One fifty-ton fixed electric crane; one twenty-ton fixed steam crane; six five-ton traveling electric cranes; twelve one and one-half-ton traveling electric cranes—all installed by the Imperial customs—serve the ships at dock. Tiering machinery is lacking. The coolie's back still bears the burden of much freight handling.

Even with vessels discharging in the inner harbor, which means within the breakwater, there is sporadic congestion. The Chamber of Commerce has a plan, the fruition of which probably will require years, for extending the width of the present breakwater, with piers jutting out from it; and Captain K. Yabe, harbor master, holds that, when this has been done, another breakwater should be built outside the present one to give more anchorage ground.

Pacific Mail Steamship Company's office, Yokohama


PLAN OF YOKOHAMA HARBOUR.
横濱港圖
KANAGAWA STATION
YOKOHAMA STATION
1ST DIVISION
2ND DIVISION
SMALL VESSELS
MARK POST FOR DIVISION LINE
BREAK-WATER
SPIT BUOY
WATCHING-HOUSE OF HARBOUR OFFICE
RED LIGHT
WHITE LIGHT
2½ CABLES
N E ½ N FROM NEW MATOBA TO MARK POST ON BREAKWATER
WAREHOUSES OF YOKOHAMA DOCK COMPANY LTD
Y. DOCK CO. LTD
CUSTOMS QUAY
SHED
SHIMMINATO BRANCH OFFICE OF CUSTOM HOUSE
NEW MATOBA
ELECTRIC PLANT
FLAG-STAFF OF N Y K
WESTERN MATOBA
CUSTOMS PIER
LIGHTERS
STEAM LAUNCHES
KANAGAWA KENCHO
TOWER OF CUSTOMS
WATER POLICE STATION
METEOROLOGICAL STATION
HARBOUR OFFICE
TOWER OF POST-OFFICE
TIME BALL
YACHTS & STEAM LAUNCHES
EASTERN MATOBA
NAKAMURA GAWA
BRITISH NAVAL STORE HOUSE
F S
SUBMARINE CABLE OF HARBOUR OFFICE
ISEYAMA DAIJINGU
TOWER
SAKURAGI STATION
LIGHT-HOUSE OFFICE
TOWER OF CHURCH
CHIMNEY OF ELECTRIC CO
CUSTOMS PIER
2½ CABLES
RED LIGHT
5 CABLES
WHITE LIGHT
IRIEGAWA
NAMAMUGI
ANCHORAGE FOR SAILING VESSELS ABOVE 300 GROSS TONS & ALL VESSELS HAVING EXPLOSIVE OR INFLAMMABLE MATERIALS
4TH DIVISION
MOUTH OF TSURUMI-GAWA
N MARK POST OF HARBOUR LIMITS
LINE OF HARBOUR LIMITS
TRUE N FROM … TO MARK POST AT TSURUMI-GAWA
ANCHORAGE FOR MEN OF WAR
3RD DIVISION
LINE OF HARBOUR LIMITS
N E ½ E FROM JUNITEN TO LIGHT BUOY
LIGHT BUOY
Scale 1/10,253
CABLE
SHAKU

The customs pier, at which most of the trans-Pacific liners berth to discharge passengers, is not suited to handle freight. It has thirty-five feet of water at low tide. The depth at the customs quay ranges from thirty-three to twenty feet at low tide. The depth of water inside the breakwater is shown in the accompanying map.

Tracks of the Imperial railways run into the customs compound, serving the different wharf sheds, of which eleven are iron and three wood, exclusive of the two wooden sheds of the customs pier.

The customs pier, at which passengers are landed from the trans-Pacific liners, is 202 ken by 23 (a ken is equal to approximately six feet). The two wharves of the customs quay are 176 ken long on the inner length by 60 wide and the slip between them is 60 ken wide. The length of the north breakwater is 6702 feet, and of the south, 5383 feet, with a passage of 800 feet in width separating them. At the northwestern end of the breakwater there is a 198-foot break, and one of 500 feet at the southeastern end, which serve to reduce the tide race through the channel entrance.

Despite the supremacy of Kobe, Yokohama is the most widely-known port of the empire; it has been celebrated in literature of every language; passengers from the States and Canada by the Pacific Mail, China Mail, Toyo Kisen Kaisha, Canadian Pacific Ocean Services, Nippon Yusen Kaisha, Osaka Shosen Kaisha, get their first glimpse of Japan there; and, in short, it has a premier place among Japanese ports in the eyes of the traveling world.

Of late, Tokyo has revived discussion of a harbor for the city proper, which would make the metropolis more independent of Yokohama than it is now. Americans can more correctly appreciate the situation of Tokyo relative to deep-sea commerce if they will imagine a city the size of Chicago lying on a bay and yet dependent upon Hammond, South Chicago and the other southern suburbs for its actual ocean connections. For Tokyo is one of the great cities of the world, being closely grouped with Chicago, Berlin and Vienna behind New York, London and Paris, with a population, as given by Japanese authorities, of 2,050,126 in 1913, although American references show it as even larger.

The plan of the municipal authorities, as recently announced, is for an expenditure of 100,000,000 yen ($50,000,000) and for the deepening of the harbor, from Haneda to Susaki, from twelve feet, the present depth, to thirty-two feet, which would accommodate most of the larger trans-Pacific vessels. As has been stated above, 70 per cent of Yokohama's traffic really is for or from Tokyo and is handled between the two cities largely by lighters, which work with ocean vessels at Yokohama. The plans are for both an inner and an outer harbor. Should they mature, the Japanese say, Yokohama and Tokyo would have much the same relative positions as Kobe and Osaka, the former being more strictly a deep-sea port, although Osaka also can care for ocean steamers.

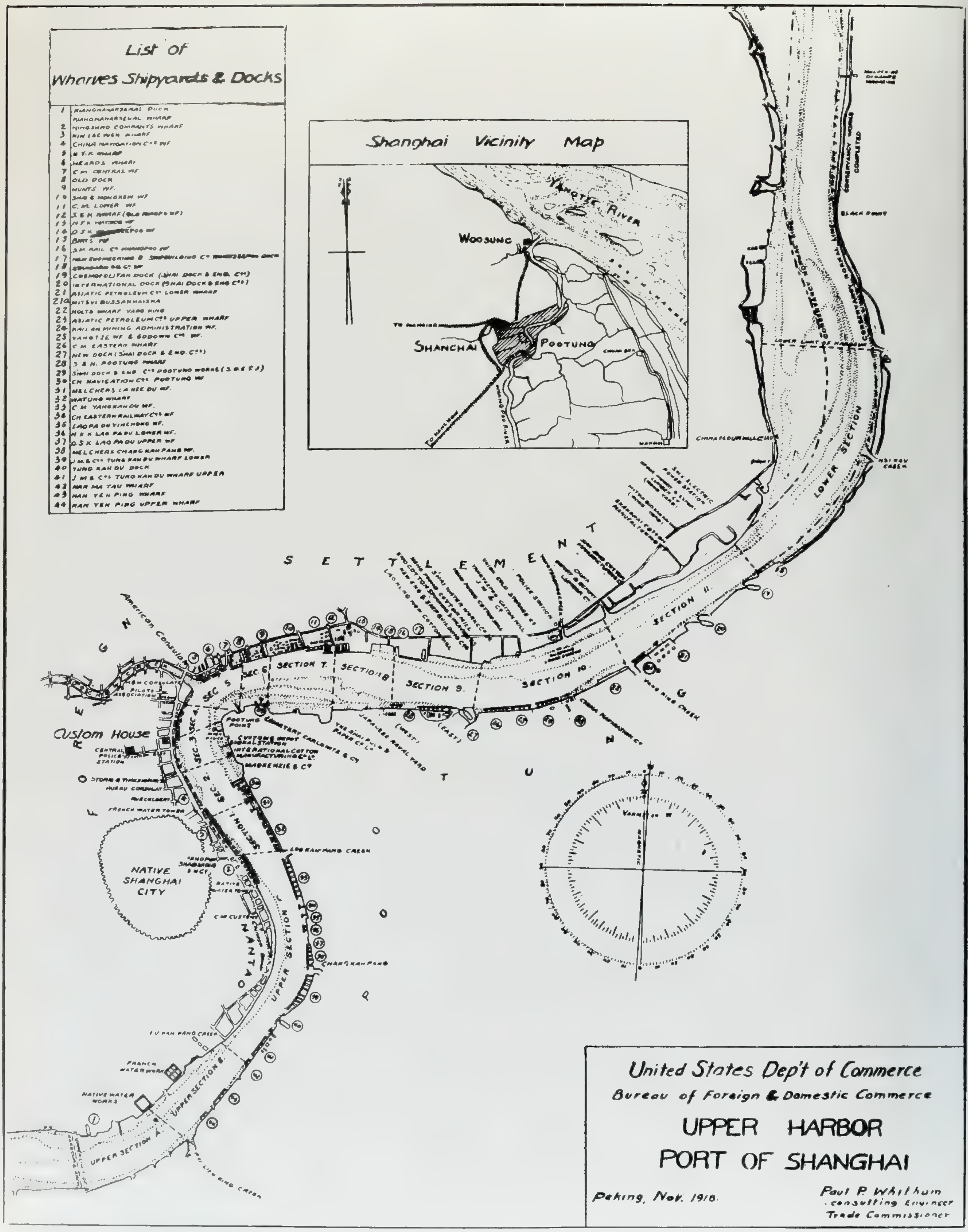
There is also intention to improve land communications between Yokohama and Tokyo by the construction of a freight station at Ecchujima, which would be the largest of its kind in the Far East. In connection with the harbor work, it is proposed to reclaim 3,000,000 tsubo (one tsubo is equal to thirty-six square feet) of land, the receipts from the sale of which would go toward defraying the expenses of the improvement, the remainder to be raised by a Tokyo municipal loan.

Port of Shanghai

THE modern ports of China are a development imposed from without rather than from within. The treaty ports, as they are called, except a few recent ones voluntarily opened by China, were thrown open to foreign trade under pressure from the Western nations desiring facilities by which to reach the rich markets of China, and in turn to gain access to the abundant supplies of raw materials. As a result, much of the development has been influenced, if not dominated, by the desires of the various foreign nations jealously striving to advance or protect their particular special interests rather than guided from the standpoint of China's own national needs and progress. In spite of all this, however, the law that forces commerce along the lines of least resistance or in the direction of greatest national advantage has in a measure prevailed. This seems to be true particularly in the case of Shanghai, a truly international port that has sprung into being at the mouth of the great Yangtze, the traffic and communicational artery leading to the heart of an immense country, richly productive, inhabited by an industrious people numbering perhaps five times the population of the British Islands and probably half again as many as live in the United States of America. Prospering as a result of its advantageous situation, Shanghai has grown to the position of premiership among the ports of China. Its foreign trade now nearly equals half that of the total foreign trade of the nation.

Up to the present time, the port of Shanghai has served quite well the needs of shipping and commerce, but it is now apparent that this cannot be said in the near future. Its facilities will require modernizing and enlarging and, above all, the channel approaches will have to be sufficiently deepened to admit larger and yet larger vessels, keeping in step with the inevitable progress that will take place in China and the Pacific countries. These things must be done lest Shanghai fail in its capacity of premier port, or yield its chief functions to another location. Thus China is brought face to face with the "Shanghai Port Development" problem and along with it a definite national port improvement policy. It is fortunate that the Whangpoo Conservancy Board has been conducting an investigation of the Shanghai port problem under the direction of Mr. H. Von Heidenstan, its chief engineer, and at this juncture has published a report on the "Future Development of the Shanghai Harbor."

This ably prepared report, together with the pertinent and illuminating comments by Mr. W. F. Tyler, chief coast inspector of the Chinese maritime customs, should bear fruit in the form of an aroused interest among both the Chinese and foreigners, perhaps leading to the adoption of not only


List of Wharves Shipyards & Docks
1 Kiangnan Arsenal Dock
Kiangnan Arsenal Wharf
2 Ningshao Companys Wharf
3 Kin Lee Yuen Wharf
4 China Navigation Co's Wf
5 N.Y.K. Wharf
6 Heards Wharf
7 C M Central Wf
8 Old Dock
9 Hunts Wf.
10 Shai & Hongkew Wf
11 C.M. Lower Wf
12 S & K Wharf (Old Wangpoo Wf)
13 N Y K Wayside Wf
14 O S K Wayside Wf
15 Butts Wf
16 S M Rail Co Whangpoo Wf
17 New Engineering & Shipbuilding Co Dock
18 Standard Oil Co Wf
19 Cosmopolitan Dock (Shai Dock & Eng. Co)
20 International Dock (Shai Dock & Eng Co)
21 Asiatic Petroleum Co Lower Wharf
21a Mitsui Bussan Kaisha
22 Holts Wharf Yang King
23 Asiatic Petroleum Co's Upper Wharf
24 Kailan Mining Administration Wf.
25 Yangtze Wf & Godown Co Wf.
26 C M Eastern Wharf
27 New Dock (Shai Dock & Eng. Co)
28 S & N. Pootung Wharf
29 Shai Dock & Eng Co Pootung Works (S.D.& E.J.)
30 CH Navigation Co's Pootung Wf
31 Melchers La Kee Du Wf.
32 Watung Wharf
33 C M Yangkah Du Wf.
34 CH Eastern Railway Co's Wf
35 Laopa Du Vinchong Wf.
36 N K K Lao Pa Du Lower Wf.
37 O S K Lao Pa Du Upper Wf
38 Melchers Chang Kah Pang Wf.
39 J M & Co's Tung Kah Du Wharf Lower
40 Tung Kah Du Dock
41 J M & Co's Tung Kah Du Wharf Upper
42 Nan Ma Tau Wharf
43 Nan Yeh Ping Wharf
44 Han Yeh Ping Upper Wharf
Shanghai Vicinity Map
Yangtze River
Woosung
To Nanking
Shanghai
Pootung
Whangpoo River
Foreign Settlement
American Consulate
Custom House
Central Police Station
French Water Tower
Native Shanghai City
Pootung Point
Nantao
Pootung
Upper Section
Lower Section
Sec. 2
Sec. 3
Sec. 4
Sec. 5
Sec. 6
Section 7
Section 8
Section 9
Section 10
Section 11
Upper Section A
Upper Section B
Lower Limit of Harbour
Black Point
China Flour Mill Co
Lookahpang Creek
Changkahpang
Yang King Creek
Siccawei Creek
Yu Kah Pang Creek
Lih Ka Pang Creek
French Water Works
Native Water Works
Variation W
Magnetic
United States Dep't of Commerce
Bureau of Foreign & Domestic Commerce
UPPER HARBOR
PORT OF SHANGHAI
Peking, Nov. 1918.
Paul P. Whitham
Consulting Engineer
Trade Commissioner

Scenes in and around Shanghai Harbor: Upper: Chinese man-power lighterage. Center: Chinese Coolies as industrial trucks. Lower: Congestion in a canal

The home of a Chinese merchant, Shanghai

a Shanghai but also a Chinese national port development policy. What may be done must be prompted by the new spirit in China, but it will be incumbent, nevertheless, upon the nations of the allied group, interested in trading with China as well as in her national welfare, to lend encouragement and support to the work.

The report proposes dredging the "Fairy Flats" so as to produce and maintain a channel at least forty feet deep at low water. This will give large ocean freighters a fairway into the Woosung reach. Then, in order to give good depth of water at the quays of Shanghai, it is proposed that the locks be built at the mouth of the Whangpoo, converting the whole lower reach of that stream into a non-tidal basin. This is a very ambitious project and one that will require some years and much money for its accomplishment, but it is undoubtedly necessary, and the available resources of Shanghai and her interested friends are ample.

Typical junk

A canal scene near Shanghai

COLLINS-FERGUSON COMPANY

AMONG the more recent export and import companies to enter the Oriental field is the Collins-Ferguson Company of Seattle and Portland. This company is organized by men who have been prominent in the machinery business in the Northwest and who as engineers are entirely familiar with the application of mechanical equipment to all phases of export requirements and also in the buying and selling of raw steel products.

The firm will make a specialty of machinery and the technical service which is needed in selection and installation of complete plants such as are required for railroads, shipyards, dock terminals, power plants, mills and mines. In this connection some of the leading American manufacturers will be represented both in the Northwest and abroad.

Mr. Howard P. Ferguson, president of the company, sailed for Oriental ports July 29 on the Mexico Maru and will establish connections and offices in Japan, China, Philippine Islands and other points.

The main office of this company is established in the L. C. Smith Building, with a branch office in the Gasco Building at Portland. These offices will be in the hands of especially competent and experienced men who are not only prepared to take care of the domestic needs of the Northwest territory, but who are especially conversant with the handling of products for shipment to the Orient and in supplying steel products and machinery for export generally. It will be the object of this company to give special attention to the needs of Oriental purchasers and in the importation of coals, pig iron and other raw products.

The men composing this company and its staff are of the active type so conspicuous throughout the Northwestern States for their accomplishments in building up and developing the country.

The Port of Hongkong

HIANG KIANG (place of sweet lagoons) is a British island possession lying on the east side of the Si Kiang estuary and separated from the mainland by a channel ten miles long and varying in width from a mile at Hongkong Roads to a quarter mile at Ly-ee-mun Pass. Everywhere in this channel there is good anchorage except at the pass, and as the island is very irregular in outline and hilly, there is formed naturally a capacious and safe harbor.

The island of Hongkong was first ceded to Great Britain by China in 1841, and a free port was then established, and named Victoria after the young British queen. In 1860 the treaty of Peking added the peninsula of Kowloon, a wooded promontory on the mainland opposite Victoria. There several docks were built, granite quarries developed, and manufacturing industries established. In 1898 China leased to Great Britain for ninety-nine years a large strip of territory behind Kowloon, including several islands off shore and making a total area of 378 square miles.

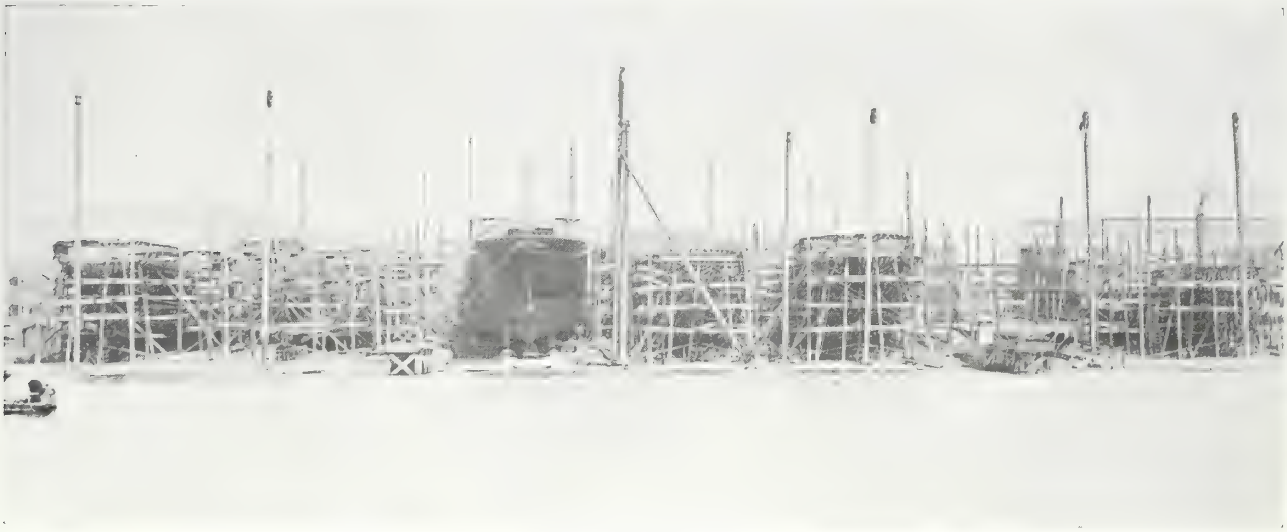
The present population of Hongkong is estimated at about 15,000 European and American civilians, 548,000 Chinese civilians and about 8000 composing the military and naval establishments.

The harbor being free, there are no official figures as to volume of trade, but it is estimated that the value of exports and imports in 1910 was over $300,000,000. It is the chief re-shipment point for exports from and imports to South China, the Maylayan peninsula and the Philippines; is blessed with a very abundant supply of pure fresh water, which is supplied to ships at very reasonable rates; and it is well furnished with docking and repair facilities of capacity sufficient to accommodate the largest ocean-going steamships.

The Hongkong & Whampoa Dock Company, one of Hongkong's largest shipbuilding concerns, announced on March 31 that the extension to their large plant is ready for the installation of the machinery which is expected to arrive in the course of the summer, some of it from the United States. When the machinery is in place, the company's shipyard will consist of twelve berths, three of which are for vessels up to 800 feet in length, five for vessels up to 500 feet, and four for vessels up to 250 feet. Due enlargement of the company's boiler works, machine shops, sawmills and other establishments is being made on land acquired for the purpose.

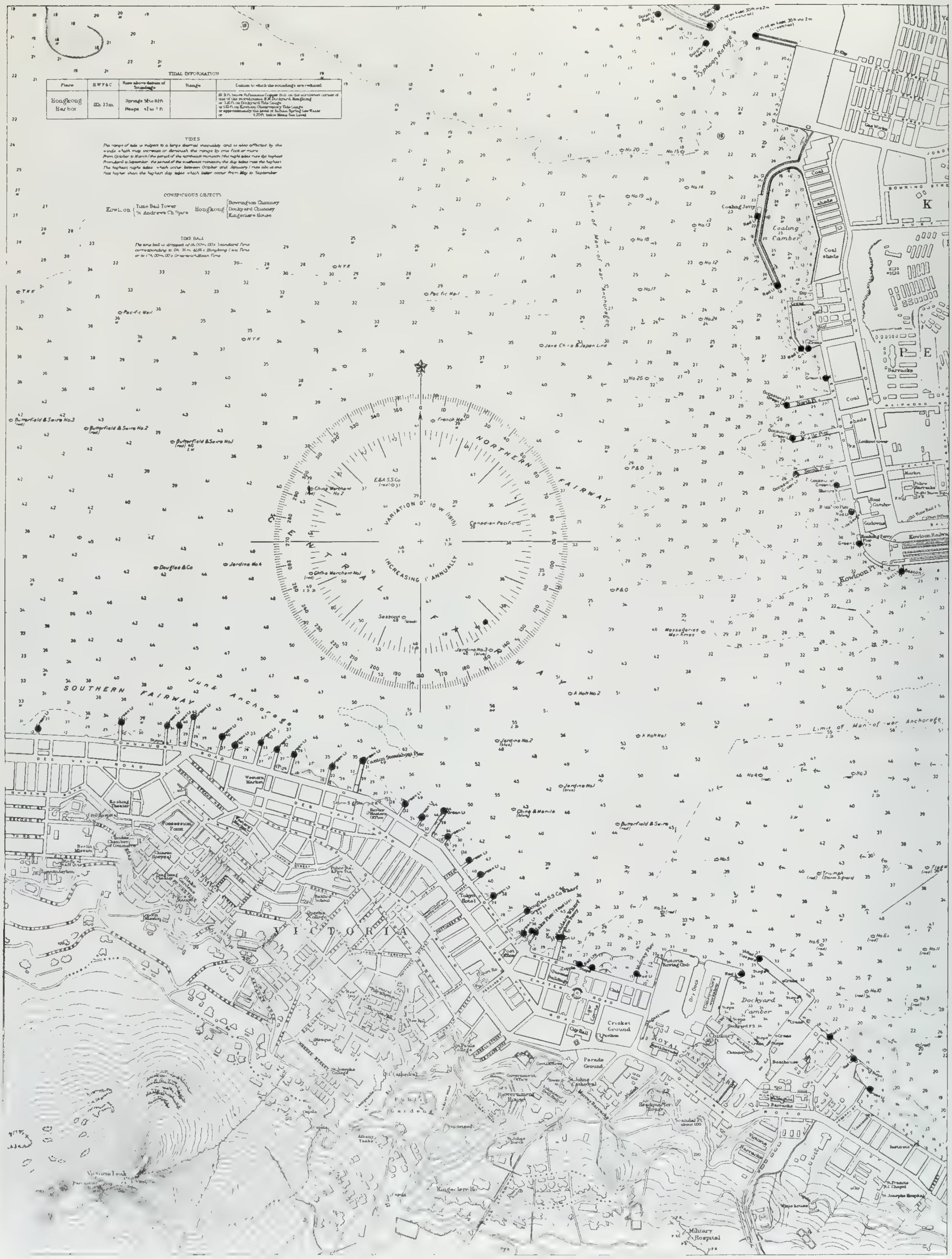
Land has also been acquired for the construction of a new graving dock between the two large docks already in operation. The new dock will have a length of 1000 feet, an entrance width of 110 feet, and sufficient depth for the largest vessels expected on the Pacific in many years. In the course of the enlargement of its western yard, the company is tearing down three blocks of houses which are to be replaced by more modern quarters in a better location overlooking Kowloon Bay. The change is made partly with a view of bettering the living conditions of the company's European staff.

Dry docks at Kowloon



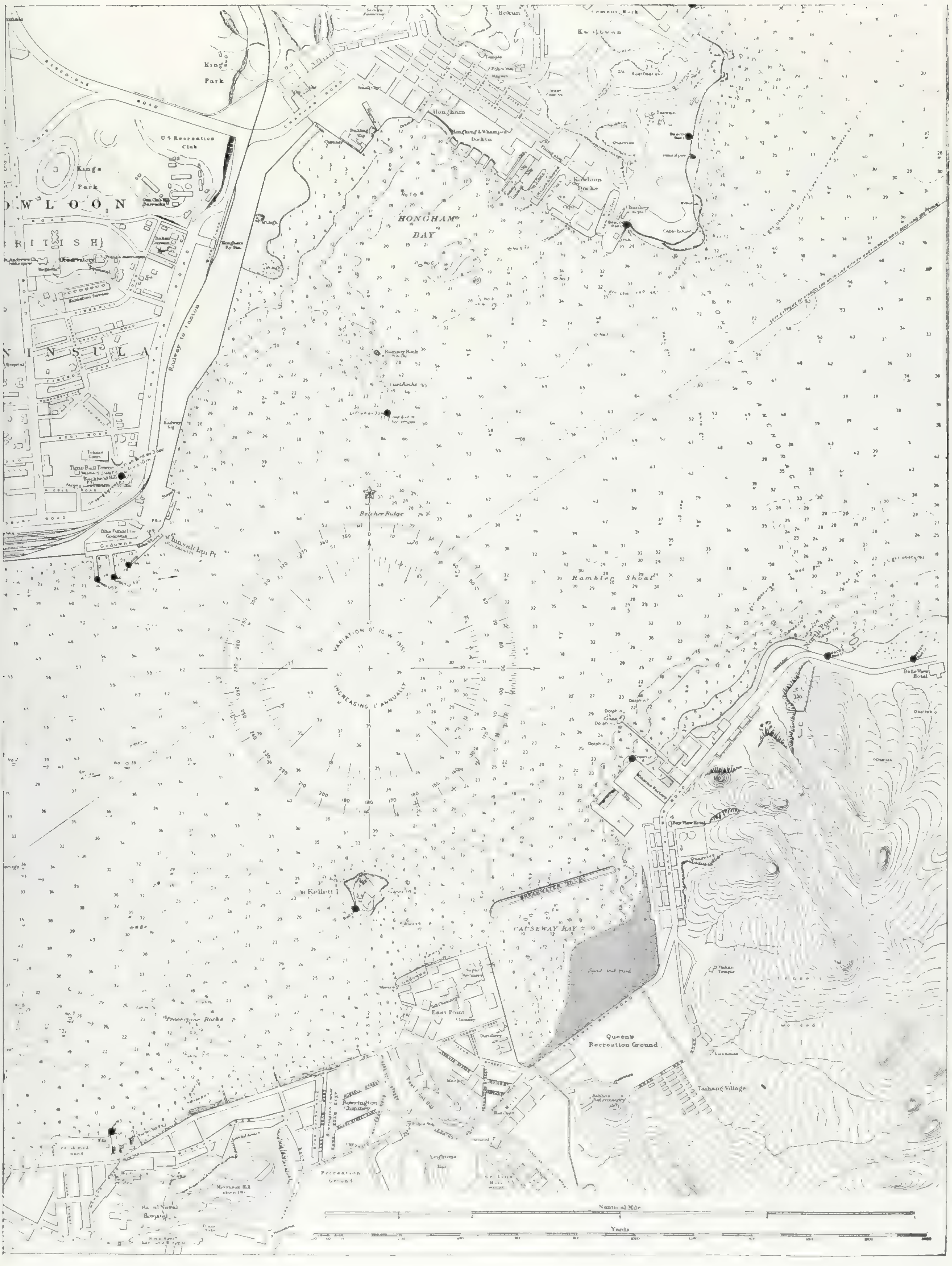
Shipyards at Hongkong

The Port of Hongkong



From charts furnished through

The Port of Hongkong



the courtesy of Louis Weule

The Port of Singapore

SINGHA PURA, the "City of the Lion," was at one time the "maritime capital" of the Malays. The city was probably first established by Sang Nila Utama about 1360 A. D. as a colony of the State of Plembang. It was captured during the great Javanese invasion in 1377, and there was a horrible massacre of its inhabitants. By the year 1703 the city seemed to have lost all its prestige, for at that time it was offered as a gift by the Rajah of Johore to a Captain Hamilton, who refused it, although it seemed to him that it was "a proper place to settle a colony in, lying in the center of trade, and accommodated with good rivers and a safe harbor, so conveniently situated that all winds serve shipping both to go out from and come into these rivers." This description of Singapore is certainly a very good one. The city was always a favorite resort for all navigators of that part of the world.

During the eighteenth century the Dutch had held practically a monopoly of the Malay trade through their fortified port of Malacca. The British were gradually breaking into this trade and the Dutch established another post at Rhio, one of the islands just south of Singapore. It therefore became very expedient for the British to establish a post between these two points.

Junks

In 1818 Sir Thomas Stamford Raffles, lieutenant-governor of Sumatra, made a treaty with the Sultan of Johore providing for mutual liberty of navigation and commerce in "Johore, Pahang, Linggi, Rhio" and other places subject to the Sultan, including Singapore, and late in the same year he planted the British flag on the present site of that city. His object was "not territory, but trade: a great commercial emporium, and a fulcrum whence we may extend our influence politically as circumstances may hereafter require. One freeport in these seas must eventually destroy the spell of Dutch monopoly." Great Britain did not immediately grasp the vision of "Raffles," for she sent him no assistance and did not even recognize Singapore until 1822.

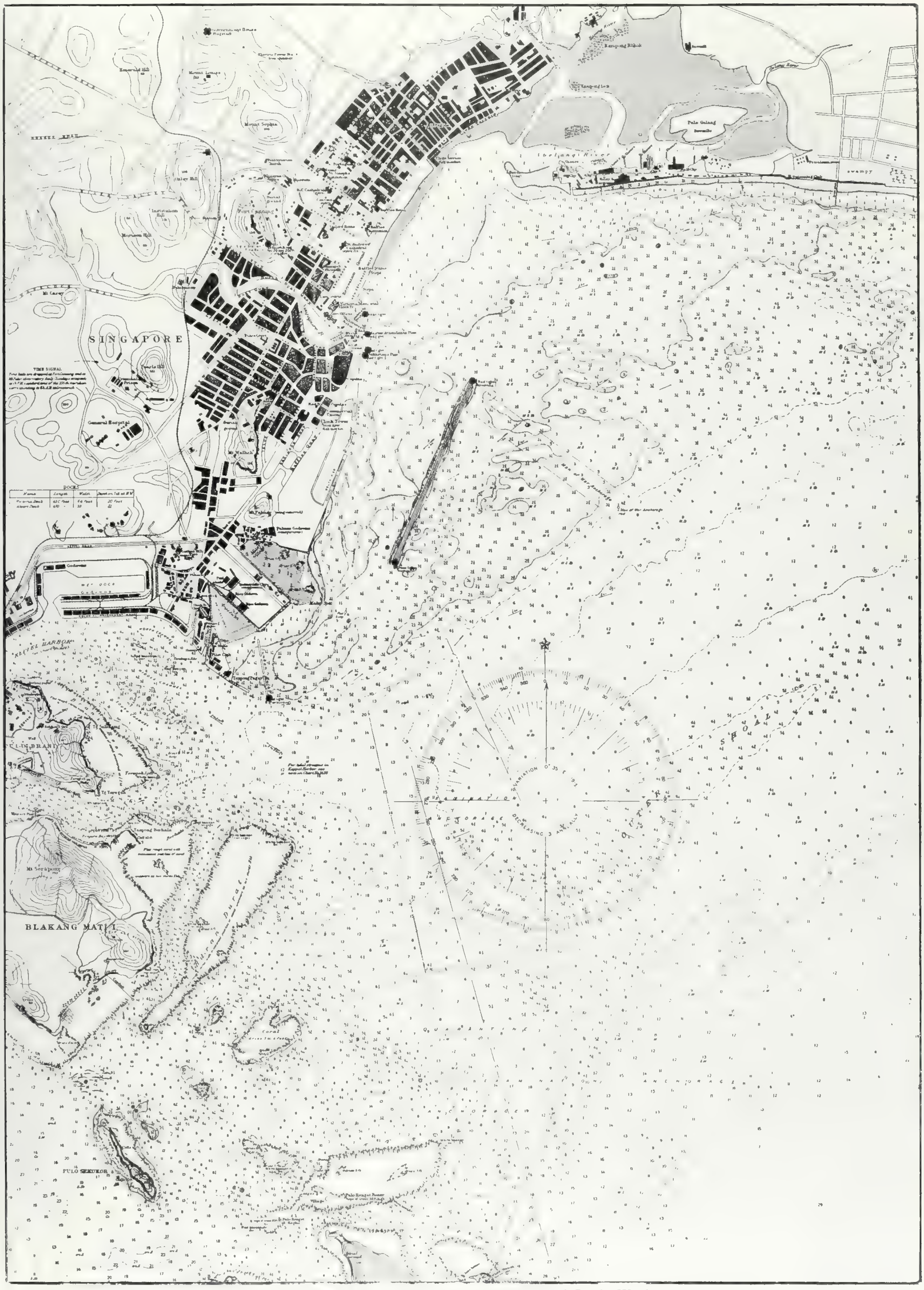
From that time up to the present, Singapore has had a rapid growth as a commercial free port, although in the sailing ship days commerce was much harassed by Malay pirates. Our chart shows plainly the characteristics of the port. An artificial breakwater to the east of the city protects the piers on that side. On the south, Keppel Harbor, named after the admiral who discovered this deep water anchorage, is protected by the high, strongly fortified islands of Blakang Mati and Pulau Brani. On this latter island is the largest tin smelter in the world, belonging to the Straits Trading Company. This plant produces over one-half of the world's annual supply of tin.

Singapore city is a very picturesque and interesting place to the visitor. Many pleasant and delightful drives can be had into the surrounding country, which is rich in historical and ethnological interest. One feature in which the city takes a very justifiable pride is the Botanical Garden noted the world around for its wonderful collection of tropical plants.

The one hundredth anniversary of the British free port of Singapore has just been celebrated and the city is looking forward to an era of large expansion in her commercial relationships. "The long, long thoughts" of Raffles have been fully justified.

A scene along the Coast

The Port of Singapore



From chart furnished through the courtesy of Louis Weule

The Port of Sydney

The American fleet entering Sydney Harbor

SYDNEY, NEW SOUTH WALES

THE port of Sydney, situated on the southern shores of the magnificent natural harbor of Port Jackson, New South Wales, was the first settlement founded in Australia, and in addition to being one of the most beautiful harbors in the world, it is also one of the largest and safest.

On January 18, 1788, eighteen years after Captain Cook had planted the British flag on the Australian Continent, Captain Phillip, the newly-appointed governor of New South Wales, arrived in Botany Bay with a fleet of eleven vessels—"the Sirius, a frigate of 450 tons, with twenty guns; the tender ship Supply; six transports and three store ships, and a human freight numbering all told 1100 souls." Finding Botany Bay quite unsuitable for the location of a settlement, Governor Phillip set out with a small party in rowing boats, and after a few hours' journey "he had the satisfaction to find one of the finest harbors in the world, in which a thousand sail of the line might ride in perfect security."

Sydney Cove, four miles from the Heads, and named after Lord Sydney, then secretary of state for the colonies, was chosen as a site for the new colony. Its transformation to the present Circular Quay was accomplished by slow stages and under the stimulus of much public agitation.

Sydney Harbor extends thirteen miles inland, but the shoreline is so deeply indented by bays and coves that, although the harbor does not average a mile in width throughout its entire length, it posseses a coast line of 188 miles. Rocky promontories, one mile apart, mark the entrance to the harbor; its waters are deep and free of danger; its steep foreshores provide excellent shelter for vessels at anchor; it is well lighted and ships of the heaviest draft can maneuver in it with ease and safety.

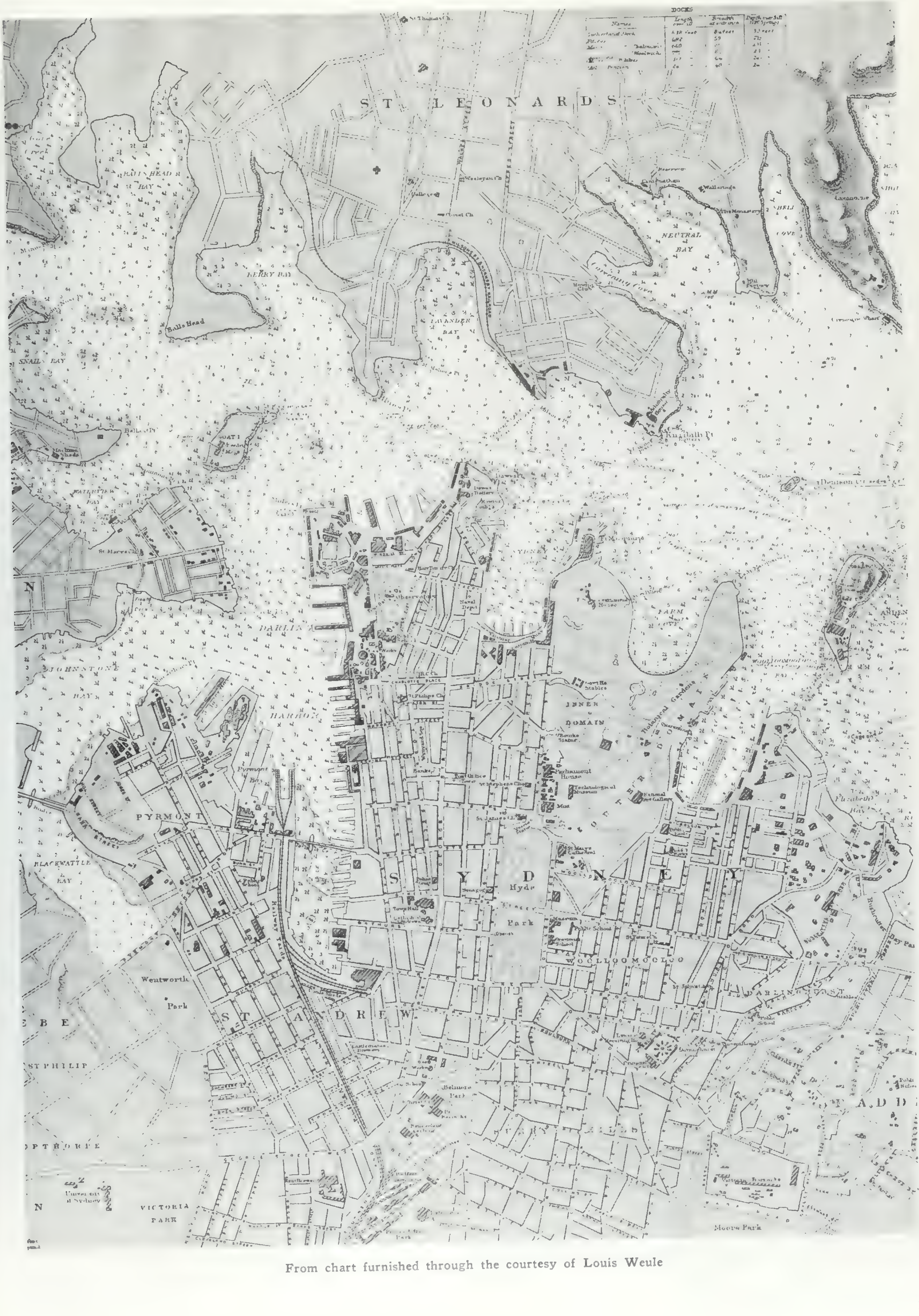
As an index of the progress of the port during the nineteenth century, it is interesting to note that the shipping of the harbor increased from twenty-nine vessels aggregating 7642 tons in 1800 to 1819 vessels aggregating 2,716,651 tons in 1900.

The marked increase in the size and draft of vessels of the last few years has attracted special attention to the harbor and docking facilities of the chief ports of the world, and in this connection Sydney ranks high. Since 1901 nearly $35,000,000 has been expended upon wharfage and harbor improvements. The total area of water in the port is 14,184 acres, or about twenty-two square miles, of which 3000 acres have a depth of from 35 feet to 160 feet. Exclusive of the fairways and bays (in which most of the shipping is at present accommodated) there are over 1000 acres available for anchoring vessels of the deepest draft.

Sydney is classed as the fifth port of the British Empire and its shipping trade is exceeded only by that of four ports in the United Kingdom, namely, London, Liverpool, the Tyne and Cardiff. Docking accommodation in Sydney is superior to that of any other port in Australasia. These are four large graving docks, five floating docks, and five patent slips. In addition to the many privately-owned wharves there are five public or government wharves, the principal of which is Circular Quay, covering a frontage of half a mile, with accommodation for thirty ships. Most of the wharves have good shed accommodation, and the latest are fitted with up-to-date mechanical appliances for the handling of cargo.

The famous circular quay at Sydney

The Port of Sydney



From chart furnished through the courtesy of Louis Weule

Teak the Finest Ship Timber

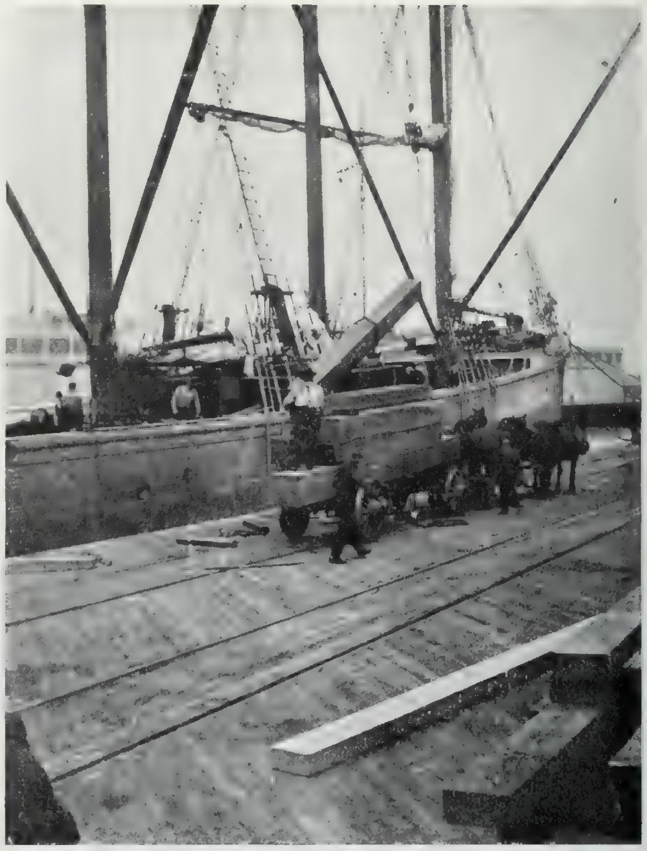
By J. H. Dieckmann, Jr.

RECENT activity in shipbuilding has brought into prominence the Asiatic hardwood known as teak. Teak has always been considered the wood par excellence in the construction of ships and may justly be called the most valuable of all known timbers. At Lloyds it is placed in a class by itself, and is recognized as the only wood that is safe to insure for sixteen years for timbering and outside planking of vessels.

Teakwood contains an aromatic substance which gives it a peculiarly pleasant smell and an oily feeling to the touch when smooth. It is not known whether the above-mentioned substance or some other element is responsible for its long life and its value as a shipbuilding material, but there is something in the wood that prevents decay, resists entrance of water into the wood and guards against rusting of nails, bolts, armor or any other form of metal used in contact with same when used on ship work or other structures whose life is generally under water or in close proximity thereto.

Teak is a native of the two Indian peninsulas and is also found in Java and other islands in the Malay Archipelago. It requires a tropical climate, the most important forests being found on low hills in the moister districts, thriving best with a mean annual rainfall of fifteen inches. In its youth the tree grows with extreme rapidity. Two-year-old seedlings on good soil attain a height of from five to ten feet, and instances of more rapid growth are not uncommon. In teak plantations trees obtain an average height of sixty feet in fifteen years, with a girth, breast high, of nineteen inches. In the natural forests teak, with a diameter of twenty-four inches (seventy-two-inch girth), is never less than 100 and often more than 200 years old. The trees are not generally more than 100 to 150 feet in height.

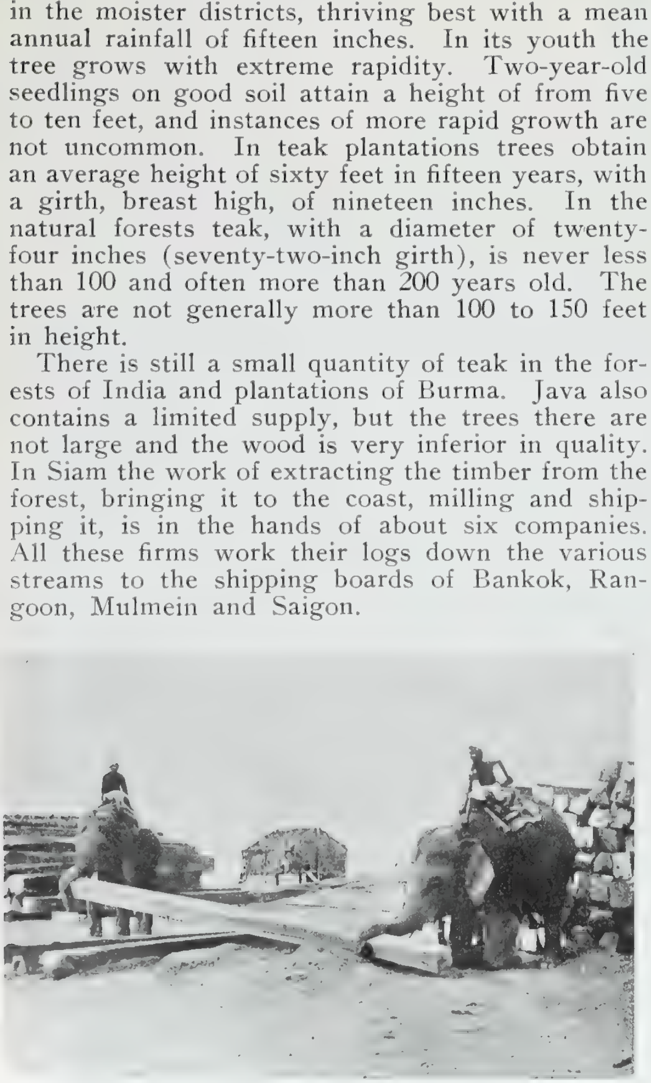
There is still a small quantity of teak in the forests of India and plantations of Burma. Java also contains a limited supply, but the trees there are not large and the wood is very inferior in quality. In Siam the work of extracting the timber from the forest, bringing it to the coast, milling and shipping it, is in the hands of about six companies. All these firms work their logs down the various streams to the shipping boards of Bankok, Rangoon, Mulmein and Saigon.



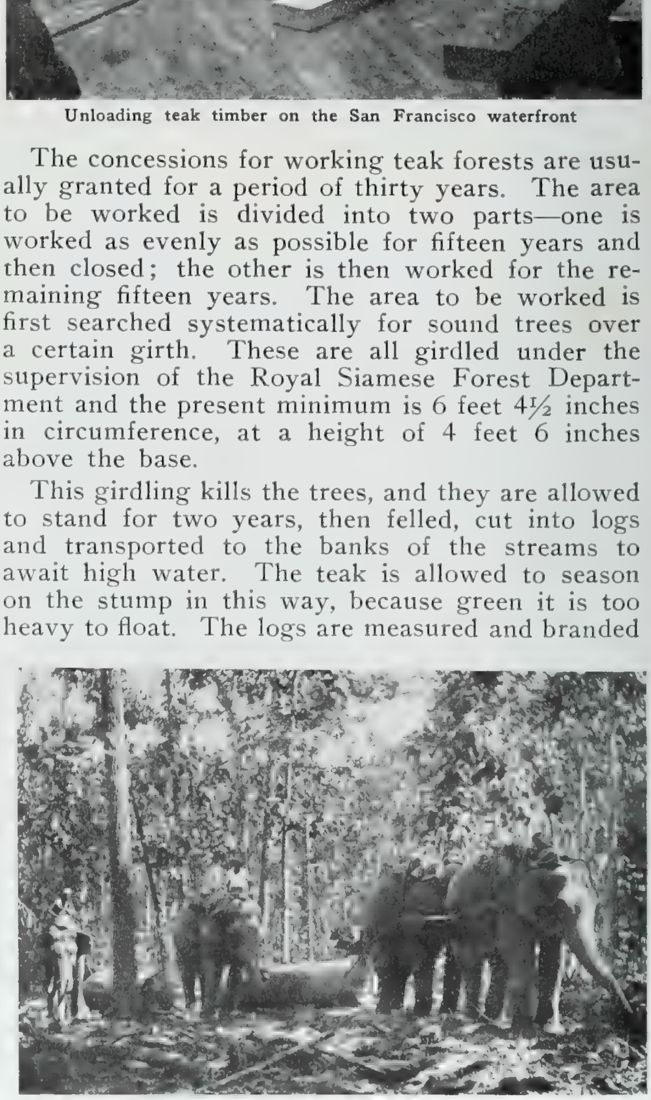
Unloading teak timber on the San Francisco waterfront

The concessions for working teak forests are usually granted for a period of thirty years. The area to be worked is divided into two parts—one is worked as evenly as possible for fifteen years and then closed; the other is then worked for the remaining fifteen years. The area to be worked is first searched systematically for sound trees over a certain girth. These are all girdled under the supervision of the Royal Siamese Forest Department and the present minimum is 6 feet 4½ inches in circumference, at a height of 4 feet 6 inches above the base.

This girdling kills the trees, and they are allowed to stand for two years, then felled, cut into logs and transported to the banks of the streams to await high water. The teak is allowed to season on the stump in this way, because green it is too heavy to float. The logs are measured and branded



Elephants handling a teak log in the lumber yards

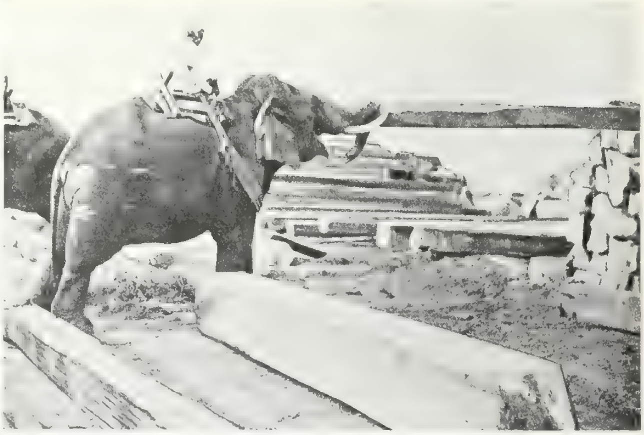


Logging with elephants in the teak forests on the banks of the streams and are then simply turned loose. The companies have contracts with villagers on the streams below the rapids who swim out and recover these logs and make them up into rafts, which are floated down past the government measuring and royalty stations located on the way to the saw mills and ports of loading.

In many cases there is a lapse of four years between the measurement of logs on the stream banks and their arrival at the seaports. At the saw mills the best teak logs are cut into squares with an average content of forty cubic feet. The defective logs are cut into planks, scantlings, shingles and miscellaneous shapes.

Notwithstanding the advances of engineering in machinery for handling lumber and for logging purposes generally, the great bulk of the work in the teak forests and lumber yards of Siam and Burma is done by elephants.

Teak is of a yellowish-brown color, close-grained, medium shortness and rather heavy in weight. It adapts itself to a beautiful smooth finish and is wonderful for carving, as may be seen in the carved interiors of Indian and Burmese temples. The wood takes a high polish without the use of finishing materials such as oils, waxes, etc., although apparently oily paint will adjoin perfectly. For work on ships it needs practically no finish, and as it works easily it should be very attractive to shipbuilders on account of economy. Teak could be used also more extensively for handsome finish in residences.


A huge tusker tiering teak timbers

San Francisco is the headquarters in America for this valuable wood. The writer has always taken an active part in importing great quantities of teak, and the fact that in his warehouses there is sometimes stored nearly a million feet of teak is an indication of the great demand for this wood among shipbuilders and other hardwood users.

American Trade in China Now—And in the Future

By J. Harold Dollar

Annual Report of the President, American Chamber of Commerce of China

IN 1860 America took 47 per cent of China's foreign trade. In 1904 this percentage had dropped to 14.9, and in 1910 it almost reached the bottom with 6.5 per cent. Since that time it has been steadily increasing until 1917, when America's percentage of China's foreign trade reached taels 156,000,000, or 16 per cent of the total. We are now on the up-grade and I believe I am expressing the belief and certainly the hopes of all of the members here when I say that the next ten years will see America back in the position she occupied a half century ago. When I say this I do not mean that America is going to take away anybody else's trade, but that China's foreign trade will have so grown and developed that all nations will be receiving increased benefits as well as ourselves. America wants no privileges in China that she is not willing to concede to others and American merchants desire nothing but an equal opportunity in assisting in the development of this country.

Probably the most interesting and significant factor in the trade and political situation in China in the past year has been the awakening of the Chinese business men to their real responsibility in the development of China. This active interest has been due largely to China's participation in the world war; to the fact that Chinese young men who have been educated in modern institutions of learning both in China and abroad are going into business life; and to the fact that the great war has demonstrated that the world needs the products of China. In America and Europe the world war has demonstrated the necessity for business men becoming more active in the political and larger affairs of the world, and we are glad to see this tendency in China, although it necessarily is not yet so effective here as it is abroad. The growing influence of the various Chinese chambers of commerce is an excellent indication of the increasing influence and importance of the Chinese business man. It is now the problem of American business men, or rather all Allied business men, to meet these Chinese business men at least half way in the solution of their problems. We have the manufactured products that China needs to become a strong nation. To receive full benefits from the manufactured products that we sell to China, China must be strong enough to utilize these things and receive benefits from them. In dealings between nations the customer must be satisfied just the same as in dealings between individuals.

The American Chamber of Commerce of China,

Locomotive crane at Shanghai

organized in June, 1915, was among the first American chambers of commerce to be organized outside of the United States. Now there are probably two dozen American chambers of commerce in the chief ports of the world and a movement is on foot to amalgamate these organizations into one compact body. The membership in the American Chamber of Commerce of China has increased in the last year from sixty-five firms and individuals to a present total of 200 firms and individuals. The increase has been especially notable in the number of new firms that have established their offices in China and among responsible firms at home that have a deep interest in this field. The growth in our membership is an excellent indication of the growth of our trade and prestige in this field. The figures for the 1918 trade of the United States and China have just become available, and the following are a few of the outstanding items:

Exports

Article	Value U. S. Currency	Per Ct. to U. S.
Antimony, crude	$ 2,393,777.82	10.5
Antimony, regulus	3,788,607.42	41.5
Bristles	6,295,070.76	32.0
Cotton, raw	20,436,579.24	16.5
Egg products	12,239,677.68	50.5
Iron, pig	5,394,561.72	15.0
Oil, bean	18,560,047.50	79.0
Oil, wood	4,932,626.16	76.0
Silk, raw, re-reeled	10,582,675.44	56.0
Silk, raw, steam filature	57,157,905.24	20.5
Silk, pongees	6,451,724.40	30.5
Skins and hides	17,714,923.44	52.0
Skins, goat untanned	8,056,149.72	76.0
Straw braid	2,454,816.66	36.5
Tallow, vegetable	1,818,596.76	48.5
Tea, black	12,643,738.44	20.0
Tea, green	9,145,434.24	46.5
Wool, sheep's	10,743,680.43	63.5

Imports

Article	Value U. S. Currency	Per Ct. to U. S.
Cigarettes	$31,888,287.54	48.0
Cotton, raw	6,534,348.48	7.0
Electrical materials	4,107,787.86	20.5
Galvanized sheets	404,575.86	31.0
Iron and milled steel	1,559,594.28	38.5
Kerosene	34,021,749.12	59.0
Leather	9,881,794.68	5.0
Lumber, soft wood	2,976,981.18	25.5
Nails and rivets	2,490,718.62	45.5
Paints and paint oils	1,236,646.98	13.0
Paper and card board	8,332,390.67	8.5
Piece goods, sheetings	10,209,710.40	2.0
Ry. materials, sleepers	2,005,971.78	15.4
Sheets and plates	2,174,136.12	54.0
Tinned plates	2,548,413.90	61.0
Tobacco, leaf	369,295.08	41.0
Locomotives and tenders	3,649,676.28	4.5
Motor cars	932,837.94	61.0
Wax, paraffine	2,637,054.96	45.0

The chief items in which America did no business in China last year are as follows:

Exports

Article	Value U. S. Currency	Per Ct. to U. S.
Beans	$19,994,599.98	00.0
Meats, fresh and frozen	3,043,765.68	00.0
Copper, ingots and slabs	10,145,691.12	00.0
Tin, in slabs	12,448,974.54	00.0

Imports

Article	Value U. S. Currency	Per Ct. to U. S.
Cotton, yarn	$61,345,662.12	00.00
Piece goods, drills	5,618,558.82	00.0
Piece goods, jeans	5,751,153.72	00.0
Piece goods, gray shirt'gs	11,174,075.52	00.0
Piece goods, white shtgs	12,802,652.40	00.0

The foregoing figures, which were supplied to the chamber by the American consul-general at Shanghai, should furnish a subject for deep thought on the part of the members of this organization. In the future the firms that gain the most from the trade of China will be those that get closest to the field and those who enter into the closest possible co-operation with the Chinese merchants and people.

Although the total American trade in China for 1918, taels 135,820,249, shows a slight decrease from the previous year, it is really remarkable, for these figures represent what American merchants in China were able to accomplish in spite of the fact that America's total resources of men and treasure were devoted to the active prosecution of the war. In spite of the fact that the entire world was engulfed in war, China's total foreign trade, taels 1,040,776,113, showed an increase of taels 28,325,709 over the previous year. Although this increase is partly due to war prices, the fact still remains that China's trade is increasing and developing.

Street scenes in the city of Shanghai

The Business of Freight Forwarding

By B. C. Dailey, Vice-President, Overseas Shipping Company

FORWARDING has been properly defined as the business of receiving and transmitting goods for compensation. A forwarder, of course, is primarily an agent, never a principal. His function consists of being at all times on the alert to secure the proper and most efficient transmission of freight from the consignor to the consignee. Just as it has often been said that figures do not lie but liars frequently figure, in the same manner it might well be said that forwarding is never un-essential, but that non-essential persons frequently forward.

I am frequently met by persons not entirely conversant with the proper duties of a forwarder with the following query:

"What is the use of engaging a forwarder to forward our goods when we can engage the steamship space ourselves?"

Whenever I hear that statement made, I immediately put the questioner down as one who has a great deal to learn about the business of foreign trade. I wish briefly to state to you, gentlemen, a few of the services which a well-equipped and alert forwarder renders to his clients, and permit you to determine for yourself the necessity for a forwarder's services:

Furnishing data showing which route is the most efficient and economical.

Booking of ocean space.

Securing of rail permits.

Preparing of shippers' export declarations.

Preparing of consular documents.

Exchanging domestic bills of lading for through bills of lading.

Tracing shipments from point of origin to port of export.

Advising shippers of arrival of goods at port of export.

Checking delivery of shipments to steamer until on board—reporting overages and shortages.

Sending clearance advices to shippers.

Sending of clearance advices to consignees.

Arranging for marine, war risk, fire and pilferage insurance.

Weighing, marking, checking and reconditioning of a cargo, either export or import.

Furnishing lighter, barge and scow accommodations for handling or storage of cargo.

Operation of storage warehouses at ports of export for the accommodation of shipments sent forward under domestic rates to be held until suitable space can be obtained.

In other words, a complete service for all exporters.

B. C. Dailey

Lissenden, the famous English traffic expert, shows by experiments that by bulking a great many small packages of shipments to points within the Dominion of the British Isles, he saved as much as $30 per ton in the freight. During the war when prices were high and margins of profit great, the saving of a few dollars a ton on shipments seemed to the ordinary exporter to be much ado about nothing. With the close of the war the reduction in freight rates throughout the world, and the keen—I might say, cut-throat competition offered by the various European markets to the importers in the Orient and elsewhere, the margin of profit upon shipments becomes so small, that every saving effected by the exporter is gloriously welcomed.

Statistics show that China's foreign trade at present is largely divided between about $347,000,000 to Japan, $158,000,000 to the United States, and $125,000,000 to Great Britain and her possessions.

Japan and America have absorbed the great foreign trade heretofore enjoyed by Germany with China. With the increase in the standard of living that the leavening of war has brought about, a tremendous demand for articles hitherto unheard of has been created throughout the world. This demand is particularly and peculiarly acute in backward countries like China and India and semi-backward countries like Japan and the South American Republics. China is perhaps the best example of a country that is slowly finding herself.

The late John Hay, Secretary of State, once said that the man who understood China had the key to the world political situation for the next half century.

The same thought might well be applied to India, Japan, and, as recent events are now demonstrating, Russia. The markets of these countries are open to you, gentlemen, and your foremost problem at present is not to create the demand for your goods—that has already been done for you by a kind Providence—but rather to establish and organize a stable and continuous course of trade to these countries, to create the utility of space as economists would say, to place the products of this country at the very doors of those who seek them. And the technique of creating this utility of space is the art of forwarding.

I take it that many of you gentlemen play golf and you are familiar with the common view that golf consists merely of hitting a ball and running after it; in the minds of the ignorant operating a bank consists merely of building a store front, taking in deposits and loaning them out—the operation of a steamship line consists merely of buying ships and sailing them across the seas.

Within the last twenty years traffic management and traffic direction have assumed a position of importance that is inestimable. The forwarder is the hub about which all spokes of traffic move. He is the center, the axis, and it is as important that he be properly equipped to supervise the movements of freight about him, as it is that the hub of a wheel be strong enough to sustain the burden of traffic which constantly grinds and wears upon it.

When an exporter gets an inquiry on a C. I. F. basis from a buyer in a foreign country, he first determines the cost of the commodity itself. In this he needs the services of the forwarder. He then determines the cost of packing and the method of packing necessary in the particular instance. This information he must obtain through the forwarder or from some similar source. He then determines the classification of his shipment to ascertain the cost of shipping it to the seaport. In ascertaining this the forwarder aids him. He then determines the routing of the shipment by the cheapest and most reasonably expeditious route. In determining this a forwarder with offices throughout the world and consequently in touch with all routings and rates, renders services that can be nowhere else obtained. In this service, the forwarder is the thousand eyes to the exporter. He wears the seven league boots that make possible the magic of exporting goods at a cost which successfully competes with that which is obtained in countries where labor costs are such that goods are manufactured and produced more cheaply than here. Neither railroads nor steamship lines are legally bound to convey goods by the shortest or cheapest route. But the forwarder, with all his information and the facilities of his various offices at his command, is able to accomplish by matching the facilities of one carrier against the other, what the exporter could never attain without the forwarder's aid. For example, an exporter has an order for 500 tons of 4-inch pipe to be shipped to Kobe which is to be supplied by a mill in Pittsburgh. He wants to make a C. I. F. quotation and has three routes via which he can ship. The question of cost arises and he calls on his forwarder for information. I will quote the cost of making this shipment via New York and New Orleans and Pacific Coast ports:

Pittsburgh to New York 27½c per 100 lbs. or	$6.05 gr. ton	
New York to Kobe	25.00 gr. ton	$31.05 gr. ton
Pittsburgh to New Orleans 38½c per 100 lbs.	8.62 gr. ton	
New York to Kobe	25.00 gr. ton	$33.62 gr. ton
Pittsburgh to Pacific Coast 60c per 100 lbs. or	13.44 gr. ton	
Pacific Coast to Kobe	13.44 gr. ton	$26.88 gr. ton

You will see that it would cost $4.17 less per gross ton to ship via the Pacific Coast than via New York and $6.74 less via Pacific Coast than via New Orleans. You will note that I have used a $25 rate from New York on this commodity. It will no doubt be a surprise to some of you to learn that the $20 rate on iron and steel quoted by the United States Shipping Board from New York to the Orient, only applies on close stowing steel such as bars, plates, etc. If this information had not been available to the exporter he would no doubt have figured on the $20 rate via New York and suffered a loss of about $5 a ton. This is only one instance where a well-equipped forwarder actually can save the exporter money.

After the cost has been transmitted to the importer and he has presumably placed his order, the question of handling the necessary documents becomes important. Here the forwarder plays an important part. He prepares the necessary bills of lading and documentary memoranda of shipment. He acts as the go-between, on one side representing the exporter and on the other the importer or his agent, the carrier. In case the exporter wishes to stop the goods in transit, the forwarder is at his service so to do. In case the goods are to be trans-shipped beyond the port of discharge of the vessel carrying them, it is the forwarder who bears the burden and attends to the details of trans-shipment. In case of a dispute with the carrier necessitating a reweighing of the goods, the forwarder's services are again sought. In case it is necessary to recondition the goods, or to inspect them or to survey them for insurance purposes, it is the forwarder who with his expert knowledge gained from an experience of many years, does the trick. Where claims arise against the carriers and insurance companies on account of delay or damage to goods, the forwarder prepares the claims and hounds the steamship lines and insurance companies until they are disposed of.

Mercantile Marine Developments

By Winthrop L. Marvin

CHAIRMAN HURLEY'S resignation came much earlier than was anticipated, and another Middle Western man — a lawyer this time — is at the head of the United States Shipping Board. It was believed that Mr. Hurley would remain at least until the autumn, and it is understood that he had so stated to some of his particular friends. Mr. Hurley will always be remembered with Mr. Charles M. Schwab as a chief driving force in Shipping Board affairs in the height of a great national emergency. The zeal, devotion and aggressiveness of the late chairman knew no bounds. Men who know Mr. Hurley are aware that long before the war as president of that powerful organization, the Illinois Manufacturers' Association, he had a deep interest in our merchant marine, though without any intimate acquaintance with the industry. He and his associates were friends in an unfriendly region. It is a matter of history that most of the great Chicago newspapers were violently hostile to American shipping in the years before the war, and that most of the Chicago Representatives in Congress—indeed, most of the whole Illinois delegation, particularly those who hailed from German districts — voted doggedly against every legislative proposal for the increase of our merchant service and our potential naval reserve. But President Hurley and his Illinois manufacturers never allowed themselves to be stampeded in that direction, and when he came to Washington to guide the destiny of the Shipping Board in a crisis that came very near to being an extremity, those who were familiar with his career were very sure that whatever lack there might be in his technical equipment for his new responsibility, there could be no discounting of his 100 per cent Americanism.

And so it has proved. Chairman Hurley made his mistakes, but they were of the head and not of the heart. Now that he has stood his last watch and gone over the side for the last time, even those who felt aggrieved at some of the things which he has done will acknowledge his enthusiasm and his forcefulness. He is a stalwart business man, friendlier to other business men than most of those who have lately come into the public service from his section of the country. He did a wonderful amount of work in "speeding up," not so much the shipbuilders and the shipowners, who needed no urging, but rather his Middle West, the nation and the government. To his successor Mr. Hurley leaves no easy task.

The New Chairman

Frankly, it would have been more pleasing if the new chairman of the Shipping Board had been distinctly a maritime man instead of the able chief counsel of the Railroad Administration, who came from Chicago to serve a brief space as general counsel of the board by Mr. Hurley's invitation. Under every other government but our own, a national shipping board would be made up from the great seaports, among the most conspicuous representatives of commerce, shipbuilding and navigation, with perhaps one or two distinguished publicists. That is the way these things are done in Italy, France and the United Kingdom—and the general results have been by no means discouraging. On our own Shipping Board at the present time is but one member of practical shipowning experience—Commissioner Donald, first in continuous service. He has information joined with shrewd commonsense, and it is no secret to maritime men that his work has been invaluable.

The new chairman, John Barton Payne, has come to his post with a reputation as a lawyer of a high type, familiar with large problems of land transportation, firm and independent of judgment—characteristics that augur well. His nomination does not please the country so much as would that of a great shipowner or shipbuilder or merchant, but it must be remembered that in every Federal commission a certain political balance must be maintained, and it must be confessed that most of the men of today who would be thought of as eligible are Republicans. From his own party it is the impression that President Wilson has made a good selection.

Work of Congressional Committees

Mr. Hurley in retiring said: "I feel that my own work has been done. The Shipping Board and its Emergency Fleet Corporation both are well organized, and all that remains is for Congress to work out the legislation that will serve as a compass for the future." But those who know our shipping conditions best are best aware that the working out of that legislation is a task of undeniable magnitude. Much more significant than any drag-net investigation of past shortcomings of the Shipping Board is the constructive program that has been blocked out by veteran Chairman Greene of the House Committee on Merchant Marine and Fisheries. Mr. Greene hails from the maritime commonwealth of Massachusetts, and he has unerringly chosen the right course by setting a sub-committee to work upon a definite maritime policy for the nation—such as it has not had in fact since the original, and very successful, policy was framed by the combined wisdom of Washington, Adams, Jefferson and Madison. The House Committee, through other groups of its members, is promptly taking up the very practical tasks of a modernizing and equalizing of our navigation laws and regulations and the creation of an American system of marine survey, classification and insurance.

In the Senate the great Committee on Commerce, headed now by Senator Jones of Washington, whose information and experience are considerable, is also moving to prepare itself for a just determination of the problems of the future of our merchant marine. It is most fortunate that the heads of these committees both come from seaboard states, one of the Atlantic, one of the Pacific, but the understanding is that members of the two committees that come from states far inland—as is right and necessary to give the committees a genuinely national character—are all manifesting this year a keenness of interest in merchant shipping questions that has never been known before. When after the great war began, but before our own government entered into it, Western farmers were receiving less money for their wheat than had to be paid to foreign shipowners for carrying the wheat to Europe, a flood of light broke in upon Western comprehension. Those foreign shipowners were dominating nine-tenths of our ocean-carrying trade and took full advantage of their opportunity. That experience has taught the grain growers of our great West a lesson that this generation is no more likely to forget than it is to forget that after we did enter the war and our boys in khaki had helped to win it, thousands of these lads from the Mississippi Valley and the maritime states were forced to remain abroad, long after there was no need of them there and when there was sore need at home, for the simple reason that the United States lacked ocean liners to bring back its troops in the only way most of them could then be brought back—in its own ships, under its own colors.

There has been a great awakening in the Middle West since Herr B. von Hulderman, an official of the Hamburg-American Steamship Company of Germany, arrogantly declared in propaganda distributed throughout the whole Mississippi Valley that any American ambition to possess a merchant marine was merely "a kind of national vanity, based on the desire to see the national flag flying on the ocean." These German propagandists had very good reasons of their own why the American flag should not be flying on the ocean. There cannot be the slightest doubt that the German government, through agents and attorneys of the German steamship companies, conducted a bitter fight against the American merchant marine, particularly in the Middle Western States, before the war—and that many uninformed Americans, particularly of the farmer class, were deluded by it. These German plotters thought that they had succeeded. As the German Admiral von Tirpitz, leader of the party of "frightfulness," declared in an address in Dresden in April, 1917: "I would point out from a military viewpoint America's entrance into the war is of little significance to us, **because it is the tonnage question that is decisive.**" These Germans believed that if they could prevent America from getting ships they could effectually prevent America from sending troops to Europe.

Hardly had the United States Shipping Board given out the comforting assurance that wages of firemen and seamen were and would be as high on British and Scandinavian merchant ships as on similar vessels of American nationality, than signs of unrest became apparent among maritime labor unions of the Atlantic Coast, culminating in a demand for an advance of $15 a month from the existing base pay of $80 for oilers and $75 for seamen and firemen. This was not involved in the original request for the granting of preference in employment to union men, which was met by an offer from the American Steamship Association to grant such a preference to American citizens. Various "grievances" were submitted along with this request, but a wage advance was not then suggested. This appears to have been an afterthought, inspired, perhaps, by a considerable growth in the numbers of men enrolled in the labor organizations and by the further fact that scores of new ships were leaving the builders' yards and going into commission, with the result of an unprecedented draft upon all ranks of our seafaring population. In other words, it seemed to be a thoroughly human, but never the less deplorable, attempt to "hold up" Uncle Sam at a critical period in his maritime development.

A Disconcerting Drive

It had generally been assumed that the new basis of $75 a month for seamen and firemen had been definitely established for some time to come, and shipowners were going ahead on that basis to make their calculations. These new and unexpected wage demands are undeniably disconcerting. They threaten to lift the wage scale of American merchant shipping again substantially above the wage scale of North Europe, and to that extent to reinstate one handicap that long existed to the increase of the American merchant marine. It will be recalled that it was confidently promised of the La Follette Seamen's Act that it would eventually bring European wages up to the American standard. There has been a disposition to wait and see if the Seamen's Law would actually produce this effect—not immediately, of course, but after a reasonable lapse of time. It looks as if the maritime unions themselves had run away from their leaders, as it were, and had threatened to doom this bright expectation to another disappointment. Obviously, the European seamen's organizations cannot hold the pace of any such headlong progress. As it is, the report at present writing is that Swedish shipowners hotly dispute the demand for $75 a month for men who a few years ago were signing on for long-time contracts at the equivalent of about twelve and fifteen dollars.

Let it be acknowledged that the great war has wrought a fundamental change in sea labor and living conditions—a change urgently needed under most flags and justified by broad considerations of humanity—is it not a fair and reasonable view that the maritime unions should have been content to see $75 a month accepted as an international standard before precipitately moving for $15 a month more in America? Andrew Furuseth and other leaders of the seamen have frankly recognized our substantially higher wage scale as an obstacle to the restoration of the American overseas shipping industry. A spirit of moderation and patience just at this juncture would have powerfully encouraged good will all around. The great war brought many indications of a friendlier feeling and a clearer recognition of mutual interest between our shipowners and their seagoing employes, and it was to be anticipated that with the notable recent increase in the thorough-going American proportion of our shipping personnel this wholesome strengthening of good will would have continued.

Attitude of the Union

Time was when, strange to say, the maritime unions appeared to bear a positive hostility toward the efforts of shipowners and merchants to strengthen our foreign-going merchant marine. The seamen's union particularly opposed the enactment of the various bills that were advocated during President Roosevelt's administration for the building up of American mail, passenger and freight lines to the principal ports of South America, Australasia and the Orient. These bills by their express provisions would have barred Oriental and all like low-wage labor from employment in these services, wherein, indeed, a certain proportion of the crews, rising to one-half, would have had to be not only white men but American citizens—just as the ships themselves, for which these bills provided, would have had to be built in the United States or plans approved by the Navy Department with reference to their effective use as auxiliary cruisers, fast transports, ammunition ships and supply ships in case of war.

President Roosevelt and his lieutenants in Senate and House argued most earnestly for the enactment of this legislation, which was defeated in one instance by a partisan filibuster in the Senate and two or three times by the barest majority in the House of Representatives. Certain powerful European maritime interests were, of course, aligned against these bills, but the fact that at least in the earlier stages certain leaders of the seamen's unions were also fighting them surprised and displeased the country to such a degree that for some years thereafter there was a noticeable decline of seamen's union influence with Congress. It was explained that at that time most of the members of the unions were foreigners, unnaturalized, with small interest in the United States—but the American people did not relish the apparent willingness of these foreign seamen to see American mails, passengers and freight conveyed as far as possible by the ships of the alien flags under which a great majority of these seamen were born and to which they appeared still to owe their actual allegiance.

Of course, those past conditions have now somewhat changed. A great many more of our seafaring men, in the unions and outside of them, are loyally American by birth or by adoption. That significant fact by itself ought to be instrumental in the creation of a better understanding of the importance of a great and prosperous American ocean shipping industry, not only to those who own or officer the ships, but to those who man them. A steadily increasing infusion of the genuine American elements into our maritime unions will be beneficial to the unions themselves as well as to the country.

Labor unionism is powerful in Great Britain and North Europe. When an effort was made to persuade the British Seamen's Federation to endorse the La Follette Seamen's Act of the United States, and to demand the enactment of the law or its equivalent by the British Parliament, the leaders of the British seamen balked at the proposition. They would not consent to it, though they could not deny that it might confer some advantages on the men whom they were supposed to represent. These British labor leaders, therefore, proved to be Britons first and labor union leaders afterward. They recognized that the enactment of a La Follette seamen's law in the United Kingdom would inevitably handicap the British mercantile marine against its competitors of the Continent by requiring a larger proportion of trained men and generally larger crews than are now called for by British regulations. This episode is undeniably significant, and it is not at all to the discredit of British seafaring men. So, also, with the sailors' unions of France. They are naturally desirous to advance the welfare of their people, but they, too, realize that to impose additional obligations on French shipowners in the way of carrying larger crews would put the French flag at a disadvantage with the merchant flags of Germany or Italy or Scandinavia, and they are not willing to go so far as this, for they are Frenchmen first and solicitous for the prosperity of their nation on the seas.

A Great Record of Building

A far better measure of the real achievements of American shipbuilding than the deadweight tonnage employed in the past by the Shipping Board is the official gross tonnage of the Bureau of Navigation of the Department of Commerce. This bureau, headed by Commissioner Chamberlain, has announced that during the month of June, 272 vessels of 422,889 gross tons were built in American shipyards and officially numbered, and that the output of American tonnage during the twelve months ending June 30, 1919, amounted in all to 2241 vessels of an aggregate gross tonnage of 3,860,484. Of course, it is to be understood that a certain proportion of this new tonnage is not of a real seagoing character.

This is the authoritative record of American shipyards and as such of valuable permanent record at this time. As reported by the Bureau of Navigation of the Department of Commerce, the monthly output of American shipyards from June, 1918, to June, 1919, was as follows:

Months	Steel		Seagoing Wood		Total		Non-Seagoing		Grand Total	
		Gross		Gross		Gross		Gross		Gross
1918	No.	Tonnage	No.	Tonnage	No.	Tonnage	No.	Tonnage	No.	Tonnage
June	42	163,034	16	26,985	58	190,019	130	11,406	188	201,425
July	37	146,981	38	72,727	75	219,708	†118	10,223	193	229,931
August	49	191,102	39	91,997	88	283,099	89	12,750	177	295,849
September	46	177,765	54	123,668	100	301,433	70	7,037	170	308,470
October	57	228,203	53	117,165	110	345,368	91	12,164	201	357,532
November	60	227,293	55	121,746	115	349,039	‡56	8,621	171	357,660
December	40	175,678	46	98,829	86	274,507	67	8,852	153	283,359
1919										
January	42	174,799	37	80,957	79	255,756	‖53	8,590	132	264,346
February	47	206,106	26	58,095	73	264,201	62	7,229	135	271,430
March	47	199,743	44	86,398	91	286,141	95	11,864	186	298,005
April	75	316,177	30	52,097	105	368,274	°96	7,331	201	375,605
May	*84	351,368	20	34,979	104	386,347	146	9,061	250	395,408
June	72	329,981	39	82,362	111	412,343	161	10,546	272	422,889

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* Includes one concrete vessel of 2481 gross tons.

† Includes one concrete vessel of 325 gross tons.

‡ Includes one concrete vessel of 11 gross tons.

‖ Includes three concrete vessels of 1004 gross tons.

° Includes two concrete vessels of 588 gross tons.

Supplementing this record of shipbuilding month by month is the consolidated record of ships built and officially numbered during the full twelve months, as follows:

12 months ending—		Seagoing					Grand Total, including Non-Seagoing	
		Steel		Wood		Total		
1918	No.	Gross Tonnage	No.	Gross Tonnage	No.	Gross Tonnage	No.	Gross Tonnage
June	252	1,031,976	158	215,716	410	1,247,692	1622	1,430,793
July	275	1,124,066	189	274,330	464	1,398,396	1610	1,571,572
August	315	1,268,452	214	354,172	529	1,622,624	1612	1,781,379
September	352	1,411,144	256	465,327	608	1,876,471	1681	2,013,264
October	396	1,594,927	287	546,613	683	2,141,540	1760	2,280,111
November	437	1,771,560	331	657,487	768	2,429,047	1814	2,560,503
December	460	1,861,321	361	735,705	821	2,579,026	1882	2,721,281
1919								
January	490	1,982,372	392	810,194	882	2,792,566	1957	2,920,832
February	520	2,094,236	404	850,415	924	2,944,651	2008	3,074,661
March	538	2,178,939	436	916,037	974	3,094,976	2056	3,225,521
April	582	2,364,479	451	947,117	1033	3,311,596	2092	3,438,076
May	626	2,558,249	458	965,643	1084	3,523,892	2157	3,639,020
June	656	2,725,196	481	1,021,020	1137	3,746,216	2241	3,860,484

That the steel vessels launched during the fiscal year ending June, 1919—numbering 656 in all—were of an average of somewhat more than 4000 tons gross register, shows the important character of this new construction. Nearly all of these 656 vessels were of a size and type designed for overseas carrying. In addition the 481 seagoing wood vessels, of a total of 1,021,020 tons, show that most of them were large enough for at least outside coastwise service. It is probable that not all these wooden vessels will continue in our service, for it is a part of the Shipping Board policy to dispose of many of them abroad for use in the Baltic and the Mediterranean. So, also, many of the smaller steel vessels may be sold to foreign customers. But a total addition to our merchant marine, as these bureau figures disclose, of 1137 vessels of a total of 3,746,216 tons gross register in a single year is truly a remarkable achievement. The largest recorded output of the shipyards of the United Kingdom in normal times of peace was 612 vessels of 1,793,287 gross tons in 1913. On March 1 last there were 4,185,523 gross tons of shipping under construction in the United States, as compared with 2,254,845 tons under construction in Great Britain.

Thus the predictions of the Shipping Board, that seemed too rosily colored, are being substantially verified in our national experience. The United States is constructing the huge amount of new shipping that was anticipated and is constructing it more deliberately and carefully than was possible in the stress of war. Very soon, under the new and revised policy reaffirmed in the appropriations of Congress, American yards will be building a large number of liners of the naval reserve with more than the ordinary commercial speed and a tonnage of upwards of 12,000. These are required, as Mr. Hurley has contended, for the proper balancing of the American merchant fleet. We are assured of our ships, and Congress must lose no time in framing laws under which they can be efficiently and profitably operated. This of itself is a far more difficult problem than the actual construction of the vessels, as serious-minded men well know.

Modern Progress in Rigging Equipment

By **H. T. Haviside**

Manager, Rigging Department of Haviside, Withers & Davis

MODERN machinery and its adaptation to nearly every use along the waterfront of a large port has certainly not missed rigging in its passage. And by "rigging" I mean the handling of heavy cargoes as well as the lifting and stepping of long and heavy spars, masts, yards and booms.

Whether or not the advent of combination steam winches, multiple falls, patent sheaves and the other technical innovations have been for the welfare of rigging as an art, I am not prepared to say. But one thing must be patent to everybody whose trade or business takes him to the wharves where there are ships and rigging, and that is that modern innovations have reduced cost and shortened time on jobs to a minimum.

I have used the word "art" in connection with rigging, and anybody who takes exception is at liberty to try his hand at a long wire splice or an eye splice with four-inch steel hawser. Whatever we name it, rigging is one of the oldest handicrafts. We have no record of any miraculous assistance to Noah in his first essay as a shipbuilder. We have certain records as to the probable size and weights of some of the timbers he used, and I am willing to believe that the Ark was never roofed over without the use of a shear-legs made from two stout pine trees, a fall of hand-woven hemp and a sheave made from a good-sized cedar bough whittled to a near roundness.

In the old days in San Francisco there was, of course, much ship-rigging work to do. In the early nineties we handled the whaling fleet and rigged many a famous old whaler, such as the Sea Breeze, Alaska and Bounding Billow, and when the old bark Mars came to the end of her usefulness, after forty-eight years of life at sea, we dismantled her.

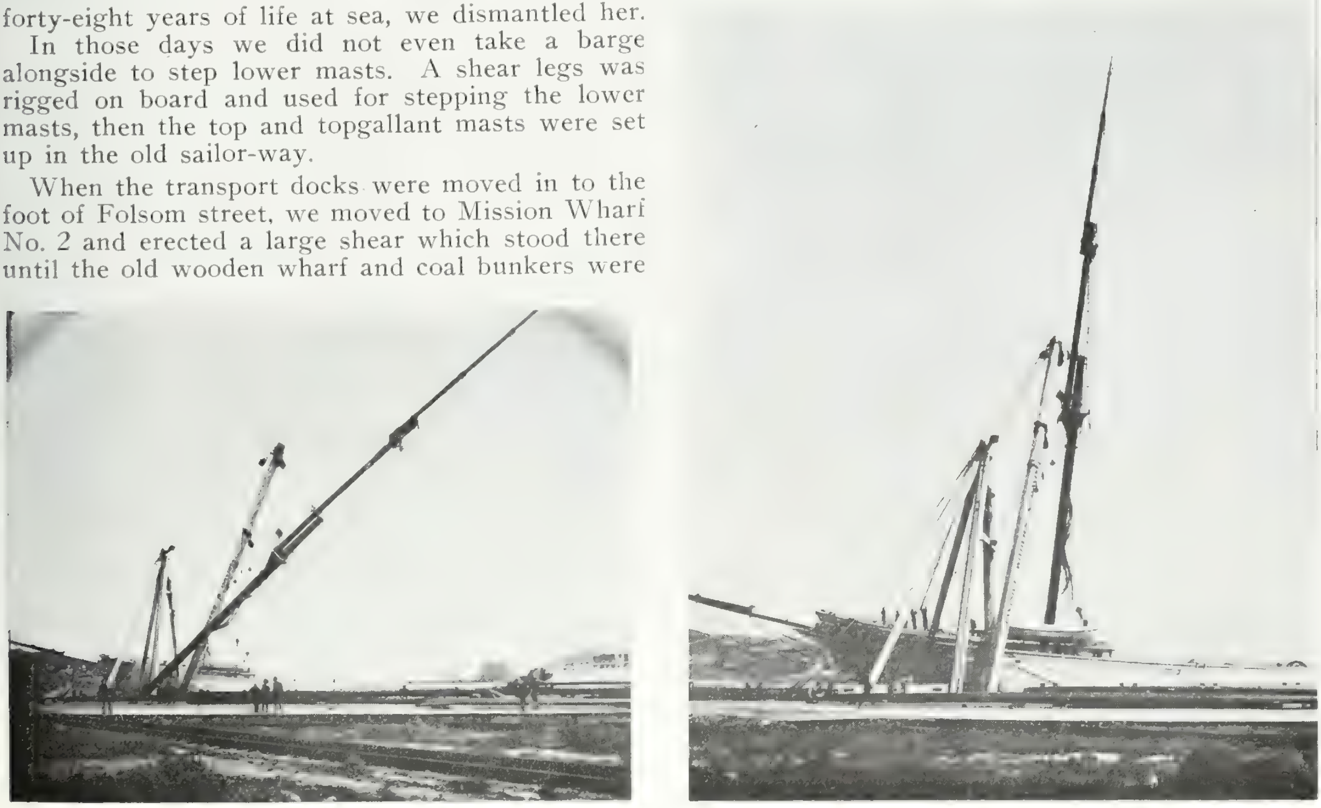
In those days we did not even take a barge alongside to step lower masts. A shear legs was rigged on board and used for stepping the lower masts, then the top and topgallant masts were set up in the old sailor-way.

When the transport docks were moved in to the foot of Folsom street, we moved to Mission Wharf No. 2 and erected a large shear which stood there until the old wooden wharf and coal bunkers were taken down to make room for the modern concrete piers 14 and 16. Here we rigged the sailing ships that were building at the Hay & Wright, William Boole & Son, Frank Stone and other yards. The stationary shears were used for stepping the lower masts and sometimes for sending up the topmasts.

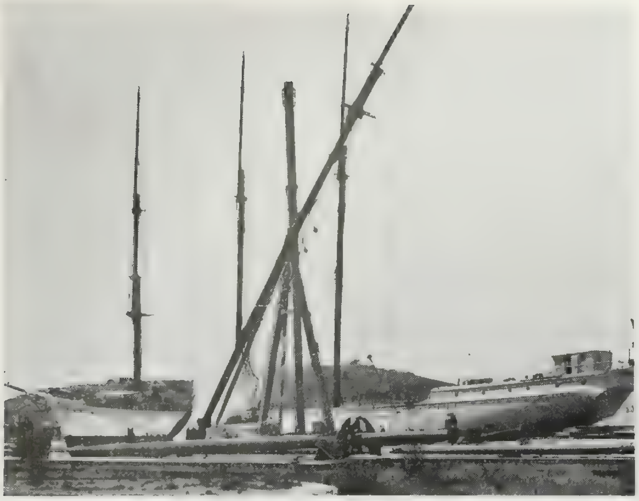
The last vessel re-rigged on the old shears was the Matson Line bark Annie Johnson in 1893. As some of the old-timers will recall, she was formerly the famous bark Lady Airedale that was picked up at sea by a French gunboat. She had wandered around the Pacific south to Tahiti without a crew for eighteen months, having been abandoned on account of fire. After twenty-three years of useful service under her new owners, she was, in 1916, again dismantled and rigged as a four-top mast auxiliary schooner, in which capacity she has had a wonderful success.

About the time of the removal of the shear legs at Mission Wharf No. 2, we built some small derrick barges and found these extremely useful in handling freight and small rigging jobs. Later we had a larger one built, and this was used in salving the steamer Sna Kak, which went ashore near Point Sur in the spring of 1916. It was the success achieved by using this barge in laying moorings for salving in a surf that first gave us the idea of really large and powerful derrick barges.

When the Sinaloa went ashore inside of Cape Blanco, we sent the same barge used for the Sna Yak up to the job. This barge enabled us to reach in and lay moorings and anchors in breaking waters where a wrecking steamer could not have ventured without being wrecked. The Sinaloa was



View showing the barge of Haviside, Withers & Davis at work stepping the foremast of the barkentine Rolph. Left: Shows derrick raising the foremast off the dock. Right: Shows foremast being stepped on the vessel



Stepping the jigger mast

salved and brought back safely by the use of a powerful tow boat towing ahead and a steam schooner maneuvering behind to act as a rudder. This was the only successful salving of a vessel from that part of the coast.

Our present large derrick was planned very carefully in the fall of 1917 and was put into use early last year. It has been a conspicuous success from the first. The "A" frame is sixty-five feet high and the main block at the peak of the frame is hung on a massive pintle that goes vertically into a seating in a heavy casting that fits over the top of the four legs. The boom is 105 feet long and will lift a full thirty-five tons at its extreme outer end with, of course, a considerably greater lifting capacity farther inboard.

The barge has complete living quarters for its crew and is fitted with oil and water tanks in case of distant wrecking jobs which give a full capacity for both the steam boilers of 100 days' work.

The latest job successfully done by this barge and one which is shown in the accompanying illustration was the stepping of the four masts, "all standing" in the barkentine Rolph, recently built for Mayor Rolph at his yards near Eureka.

The fore-lowermast was of iron, the top and topgallantmasts of wood. All the stays were spliced and put in position ready to be seized down to the chains as soon as the mast was stepped. The work of stepping in the upper masts as they lay on the wharf was, of course, very much simpler and more quickly done than if done after the lowermast had been stepped.

We put the barge alongside the Rolph between the vessel and the wharf. Then a stout pennant of wire rope was rigged on the foremast just above the lower top and to this the main fall from the boom was made fast. A single line was rove from the topgallant masthead and through a block at the top of the boom. The mast was then hoisted and canted gradually to a nearly vertical position by the single line. It was a ticklish job because the stepping ran through the forecastle head so that there were three decks through which to pass the mast. The butt of the mast was lowered over the first opening, while the mast itself was leaning slightly aft. We then rigged a handy billy just above the butt and had two guy lines running forward, one from each outer end of the topmast crosstrees. By this means we yere able to swing the lower end of the mast aft and the upper end forward, at the same time getting it perfectly square to go true down on the seating by hauling on one or the other of the two guys, the length of the crosstrees giving sufficient purchase to turn the mast around in either direction.

Stepping the foremast took about two hours. Once this was done, stepping the other three masts, with their topmasts already stepped on, was a simple matter and the whole job was done by early afternoon.

Ours are not the only derrick barges on this bay by any means. Numbers of other firms are equipped with similar facilities. So it is a fact that San Francisco is as well fitted for handling rigging and cargo to and from barges as any port in the world.

R. E. LOVEKIN, ADVERTISING ENGINEER

Mr. R. E. Lovekin, formerly managing director of the American Screw Propeller Company, and authority on engineering advertising, has disposed of his interest in the American Screw Propeller Company, and has opened offices at 610-11-12 Penfield Building, Philadelphia, Pennsylvania, under the name of R. E. Lovekin, Advertising Engineer.

Mr. Lovekin's experience in both the engineering and advertising fields, as well as his wide acquaintance among the shipyards' officials and marine engineers of the country, should enable him to render valuable service to his clients.

Barkentine Rolph, rigged and ready for sea, leaving Islais Creek under tow of the Rolph tug Relief

S. S. West Aleta Equipped with Anti-Noise Telephones

At the right: A view of the interior of the pilot house of the West Aleta, Mr. Harry Simpson, port engineer of the Williams-Dimond Steamship Company and American-Hawaiian Steamship Company, talking to the steering engine over the Magnavox Anti-Noise marine telephone.

At the left: The Magnavox Anti-Noise marine telephone as installed at the stern of the new West Aleta. Mr. Leon B. Bozardt, coast representative of the American Engineering Company, taking to Mr. Harry Simpson.

The West Aleta, built by the Schaw-Batcher Company Shipworks for the United States Shipping Board and allotted to the Williams-Dimond Steamship Company for direct service between San Francisco and Copenhagen.

Photos by N. A. Wright

Some views of the new steel steamship West Aleta, which, under the flag of the Williams-Dimond Steamship Company of San Francisco, will be the pioneer ship in a fleet of United States Shipping Board vessels allotted to this company for direct San Francisco-to-Copenhagen service.

Full-rigged sky sail yard ship James Rolph and derrick barge of Haviside, Withers & Davis

Mr. Daulton Mann, Assistant General Manager, Pacific Mail Steamship Company

Daulton Mann, Assistant General Manager of the Pacific Mail Steamship Company

IT is not often given to a Native Son to grasp so early in life the opportunities for a successful career such as have fallen to the subject of this sketch. Born in Oakland in 1893, and inheriting from his father, Seth Mann, that indomitable spirit which characterized the California pioneers, Daulton was noted in his school days at the Lowell School at San Francisco for his athletic prowess as a football player and as a member of various swimming teams. In 1911, at the age of eighteen, he entered the employ of the California-Atlantic Steamship Company, who sent him to Panama in the spring of 1912.

Six months of work as a shipping clerk at the western end of the Panama Canal gave the young man an insight into the foreign attitude toward American trade. To and from the Port of Panama converged and spread the traffic of the seven seas—British, German, Scandinavian and Japanese tramps, the great excursion liners and the coastwise freighters—all came under his keen observation, and from them were gleaned many lessons in handling and stowage, in measurement and manifest, and in marine insurance. This intimate contact with all phases of shipping activity resulted in a broadened commercial vision which proved invaluable to him in his after experience.

In the fall of 1912 he returned to San Francisco and worked for his company on the waterfront as dock clerk and super cargo. After the failure of the California-Atlantic Steamship Company in 1913, W. R. Grace & Company, recognizing the ability and energy of Daulton Mann, offered him a position in their employ on the waterfront, which he accepted.

From the waterfront he soon graduated into the office and then into the traffic department, and in 1916, when J. H. Rosseter went to the Orient, Daulton Mann was appointed assistant to the vice-president and general manager, and in that capacity his services proved of such value to his superior officer that, when the latter was called to Washington in 1918 to manage the operating department of the United States Shipping Board, he appointed Daulton Mann to be assistant general manager of the Pacific Mail Steamship Company, placing him practically in charge of all the operations of the company's steamers.

In 1914 Daulton Mann married Ethel Gregg, the daughter of Wellington Gregg of the Crocker-Woolworth National Bank.

To be happily married and to have attained distinction and prominence in the line of his life's work at the age of twenty-six is a record of which any man might feel proud, and Pacific Marine Review is glad to extend its congratulations to one of the youngest of our American steamship executives.

Pacific Mail S. S. Columbia at Shanghai

Former Pacific Mail steamer Manchuria arriving at Hong Kong dock

Pacific Marine Review
The National Magazine of Shipping

576 Sacramento Street
SAN FRANCISCO, CALIFORNIA U. S. A.

Official Organ of the Shipowners Association of the Pacific Coast

Subscription Price, per year (Domestic) $3.00
(Foreign) $3.50
Single Copies . . . . 25 cts

J. S. HINES . . . . Publisher
B. N. DeROCHIE . . . . . . Business Manager
A. J. DICKIE . . . . Editor
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NEW YORK OFFICE
339 Hudson Terminal Bldg.
30 Church Street
M. B. STEWART, Manager

NORTHWESTERN OFFICE
560-561 Empire Building
Seattle, Wash.
J. A. KENNEDY, Mgr.

Pacific Marine Review is sold at all leading News Stands
Entered as second class mail matter at Postoffice
San Francisco, California

Published on the First of Each Month. Copyright
1919 in the United States by J. S. HINES

A GOVERNMENT MERCHANT MARINE POLICY

THE Pacific American Steamship Association, at a special meeting of the board of directors, held July 3, 1919, adopted the following resolution: Resolved, That the policy set forth below is endorsed by this association as the merchant marine policy that should be adopted by the government of the United States of America:

1. Shipyards should be released promptly from government supervision and permitted to accept any orders obtainable, either foreign or domestic.

2. The Shipping Board should cease building merchant ships when present contracts are completed.

3. The Shipping Board should sell all of their wooden ships to either Americans or foreigners at the best price obtainable.

4. The Shipping Board should offer their steel ships for sale to American citizens at the world's market price, giving due consideration to the competitive conditions. The great number of Shipping Board boats should not be dumped on the market at one time and the price should not be cut or allowed to fall below the building prices of foreign yards.

5. In the meantime, pending sale of vessels, they should be chartered to American citizens at market charter rates obtainable in the different trades, thus making it possible for charterers to use American tonnage on equal charter rates with foreign tonnage.

6. Entire freedom of action should be extended to private owners and charterers in choosing routes and fixing rates of freight and passage in competition with foreign tonnage and supply and demand upon particular routes.

7. Provision should be made so that shipowners would have assurance from the government that it would not itself operate other tonnage for its own account on same routes on which private owners or charterers are operating adequate service to take care of the requirements of the trade.

8. The present operator's and manager's plan should be continued upon unremunerative routes or upon new routes desirable for extension of foreign trade until such time as those routes build up to the point where private owners and operators are willing to buy or charter American vessels for that service.

9. All coastwise trade should be restricted to American-owned and American-built vessels.

10. American steamship companies should be required to obtain a charter from the Federal government, which shall exercise close supervision over their capitalization, stock issues and bonded indebtedness. A statute should be enacted revising the mortgage law so as to constitute a mortgage the first lien on the vessel, subject only to liens for salvages, general average and the wages of seamen, thus making vessel mortgages attractive to investors.

11. The compensation for carrying mail in American bottoms should be increased in order to encourage the establishment of mail-carrying lines; such compensation to be adapted to speeds economically practicable in the various trades.

12. Fuel depots, both oil and coal, should be established upon the various trade routes, such depots to be owned or controlled by American interests.

13. All jurisdiction of municipal, state and territorial supervision or control over vessels in foreign trade should be eliminated.

14. The Shipping Board recruiting service should be continued on a basis which will assure shipowners an adequate supply of officers and seamen.

15. Carriage of cadets or apprentices, both in the engine room and on deck, on all vessels, government or private, in foreign trade, should be compulsory and graduated wages should be fixed.

16. The length of service required to obtain an able seaman's certificate should be reduced and all applicants should be required to pass an examination before receiving certificates.

17. A naval reserve should be created, whereby the navy will pay a graduated retainer to all officers and men on deck or in the engine room.

18. Measurement for tonnage should be revised to correspond with British rules, in order to equalize charges based upon tonnage throughout the world.

19. United States steamboat inspection rules for boilers, machinery and hulls, also for deck and lifesaving equipment, should be revised along the same lines of British inspection rules.

20. United States coasting laws should be extended to all American possessions.

E. F. C. INSPECTION SERVICE

DURING the war emergency in shipbuilding, builders were impressed by the Emergency Fleet Corporation and its corps of inspectors almost wholly with the idea that quantity of production was the prime necessity—that tonnage of ships must be turned out at any cost. The result both upon the Pacific and Atlantic seaboards of the United States was that a great many ships not only cost a great deal more than they should have cost, but were turned out in a slovenly way, cheaply thrown together and with workmanship so poor that of necessity they have already been a considerable burden of expense to the operator. Since the armistice has been signed, however, a great change has come about for the better in the methods employed in building ships, and in the carefulness of the inspection of these ships by the officials of the Emergency Fleet Corporation. There has been on the part of some builders, some foremen, and many workmen, a great deal of comment during the last five or six months on account of the severity of the inspection, but all real shipbuilders are agreed that this inspection was absolutely necessary and has been the best thing that could have happened to the shipbuilders. In the district around San Francisco and Los Angeles (the so-called Southern Pacific district), we can see that nothing has done more to add to the permanency of the shipbuilding industry than the intelligent and careful inspection service given by the officials of the local branch of the Shipping Board and its Emergency Fleet Corporation. Special credit in this connection belongs to Mr. William Chisholm, who has had charge of this work, and this district is especially fortunate in having in this position a man like Mr. Chisholm, who not only understands thoroughly the management of men, but who has had a wonderfully enlightening experience for the class of work on which he is now engaged. His long service as an operator with the Pacific Mail Steamship Company has given him a great opportunity to learn the weaknesses of ships. This experience as an operator brought Mr. Chisholm in contact with every angle of ship work. The knowledge of the handling of freight, both by machinery on the dock and by the ship's machinery,, the storing of the freight on shipboard and the handling of the ship in her operations, especially in maneuvering up to, or away from, the dock or anchorage, is all a necessary part of the equipment of a real shipbuilder, and probably no man on this coast has a more intimate acquaintance with these particular features of ship operation than has Mr. Chisholm. This knowledge being at the disposal of all of the inspectors under him, and of all of the shipbuilders, has enabled them to turn out ships fitted in every detail to more economically perform a real service in the commercial life of the world.

His experience as an inspector during the emergency war construction added the special training necessary to give him an ideal knowledge for the position which he is now holding. When we consider, in the light of this knowledge, his absolute impartiality in decision, we have to acknowledge that a large part of the credit for good ships which the Southern Pacific district now enjoys is due to the work of this one man. The subordinate inspectors in the various yards are of course entitled to a great deal of the credit, but that also goes back to Mr. Chisholm, as he has used great care in the selection of his subordinates and will have no one in his employ who will not see to it that the proper class of work is done in the yard under his charge. While Mr. Chisholm is absolutely impartial and very severe in his inspection, he is a man having in marked degree that rare virtue commonsense, so that in the matter of methods employed in the yard, and in the matter of the practising of justifiable economy, he is flexible enough to be willing to meet the builder more than half way, and many of our local builders will testify that to him and the inspection service under him they are indebted for considerable saving through suggested economical methods of construction and installation work.

In this connection we must not overlook the valuable service rendered by the American Bureau of Shipping. The inspection service of this classification society has had a wonderful opportunity during the war emergency construction to establish itself as a clearing house for information on merchant ship construction as carried on in America, and will undoubtedly in the future be the dominant factor in classification for American marine insurance. Under the insurance notes in this issue the work of the Bureau of Shipping will be found fully covered.

LLOYD'S REGISTER OF SHIPPING COMMITTEE OF MANAGEMENT

AT a special meeting of the General Committee of Lloyd's Register, held recently, Sir Thomas L. Devitt, Bart., was re-elected chairman of the committee for the ensuing year. Sir John R. Luscombe was elected deputy-chairman and treasurer, and Sir Thomas J. Storey, K. B. E., was re-elected chairman of the sub-committees of classification.

Sir Thomas Devitt was first elected the chairman of the committee in October, 1909.

Upon the retirement of Sir Edward Cooper from the office of deputy chairman and treasurer, the committee passed a resolution recording their sense of the great ability and unremitting care and attention which he has devoted to the affairs of Lloyd's register during his tenure for the past two years of the office of deputy chairman and treasurer.

At the same meeting the Rt. Hon. Lord Inchcape and Sir James Hills, K. C. M. G., were re-elected, and Sir Kenneth S. Anderson, Bart., K. C. M. G., and Lieutenant-Commander August B. T. Cayzer, R. N. (chairman of the Clan Line), were elected members of the committee.

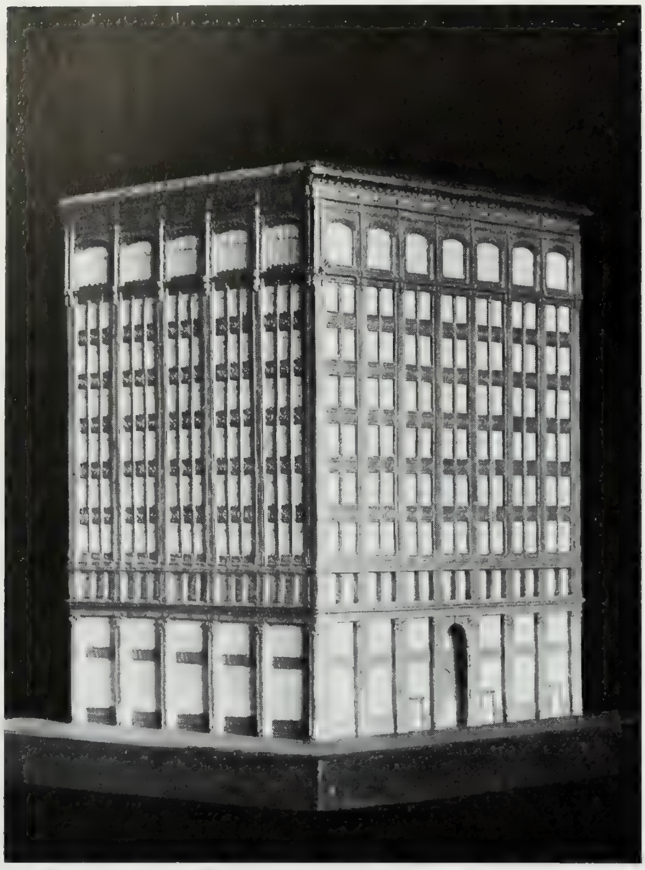
PACIFIC MARINE REVIEW FIFTEEN YEARS AGO

Pacific Marine Review for July, 1904, contained a total of twenty-one pages editorial matter, and five pages of advertisements, but that this husky infant was even then attracting attention far beyond the confines of its local sphere is evidenced by the following notice which appeared in the Shipping World of London, June 15, 1904:

"In the first number of the Pacific Marine Review, which has lately appeared in Seattle, Washington, there are a number of interesting articles which show originality and strength of purpose, besides some pretty pictures of local Pacific scenes. We wish good luck to the Review."

In August, 1904, the Merchant Marine Commission of Congress came to the Pacific Coast and hearings were held in Seattle, Tacoma and San Francisco. Many of the shrewdest shipping men of the Coast testified before this commission, among them Frank Waterhouse, James Rolph, Jr., and R. P. Schwerin. This was the beginning of the congressional investigations which, after long controversy, finally lapsed in the passage of the so-called La Follette Bill.

The Robert Dollar Company



The Robert Dollar building, corner of California and Battery streets, San Francisco, as it will appear when alterations now under way are completed

OUR illustration shows the Robert Dollar building at the corner of California and Battery streets as it will be after it is remodeled and improved with a five-story addition. The plans have been all arranged and the contract let for this work which is to cost $275,000. The existing street fronts will be removed and the outside of the entire structure remodeled in a combination of the Spanish Gothic and the Renaissance. As will be readily seen in the illustration, the street fronts contain an unusual amount of glass. The piers are very slender and are joined by thin-curtained walls. The walls of the court are constructed on the same style as those on the street sides and the offices and lofts will be unusually well lighted.

The lower stories are to be finished in matt-glazed terra cotta of sienna tint with ships of the Dollar line and various marine symbols modeled in low relief as decorations.

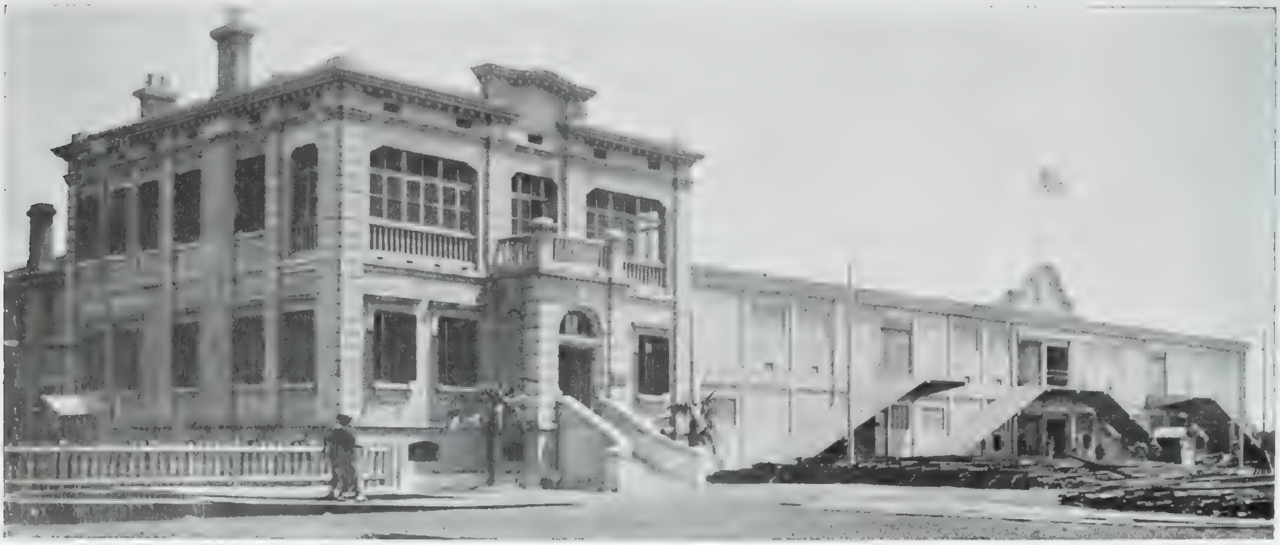
The upper stories of the building will be finished in cast stone, giving it a peculiarly graceful appearance.

High-speed direct-drive tractor elevators will be installed, practically identical with those used in the Woolworth building and others of the latest sky scrapers of lower New York. The interior will be finished in lofts to suit tenants. The structure as altered was designed by Charles W. McCall, architect, and will be strictly class A throughout.

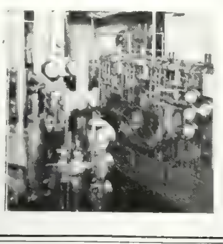
The Robert Dollar Company is preparing for a greatly enlarged Oriental trade. They have just made three purchases of vessels to augment their present fleet, and no doubt will be building or purchasing further ships. The John Ena purchased recently by this company is now en route with a cargo of grain for the United Kingdom, via the Panama Canal, while the Dunsyre, another late purchase, is bound for Sydney with case oil. These two vessels are well known sailing ships of the Pacific Coast. The latest purchase of the Dollar Company is the War Melody, a 10,800-ton freighter, powered with triple expansion engines capable of driving her from ten to eleven knots.

The company own their own terminal facilities at that port, have thirty acres at their terminal site, and 800 lineal feet of dock already constructed. At this terminal there is a reinforced godown or warehouse and office building, as shown in our illustration.

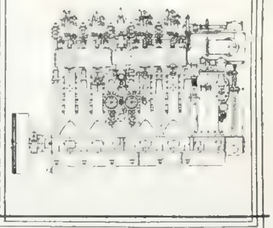
Quite recently the company purchased a block of land in the city of Shanghai containing three buildings with frontage of 136 feet.



Office building and warehouse at the Robert Dollar Company's Shanghai terminal



Oil Engine Review



Shipbuilding and Marine Motors in Great Britain

WHILE, on the whole, British shipowners are still inclined to adopt a waiting policy in regard to the question of the construction of motorships, the rapidly increasing price of bunker coal and the many reports received of the reliability and economy of the motorships now in operation are doing much to modify this attitude. In the meantime, the Glen Line continues its program of rapid construction of motor vessels, and it is understood that this company will build no more steamers, in view of the success which it has attained with its motor craft. It is signficant that Lord Pirrie, who is the controlling head of the Glen Line, and has thus shown his complete confidence in the marine oil engine, is also controller general of mercantile shipbuilding, and is one of the leading figures in shipping circles in Great Britain. It goes without saying, therefore, that in his attitude toward the future of the internal combustion engine ships, is having an important influence upon other shipowners in the country.

The latest addition to the fleet of Glen motorships is the Glenade, which has just been completed, and will make her maiden voyage next month. She is the sixth motorship to be built for this company, the others being the Glenamoy, the Glenartney, the Glengyle, the Glenavy, and the Glenapp, the last being the highest powered motorship afloat, with machinery of 6400 i. h. p. The Glenade, which is a standard type of 10,000-ton vessel built by Messrs. Harland & Wolff, is fitted with twin-screw, four-cycle machinery, constructed by the same firm, of about 3000 h. p., giving the vessel a speed of approximately 11½ to 12 knots. As is now becoming universal in European practice, all the auxiliary machinery is electrically operated, including the steering gear, winches, etc., Diesel-driven generators being installed in the engine room for the provision of the necessary current. Although when this system was first adopted there were some objections raised, owing to the feeling that it would prove less reliable than steam-driven plant, it has since been shown that the economy is much greater, while the reliability is at least as good as with steam-driven auxiliaries.

Some much larger vessels are now on order with the same firm, these having a deadweight carrying capacity of 13,000 tons, being fitted with twin-screw machinery of 6500 i. h. p. It is understood that at least one of these ships will be a triple-screw vessel, having a total engine power of 10,000 i. h. p., giving a speed at sea of 14 knots. Although the extra cost involved to attain the higher speed is somewhat considerable, it is the opinion of many shipowners that cargo vessels will, in the future, have to maintain a higher speed than in the past. Incidentally, however, it may be mentioned that the East Asiatic Company is having some 13,000-ton deadweight carrying capacity vessels constructed in Copenhagen, in which two engines developing a total of only 4500 i. h. p. at 115 r. p. m. are to be installed, with which it is anticipated a speed of about 11 knots will be possible. It will probably interest American shipowners to know that a twin-screw plant of exactly this type is being built by Burmeister & Wain at Copenhagen for a large motorship now being constructed in the United States to the order of the United States Shipping Board.

There appears to be considerable faith in the motorship shipowners in the colonies, for the Australian government has been operating such vessels for some time, while the Union Steamship Company of New Zealand has now placed an order in Great Britain for a motorship of about 10,000 tons, to be fitted with Diesel machinery of 3500 h. p. on twin-screws. This plant is being built by the North British Diesel Engine Works, Ltd., at their Glasgow factory, which has been specially laid out for the construction of Diesel engines on a large and standardized scale.

Messrs. Vickers, who have hitherto confined their attention in oil engine construction mainly to the manufacture of submarine Diesel motors, are now building engines for mercantile ships, and an order has recently been placed with them for an oil tank vessel by the Anglo-American Oil Company, in which two Vickers motors of about 1500 h. p. each are to be installed. These engines are of special interest, in that they adopt the same system of injection of fuel as is employed on the Vickers submarine engine by which the oil is pumped directly into the working cylinders without the necessity of highly-compressed air for its injection.

Another order that is now in course of execution is for a large cargo ship with Messrs. William Doxford & Sons, Ltd. This is to be a single screw ship, which is very unusual with motor vessels, and is to be fitted with a 3000-h. p. engine of the Doxford opposed-piston type, developing its power in four cylinders at about 110 r. p. m. This experiment is being watched with considerable interest by shipowners and engineers, not only because of the high power which is developed per cylinder (750 h. p.), but also because, if successful, it is anticipated that the engine will be standardized and installed largely into ordinary tramp vessels, as the design is such that it can readily replace the steam machinery of existing single-screw ships of this class. The engine has the additional point of interest that, like the Vickers motors, it employs solid injection of fuel, while, owing to its special design, the compression within the cylinders does not rise above 360 pounds a square inch.

Electric Marine Equipment as Applied to Motorships

By G. E. Swett

IT is a very pertinent fact that all foreign motorships of whatever tonnage are equipped with electric auxiliaries, and a little investigation into the cost of operation and the earning capacity of these vessels should convince the most skeptical that the future cargo-carrying vessels of the nation that will dominate the commerce of the seas will be propelled by full Diesel-type oil-burning engines and their auxiliaries driven by electric power.

England has not less than sixty motorships of approximately 10,000 tons' capacity under construction at the present time, and it cannot be stated with any degree of accuracy that England does not generally look ahead into the future where her commerce is concerned. Other large orders have been placed in Holland and Denmark. Australia, notwithstanding that she has no oil resources within her boundaries, is building motorships here on the Pacific Coast equipped with American-made full Diesel engines and American-made electric auxiliaries to be operated between San Francisco and Sydney, knowing full well that the economy of these engines and auxiliaries will permit carrying sufficient fuel for the round trip and taking on supplies in the most favorable market. A recent trial run of one of these motorships has confirmed the excellent judgment of her operators.

Economy of operation and dispatch in handling cargo are the two impelling factors that favor the adoption of electric winches and other electric auxiliaries, not to mention the simplicity, reliability and mechancal strength of properly designed electric deck machinery.

The general layout of the electric equipment of the modern motorship is to install electric dynamos directly connected to oil-burning engines, as the size of the vessel may warrant these engines using the same grade of fuel as the main propelling engines and being of sufficient size to handle maximum load conditions without overloading. Usually there are main and auxiliary units—the main approximately twice the size of the auxiliary—the main unit handling all deck and some engine room equipment while in port, and the smaller unit all engine room equipment, lighting and wireless while at sea.

All dynamos are connected to a distributing switchboard containing proper indicating instruments, switching and protective devices and placed in an easily accessible position to the operators.

All wiring between the switchboard and load points is installed in metal conduit and sealed to prevent entrance of moisture.

All motors in the engine room are usually semi-enclosed as protection against splashing of water, oil, etc., and of constant speed type.

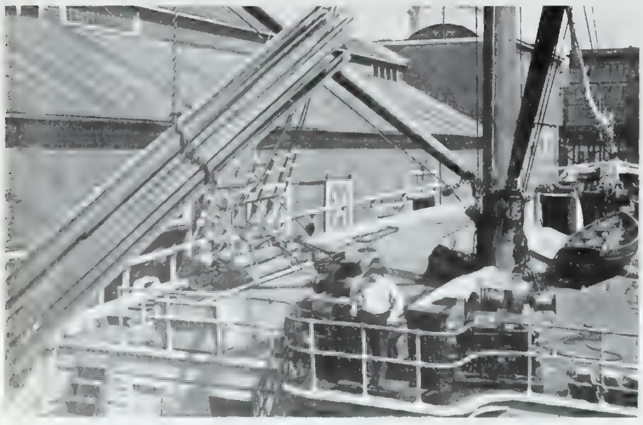
Steering gear motor is also semi-enclosed unless there is good reason for sealing it. The main current of the steering gear motor is controlled by a reversing contactor panel operated from the bridge so that only a control circuit is carried to the pilot house telemotor. On the face of the telemotor is a dial graduated to 35-degree angle each side of the amidship position of the rudder and at each graduation is a telltale lamp and jewel which corresponds to a segment on the tiller in the after port of the vessel. Hand control of the steering gear is also provided according to regulations.

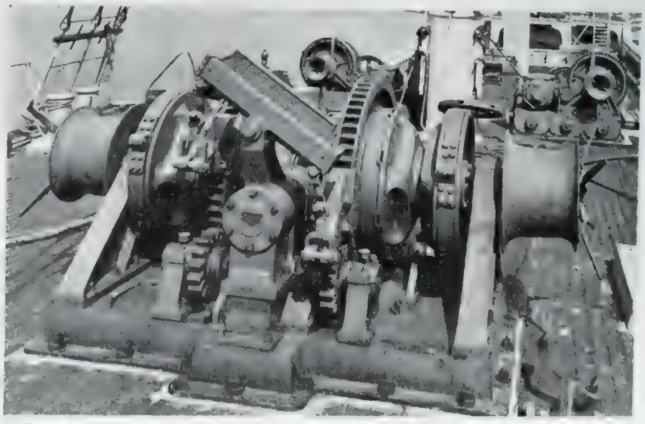
Electric winches are single drum, single geared, with watertight motors and holding brakes. Resistors which control the speeds of the motors are carried in a watertight housing as well as two controllers. Two winches per hatch is the usual installation, with two double geared winches at one hatch if heavy lifts have to be handled.

The best practice provides that one operator handles two winches, the same as steam practice on the Pacific Coast, the controllers being placed in such a position that the winch driver can look down into the hold and see the draft at all times. The control is a great feature of this type of electric winch and one only has to see it in operation to appreciate the improvement over steam.

The operator has absolute control of the draft at all times. If the electric current fails, the holding brake, which is automatic and only used for holding purposes, will operate and the load will not drop.

The brake also functions when the controller handle is moved to the "off" position. On account of the simplicity of control, old steam winch drivers pick up the "electric way" after a few minutes' practice. The motor will automatically speed up with light load and slow down with heavier load so that the all-day efficiency is much higher than a steam winch of the same nominal capacity.


Looking forward from the bridge deck, showing two electric cargo winches with "one-man control"


Looking aft from the bow, showing electric anchor windlass, and electric cargo winches

The Diesel-Powered Ship for the World Trade

IT is with sincere pleasure that we read in the papers statements from officials of the United States Shipping Board announcing their decision to build a number of vessels to be fitted with Diesel engines. To those who have followed the operation of the real motorship, and who are familiar with the operation and performances of its wonderful engines, there no longer remains a shadow of a doubt regarding the mechanical and commercial success of this modern marine machinery.

The writer wishes to emphasize the word **"real"** motorship, as we have seen a number of so-called motorships which have been anything but a success, the adoption of which has resulted in very sad experiences for those who unfortunately ventured to invest their money in them.

Captain Nils Ths. Stangebye of the motorship Borgland

Chief Engineer A. G. T. Eggen of the motorship Borgland

It is the Diesel-powered ship we shall have to use in our fight for the world trade, as it has proved itself so much superior to our everyday steamers, even those of the most modern type.

After our soldiers have been brought home, and the most urgent part of the necessary reconstruction work is completed, we shall find that freight rates for vessels in the foreign trade will be brought down to a figure which will permit of employing only those ships which can be operated for the same figure as that for which the foreign shipowner operates his ships.

This, then, will mean that the motorship which carries a small crew, and whose fuel consumption and other expenses are reduced to a minimum, will be able to operate in the foreign trade and pay a nominal interest on the money invested when our more expensive steamships are running behind every trip.

The subject of Diesel engines and their performances as shown every day has received so much publicity of late that further comment would seem almost superfluous, yet it seems that a number of our shipowners and shipbuilders are standing back as if afraid to venture.

What is there to be afraid of?

Has not the motorship proved itself?

Have we not seen it travel all over the world discharging and loading large cargoes at every port without the slightest mishap?

Are not the operating expenses cut to 40 per cent of that of the average steam vessel?

Is it not true that the steaming radius has been increased 300 per cent for the same bunker capacity, thus obviating the necessity of calling at out-of-the-way places for fuel? (It is often necessary for the steamer to travel hundreds of miles out of the proper course to replenish the bunkers, thus causing many days' delay in the voyage and much added expense.)

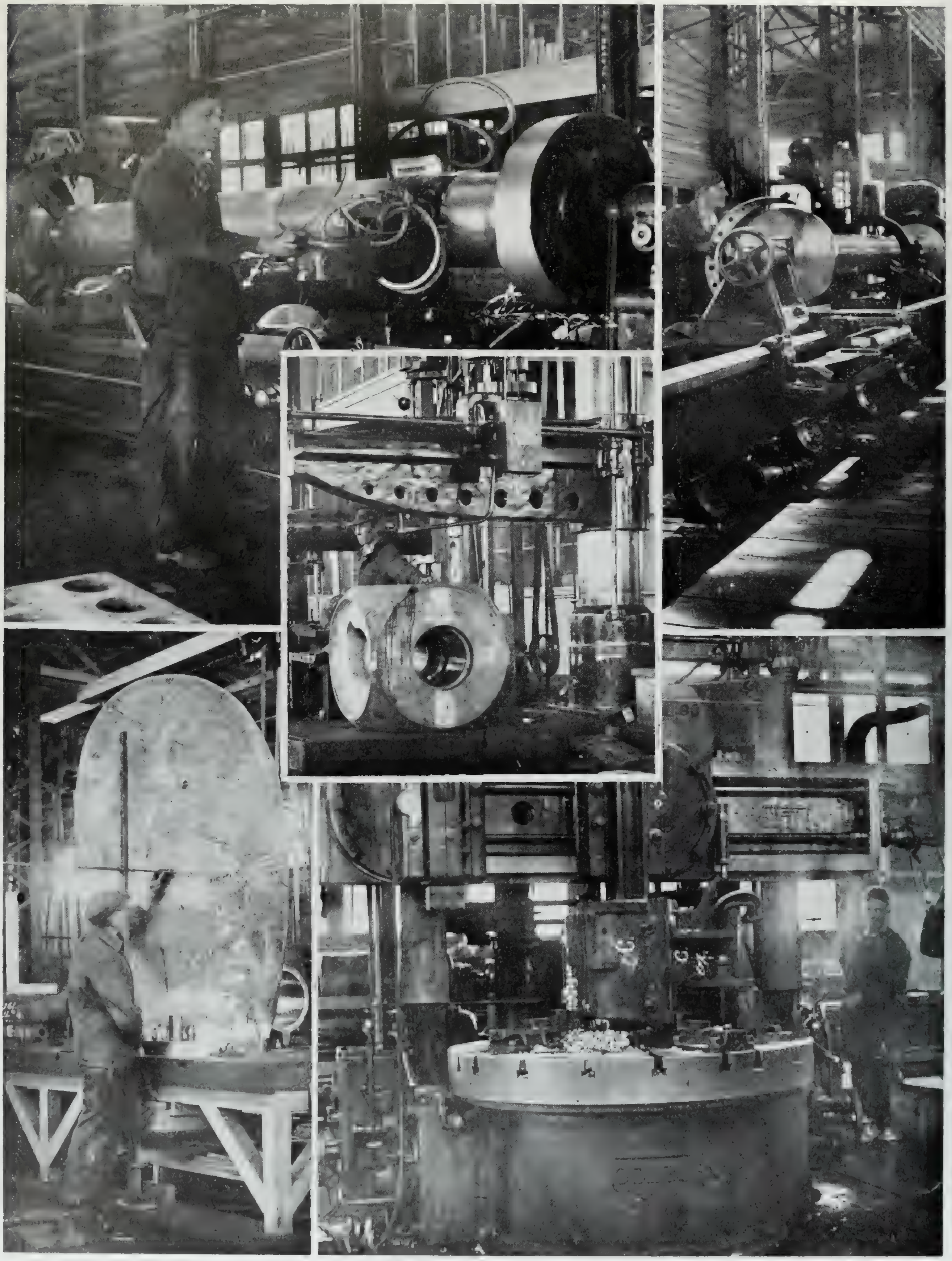
Is it not true that with the motorship lying at berth loading or discharging, an oil barge comes alongside, attaches a hose to the shipside, starts its pumps, and thus the bunkering of the motorship takes place unnoticed by anyone except the ship's crew, and with no delay to the ship?

Many things could be said along these lines regarding the successful motorship of today, and we have to bow our heads with shame and admit that the clever and enterprising American engineers and shipowners have overlooked a bet; as all the vessels above referred to fly some foreign flag.

It was but right that while the war was on we should not start to build anything new, or in short do anything which would tend to retard our progress in shipbuilding, as the thing which we most urgently needed was ships. The war emergency is now over, and our attention should be centered

(Continued on Page 163)

Tools in Machine Shop of Union Construction Co.



Upper left: Forty-two-inch by thirty-eight-foot geared head American lathe taking a roughing cut on line shafting. Depth of cut 1¼ inches, feed ⅜ inch at 70 feet a minute. Upper right: Miqueing finish cut on flange of tail shaft. Thirty-six-inch by forty-eight-foot Pond lathe. Center: One of the heavy radial drills drilling holes for studs in propeller hub. Lower left: Gauging the pitch on bronze propeller blade. Lower right: Sixty-inch Colburn vertical boring mill with two swivel heads, four 10-inch special face plate jaws and constant speed motor drive

PACIFIC MACHINERY

Gear Generating—A Specialty

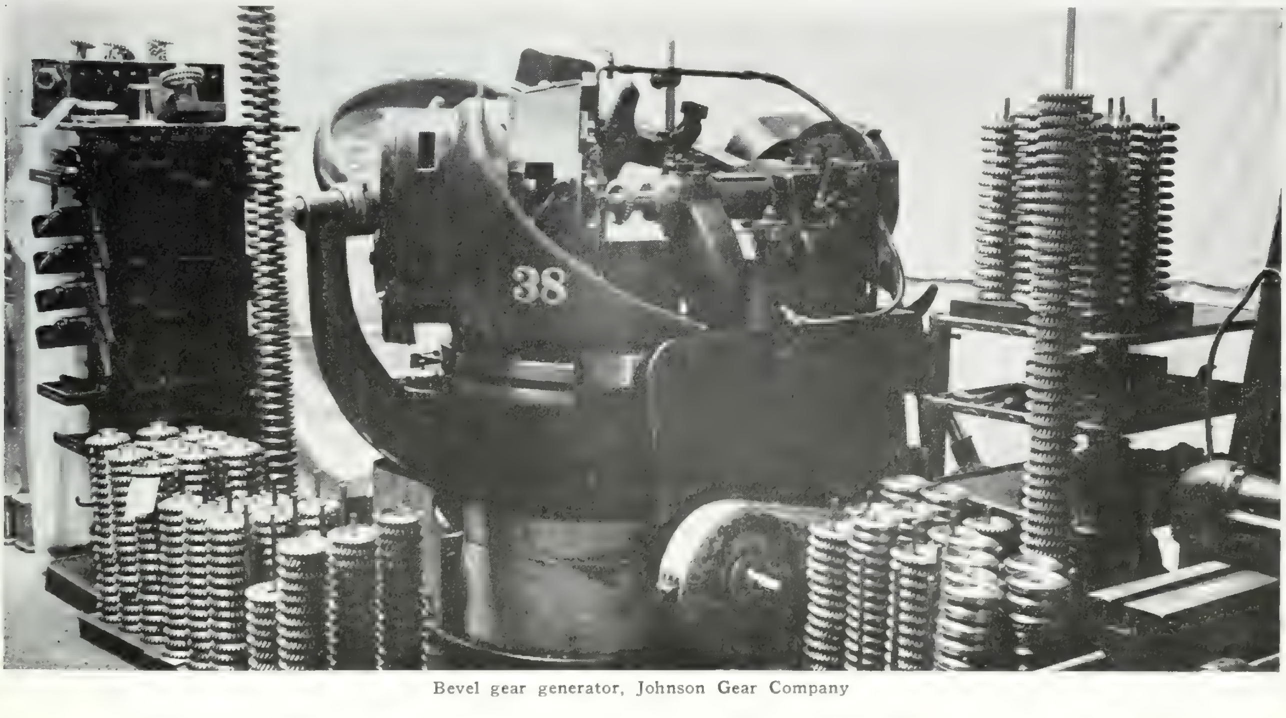
By Albert E. Jurs

THERE has often been expressed the old and all too true saying that "when it comes to specialties, leave it to the specialist," but it is surprising to know that some of the most vital specialties are overlooked, and through being classed among the commonplace both the maker and the product suffer. In this article we treat with an industrial specialty, the gear, which is as important as any.

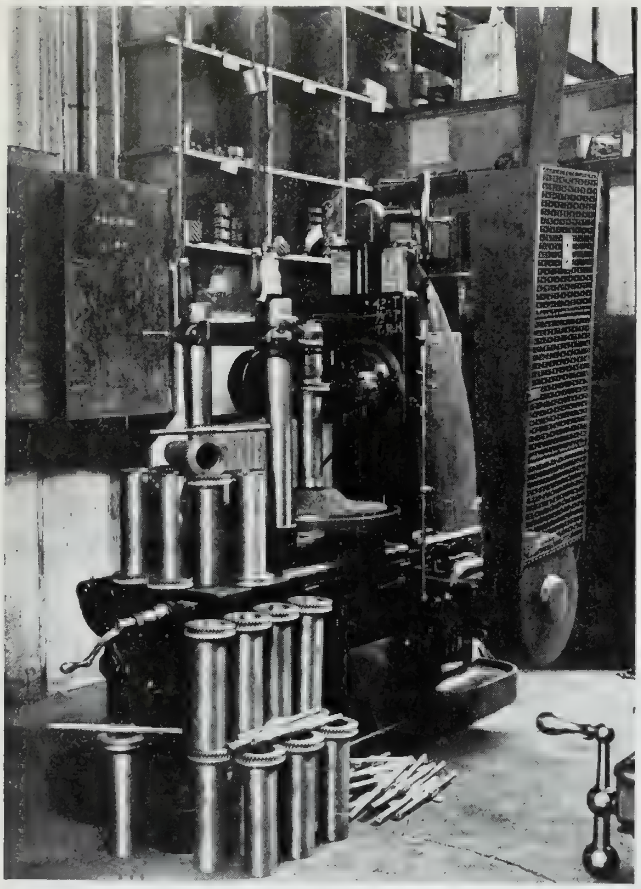
The vitals of the truck, the engine, the hoist, the reduction gear and practically every mechanical movement are dependent upon gearing in some form. Some require the best that can possibly be produced, others are not so important, but the relative quality of the finished unit should be taken into consideration in determining the quality of its vitals. Then allow a sufficient amount of time, to warrant the best efforts of the maker, and the constant fear of an irregular product will be eliminated.

The efficiency of gearing is rapidly approaching perfection, as demonstrated by its performances in the automotive industry, but efficiency is obtained only in proportion to its degree of accuracy in manufacture. The attempt to produce the highest degree of accuracy is responsible for the introduction of perfect generating equipment. When gears are made by process of generation they are formed with profiles truly involute and each tooth form correct for that particular number of teeth and pressure angle. When properly made such gears will run noiselessly with any other gear of a like pitch of any number of teeth. Needless to say, bevels when generated or otherwise cut will only operate against mates of such ratio that the apex of pitch cone angle of gear and mate converge at a common point. Rotary cutters are made with a range of cutting ability to produce only partly true profiles of gears within that range. Eight cutters are considered a set for each pitch, cutting anything from twelve teeth to a race and each cutter is most nearly perfect for lowest number of teeth within its range. Does it not stand to reason that since the true involute profile changes for each change in the number of teeth that it is preposterous in this age of enlightenment and development to imagine that a range of profiles from twelve teeth to infinity can be cut with eight cutters only.

It is this advancement in modern engineering practice that sooner or later will compel you to install parts made more perfect in the most advanced manner. A still further step, to the helical curved tooth face, is being now recognized as more nearly approaching perfection in smoothness of op-



Bevel gear generator, Johnson Gear Company eration and continuous flow of power without vibration. The helical cut spur gear when generated properly some day is going to replace the straight spur. There are innumerable instances where spur gears are mounted on short centers, where numbers of teeth in proportion to diameter are few, where smoothness of action and vibrationless flow of power are essential, that the installation of helical cut gears has more than satisfied every demand. It is possible to produce gears of this description so perfect that it would be impossible to detect its operation by other means than witnessing its motion.


Vertical type of hobbing equipment for generating spur and worm gearing at the Johnson Gear Company

The problems of gearing in general are as the sands of the sea in number, each a distinct problem of its own. To properly criticise, design and think out these gear problems from every governing or operating angle is truly the work of a specialist. There are innumerable conditions which the average layman considers either unimportant or probably does not think of at all. The questions of probable further limitations of size by the use of an alloy steel of quality, and further by adding a heat treatment, the questions of wearing qualities of material, a consideration of greater importance than strength, for when satisfactory to resist reasonable wear a gear tooth is usually amply strong; these and other questions, including type of tooth, preferable pressure angle and many things seldom thought of, all combine to designate gears, gear making, and gear designing a specialty of the first magnitude. Call it an experiment if you choose, be skeptical of the results, but some time when you have a real nut to crack—one that you think is too strong even for Mr. Gear Specialist—bring it in and let us see if there isn't some truth in specializing on gears as well as many other things.

PROPOSED PORT IMPROVEMENTS AT OPORTO AND LEIXOES

Plans for the improvement of the facilities of the ports of Oporto and Leixoes (the seaport for Oporto, located about seven miles from that city), which were suspended on account of the war, are again being discussed, and it is probable that definite action will soon be taken in the matter. These plans comprise the construction of docks and warehouses and the enlargement and improvement of the port of Leixoes, besides the construction of quays, warehouses and other buildings, and the installation of cranes, etc., along the River Duoro at Oporto.

Bids will be asked for this work. It is not yet known whether public advertisement will be made for these, or whether private invitations will be given to construction companies to submit bids. There is every reason to believe that bids from American firms would be favorably considered, and there should be a good opportunity for American contractors to secure this contract.

Fellows equipment generating spur gears, Johnson Gear Company

Moore's Scotch Boiler Shop

THAT "necessity is the mother of invention" has never been more clearly demonstrated than during the war period, and especially so in the shipyards. The Moore Shipbuilding Company at Oakland, like other shipbuilders in the United States, actuated by the enormous and insistent demands for ships, and still more ships, got rapidly under way, and began to launch ships at a pace that startled the world.

The problem then of supplying the hulls with boilers grew to be an alarming one. To build ships four or five times faster than in normal times meant that boilers would have to be constructed at a corresponding speed.

Just how the Moore Company's Scotch boiler shop rose to the occasion and kept not only their own ships supplied with boilers, but also those of two other large shipyards, would take more space to tell than can be spared here, so reference will be made only to the most prominent methods used to bring about this fifty years' advancement in boilermaking in a little more than six months. Joe King, widely known in Pacific Coast boilermaking circles, was entrusted with the Herculean task of building a boiler shop and supplying the demands created by the war with Germany.

As has been said of other shipbuilders, King has also that happy faculty of co-operating with those under him, to the extent that they are not working for him, but with him. This fact, taken in conjunction with his own natural ability along boilermaking lines, has been productive of suggestions and hints that have been responsible to a large extent for the efficient clockwork system now in vogue in the Moore boiler shop.

The first Scotch boiler was started in January of this year, and to date there have been sixty-six boilers completed, tested and accepted. This means an average of ten Scotch boilers a month. It is true that other boiler shops have a larger output per month, but when consideration is given to the number of men employed and other incidentals, which will be touched on subsequently, serious consideration will have to be given to the claim of President George A. Armes of the Moore Shipbuilding Company for premier boilermaking honors.

The average number of men employed in the Moore boiler shop is 425. Everything in connection with the construction of boilers, including the upsetting of stay rods, tubes and braces, and also all machine work, is done in the boiler shop. Then, again, there is no outside assistance in the manufacture of ventilators, emergency oil and lubricating tanks, derrick posts; fresh water, sanitary feed and filter tanks; uptakes and forced draft systems. All these and other work which is outside of boiler jurisdiction entirely, such as the construction of masts, smoke stacks, the shaping and bending of keel, oxter and boss plates, are performed in the Moore boiler shop.

In the Moore boiler shop a boiler is never riveted that has not first been entirely dismantled and all burrs and ragged edges scraped. Quality is the first consideration and is never sacrificed to speed. Were this not done—and it is by no means a common boiler-shop practice—the monthly output could be considerably augmented. This care for details and workman-like finish has won for Moore's boilers the highest rating from Lloyds, the United States Shipping Board, the American Bureau of Shipping and the United States inspectors of hulls and boilers.

Following are a few of the most important improvements in boiler-shop practice inaugurated by King and his associates in the Moore Company's boiler shop:

Flue and flange sheet bending for combustion chambers done in two heats, where formerly six heats were required. Specially designed dies were made for this purpose.

Scarphing of all plates is done by steam hammer, replacing the commonly used sledge hammer. Five times as much work is accomplished by this method.

Boiler legs are stamped out in one heat by specially designed dies. This operation formerly required four heats.

All rivet holes on flanges for back and front boiler heads are drilled on the floor from jigs before being placed on the boiler. This work is done by specially designed drilling rigs, two men drilling one head (including straight connecting seam) in six hours.

All Moore boilers are flush riveted on inside of the combustion chambers. By means of a specially designed machine, one head is countersunk in less than thirty minutes.

The oil furnaces used for flanging front and back heads are so constructed that the heating and flanging processes go on simultaneously. One part is in the fire while the other end is being flanged.

The equipment for filling and testing the boilers is an important feature of the boiler shop. Six boilers can be filled at one time by means of powerful pumps and tested simultaneously at a pressure of 315 pounds to the square inch. The general rule, however, is to test three boilers together. It seldom takes inspectors of classification societies and United States government inspectors more than half an hour to inspect three boilers, from the time of applying pressure to accepting the boilers.

Boiler heads (flue and stayholes) are drilled six at one time.

Butt straps are drilled six at one time.

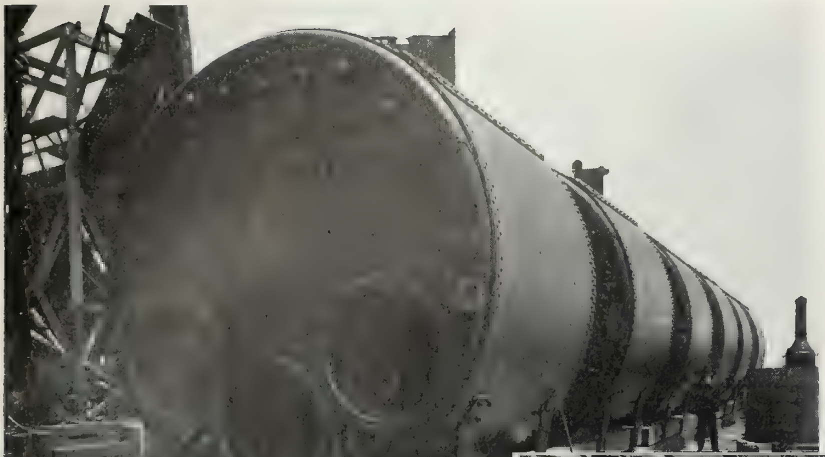
Shell plates are drilled three at one time.

Everything in the way of laying off work and drilling is done by means of jigs. The work is grouped so that a certain number of men are doing only one particular part of the boiler all the time and they soon become experts in the manufacture of that part.

A novel checking system has been perfected in the Moore boiler shop, which is a decided improvement over other methods. All the work done is tabulated in such a way that it is impossible to do too much work on some particular part of a boiler that is not immediately required, at the expense of something to be used sooner. A glance at this record tells the whole story, and if some groups of workmen are not holding up their end of the work the record will show it immediately. Thus, the manufacturing and actual erecting of the boilers proceeds in perfect harmony.

(Section continued on Page 165)

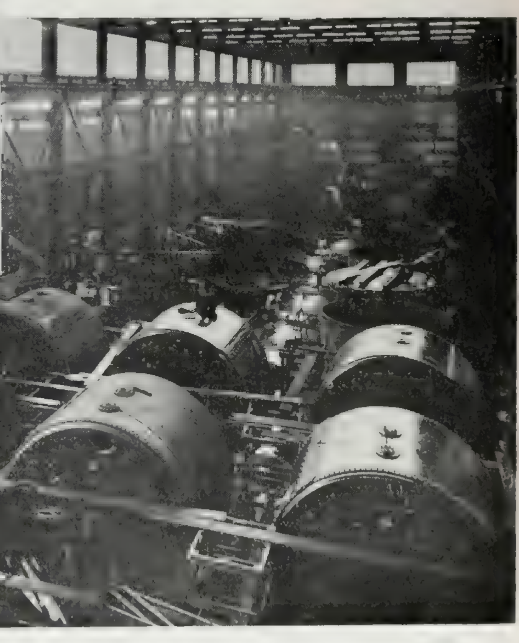
The Scotch Boiler Shop of the Moore Shipbuilding Company



Six Scotch boilers loaded on Crowley barge, showing method of fastening boilers to barge

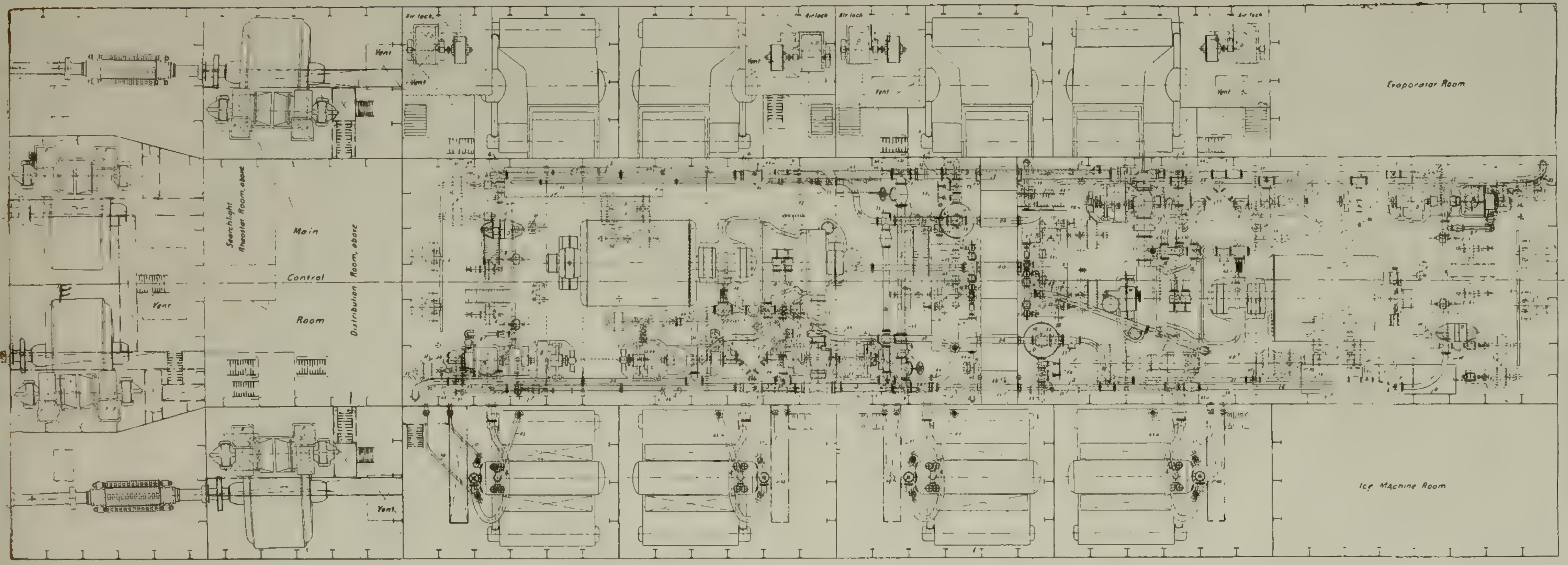
View of erecting bay in boiler shop, showing boilers under construction on the floor

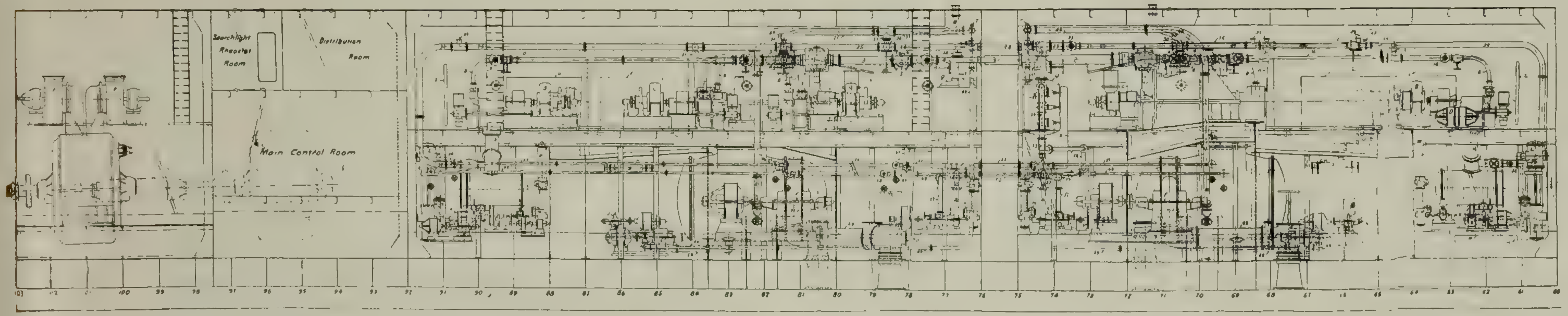
Boilers on flat cars awaiting shipment



Closeup of six boilers almost complete at one end of erecting bay.

Arrangement and Pipe Plan Propulsion Equipment of U. S. S. California





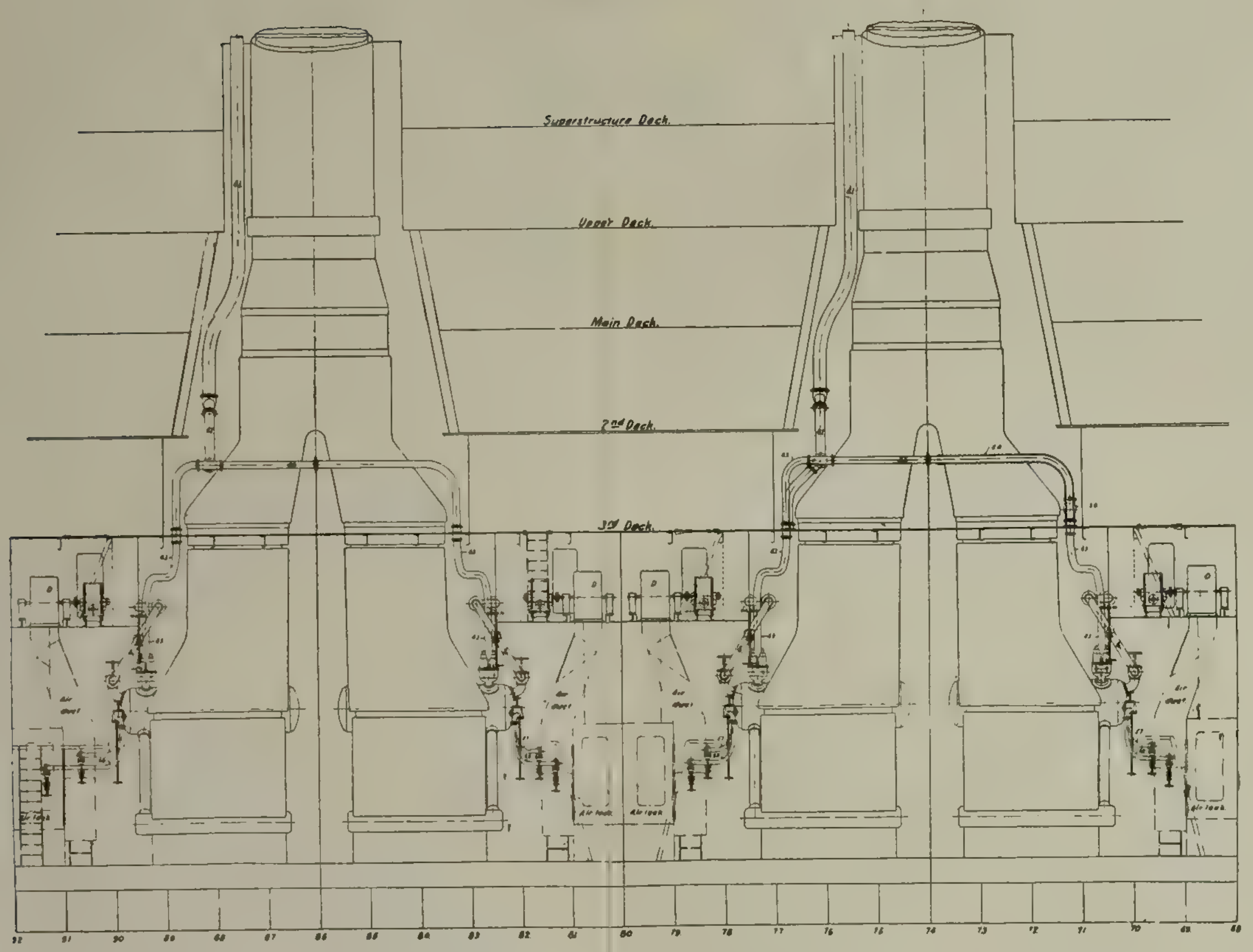
P I P E L I S T.

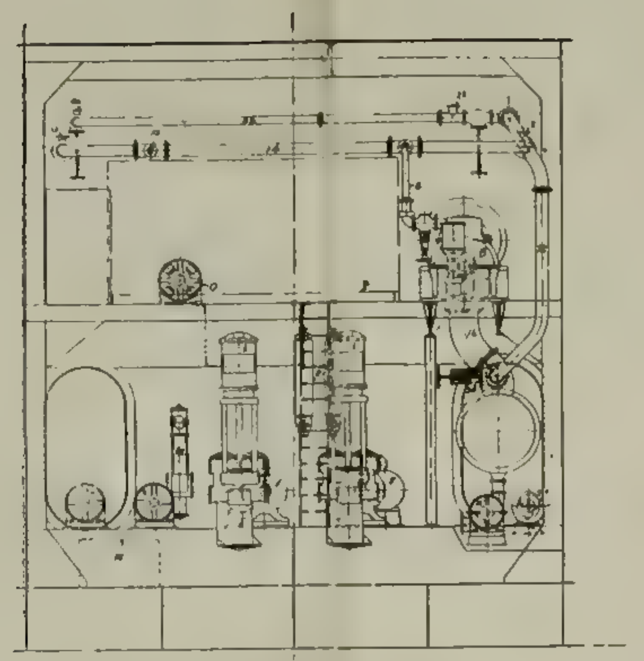
No	Dia	Purpose
1	16	Main steam to turbine
2	12	Port only
3	10	
4	7	branches from boilers
5	10	cross connection, after engine room
6		Steam to main feed and reserve feed pumps, after engine room, Starb only
7		ford
8	4	generators, condensing and non condensing
9		forced draft blowers
10		fuel oil service, fuel oil booster and fire & bilge pumps
11		whistle, ford engine room
12		evaporators, Port only
13		ice machines Starb only
14	7	loop in ford engine room
15	4	after
16	18	Exhaust from condensing generators
17	8	non condensing generators
18	8	to main turbines or
19	8	condensers
20	8	atmosphere, ford engine room
21	8	after
22	10	Auxiliary exhaust after engine room, Port only
23	9	ford Starb
24	8½	after
25	8	
26	7	after engine room Port only
27	6	ford Starb
28	5	
29	5	loop ford engine room
30	8	to main turbines
31	8	condensers
32	8	out
33		from main feed and reserve feed pumps
34		fuel oil service, fuel oil booster and fire & bilge pumps
35		forced draft blowers
36	8	cross connection after engine room
37	8	to atmosphere
38	"	feed water heaters
39		from evaporators Port only
40		ice machines Starb only
41	12	Escape pipe
42	9	
43	7	
44	8	from ford Port boiler combined with pipe No [illegible]
45	8	Air ejector suction from main condenser
46	6½	discharge to air separating tank
47	4½	
48	8	Main hotwell pump suction from main condenser
49	5	discharge to air separating tank
50	10	Feed tank cross connection
51	6	Main feed pump suction from feed tank
52	5	discharge
53	7	to feed water heater combined
54	7	from feed water heater combined
55	4½	ford engine room discharge to Starb boilers
56	4	
57	2½	
58	5	Port
59	4½	
60	4	
61	2½	
62	4½	after engine room discharge to Port boilers
63	4	
64	2½	
65	5	Starb
66	4½	
67	4	
68	2½	
69	26	Main circulating pump suction from sea
70	15½	bilge
71	28	discharge to condenser
72	28	overboard

Sections U. S. S. California Showing Arrangement of Propulsion Equipment

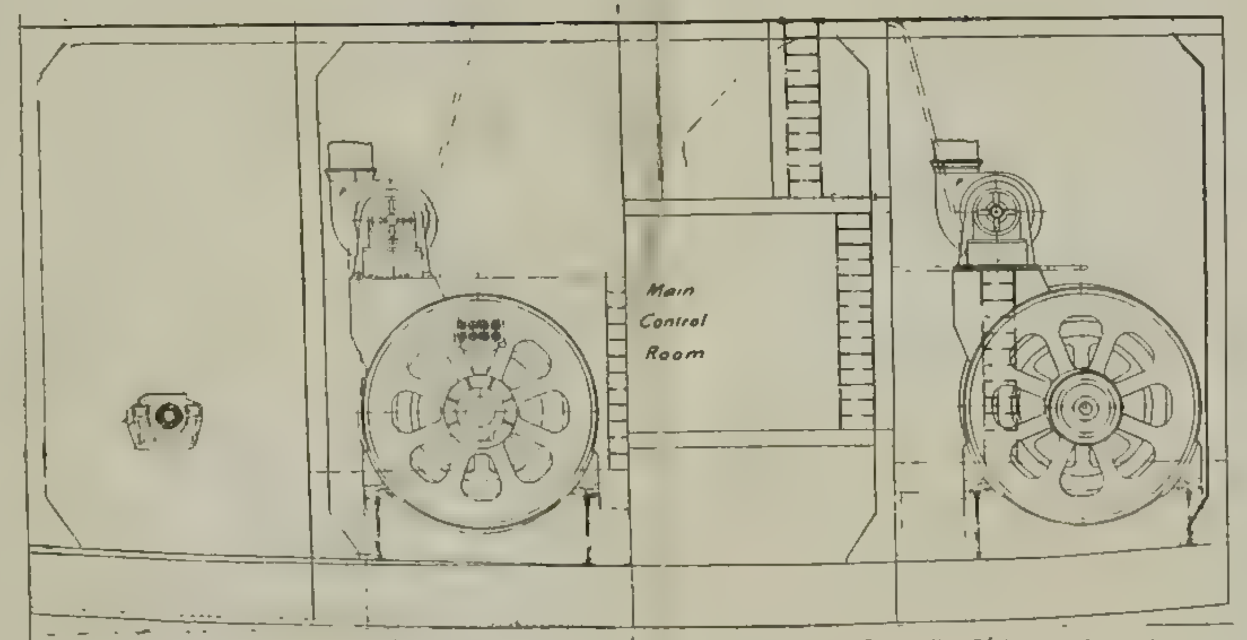
LIST OF AUXILIARIES

A. Main feed pumps
B. Generators, condensing
C. Generators, non condensing
D. Forced draft blowers
E. Fuel oil service pumps
F. Main circulating pumps
G. Main hotwell pumps
H. Auxiliary circulating pumps
I. Auxiliary hotwell pumps
J. Oil cooler circulating pumps
K. Forced lubrication pumps
L. Fire and bilge pumps
M. Fuel oil booster pumps
N. Reserve feed water pumps
O. Booster
P. Blowers for main motors
Q. Feed water heaters
R. Fuel oil heaters
S. Oil coolers, forced lubrication
T. Air ejectors
U. Lubricating oil settling tanks
V. Lubricating oil treating tanks
W. Lubricating oil drain tanks
X. Main feed tanks
Y. Air separating tanks
Z. Switchboards



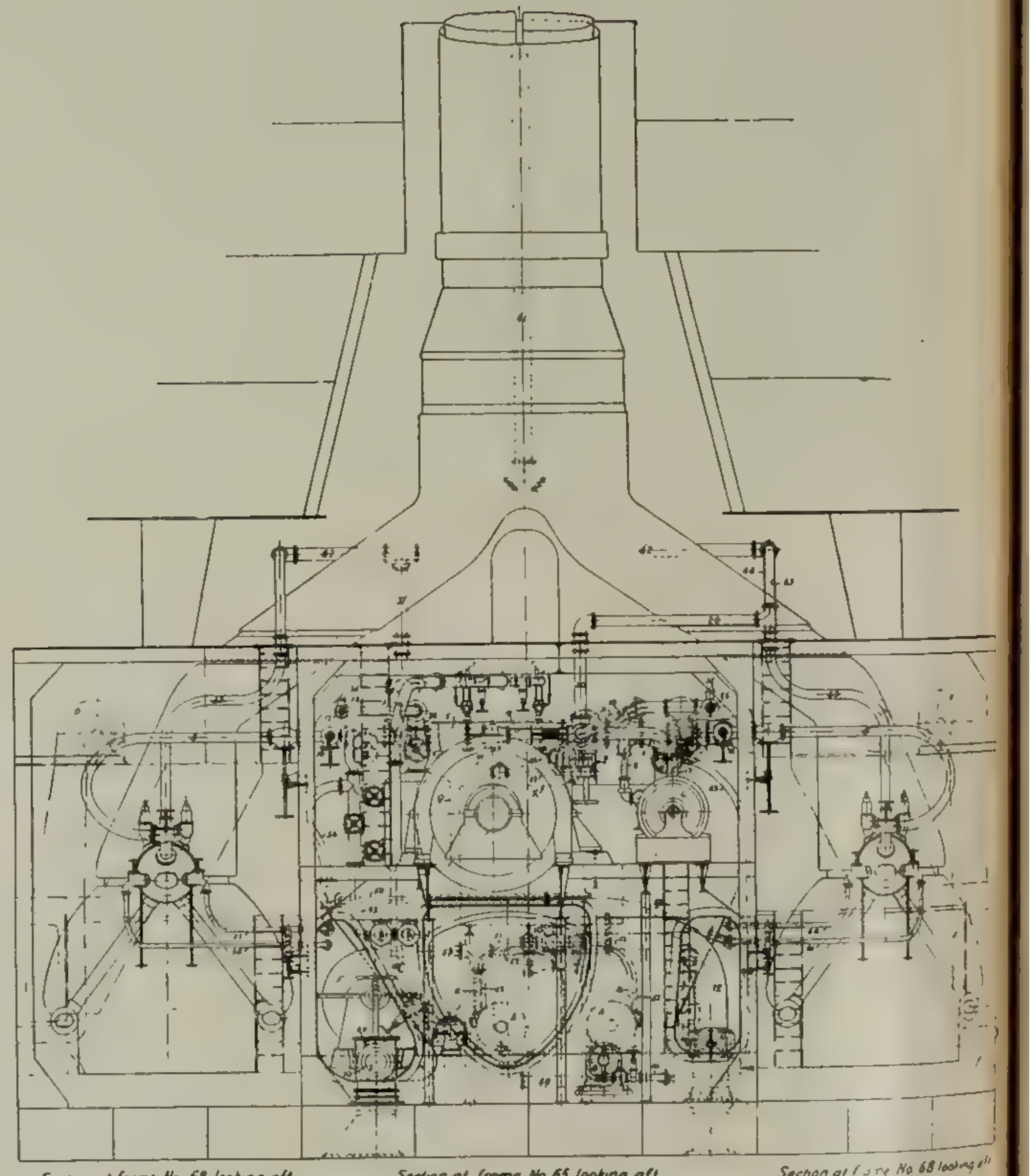


Section at frame No 60 looking aft to frame No. 65.



Half section at frame No 97½ looking aft.

Half section at frame No 97½ looking forward



Section at frame No. 68 looking aft.

Section at frame No. 65 looking aft

Section at frame No 68 looking aft

A General Description of the Electric Propulsion of the U. S. S. California

THIS machinery will consist of two turbo-generators, operating four motors, one connected with each line of shafting. The generators will run at about 2100 revolutions a minute at full power, and the motors at about 175 revolutions a minute. The motor stator windings will have a switch which can be thrown to give them either 24 or 36 poles, making the reduction between generator and motor 12 to 1 or 18 to 1. At speeds up to about 15 knots, one generator will be used to drive four motors, each on the 36-pole connection; from about 15 knots to 17½ knots, one generator will be used to drive four motors each on the 24-pole connection; from about 17½ knots to full speed, two generators will be used, each driving two motors on the 24-pole connection.

Boiler pressure by gauge (pounds)	280
Steam pressure by gauge at main turbines (pounds)	250
Revolutions per minute	175
Shaft horsepower	26,800

There will be two main condensers, one in each engine room. Each main condenser will have a cooling surface of about 11,501 square feet, measured on the outside of the tubes, the water passing through the tubes.

There will be a main circulating pump for each main condenser of the centrifugal type, motor driven, and having a capacity of 19,000 gallons a minute against a head of 30 feet. There will also be an independent air pump of the double vertical single-acting type, with two steam cylinders.

Each condenser will have a vacuum augmenter of the Parsons type, or equivalent.

There will be three 300-kilowatt direct-current generators in each engine room for ship's use and for engine room auxiliaries and excitation. One of these generators in each engine room will be non-condensing and arranged for exhaust into the main turbine, the main condenser or the atmosphere. The connection to the condenser will be through a valve controlled by the turbine governor in such a way that when main steam is shut off from the turbine, this valve will open and admit steam to the condenser. This valve is in addition to the spring relief valve fitted at the junction of the auxiliary and exciter exhaust, and therefore its operation will not affect the back pressure on the auxiliary and exciter exhaust. This valve also will be arranged so that it can be locked open by hand. The condensing units in each engine room will exhaust into a dynamo condenser. The dynamo condenser will connect with the after dynamos in the after engine room and the forward dynamo in the forward engine room. The cooling surface of the condenser and the arrangement of pumps will be such as will maintain an absolute pressure of two inches of mercury when the temperature of injection water is 60 degrees F. and when the dynamo and steam auxiliaries are in operation at their maximum output. Each dynamo condenser will be equipped with a motor-driven centrifugal circulating pump of a capacity of 2000 gallons a minute against a head of 20 feet. Each dynamo condenser will also be equipped with an independent air pump of the double vertical, single-acting type and a Parsons vacuum augmenter or equivalent.

There will be eight water-tube boilers, placed in eight water-tight compartments.

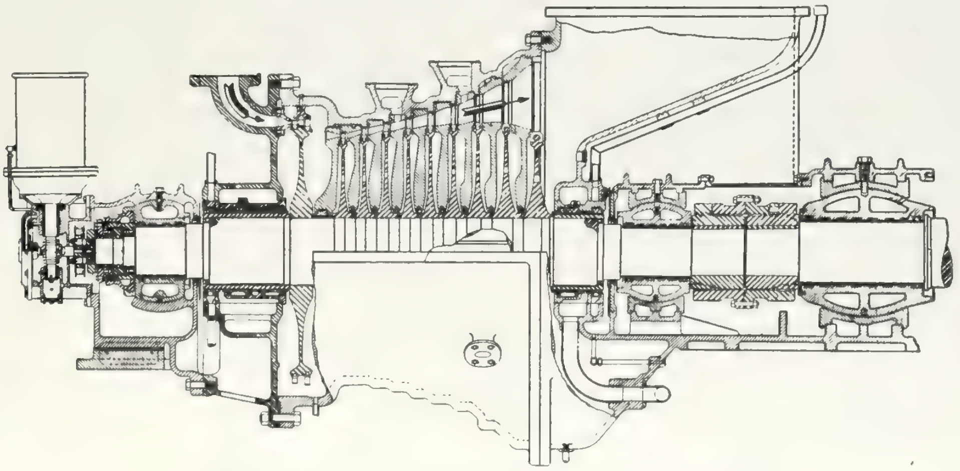
Total heating surface, approximately (square feet)	50,984

The propellers will be as follows:

Port propellers	Left hand
Starboard propellers	Right hand

Propelling Apparatus

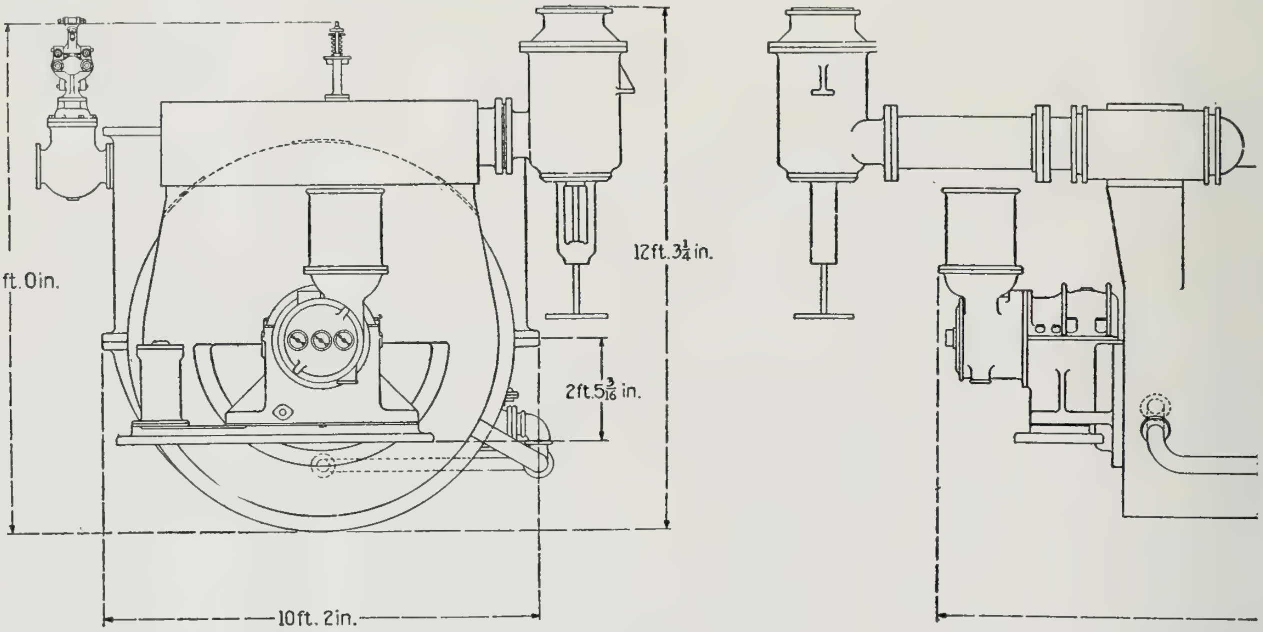
Method of Operation: Each of the turbines which drive the main generators will be equipped with a governor which operates the admission valves through a hydraulic mechanism. This governor will be so designed that by movement of a fulcrum connected to it, it can be made to hold any desired speed within the usual ranges of practical operation. The movement of this fulcrum will be accomplished from the operating stand and inter-locked with the movements of switches and of the generator field control. The motors will be wound in such a manner that by suitable changes of connections effected through groups of switches connected to their terminals, their windings can be arranged so as to give either 24 poles or 36 poles. Since the generators have two poles, the ratio of speed reduction is therefore either 12 to 1 or 18 to 1, the 24-pole arrangement being adapted to the high speeds of the vessel and the 36-pole arrangement to the lower range of speeds. When



Section of one of the two Main Turbines of U. S. S. California the vessel is operated at or near its maximum speed, the two generating units will be run on entirely separate circuits, each delivering current to the motors on its own side of the ship, so that the motors of either side may be stopped, started or reversed, without affecting the operation of the other side. When the ship operates at lower speeds one generator only is required.

The switches used in the processes of operation will be of the oil type and arranged in groups, each group being moved by a hand lever. The levers will be mounted in convenient positions so that the processes of operation can be quickly accomplished by one man. The switches will be designed to open heavy currents with high voltages, but the system of operation will be such that they will never be moved when the generators are energized. In connection with this switching structure and in convenient relation to the operating levers, two smaller levers will be provided for each generator, one of which will open and close the exciting circuit and change the degree of excitation and the other will be connected to the governing mechanism and control the steam admission of the turbine. The field levers will engage with the governor levers in such a manner that the movement of field lever to the off position carries the governor lever with it and so shuts off the steam. Interlocks will be provided by which none of the operating oil switches can be moved until the field lever is moved into the off position. The leads from the generators will approach the switching structure through double-throw, hand-operated switches. These switches will provide for connecting the generator for a higher or lower voltage or for opening its circuit altogether. The low-voltage connection will be used when the ship operates from one generator alone, and the high-voltage connection will be used when both generators are in operation.

In addition to these generator-disconnecting switches, another hand-operated switch will be provided by which either generator can be connected to the motors on both sides of the ship, and this switch will be mechanically interlocked with the generator-disconnecting switches in such manner that the generators can never be put in parallel and that the low-voltage connection must always be used with a single generator and the high-voltage connection when both generators are in operation.



Outline of main Turbo-Generator set—

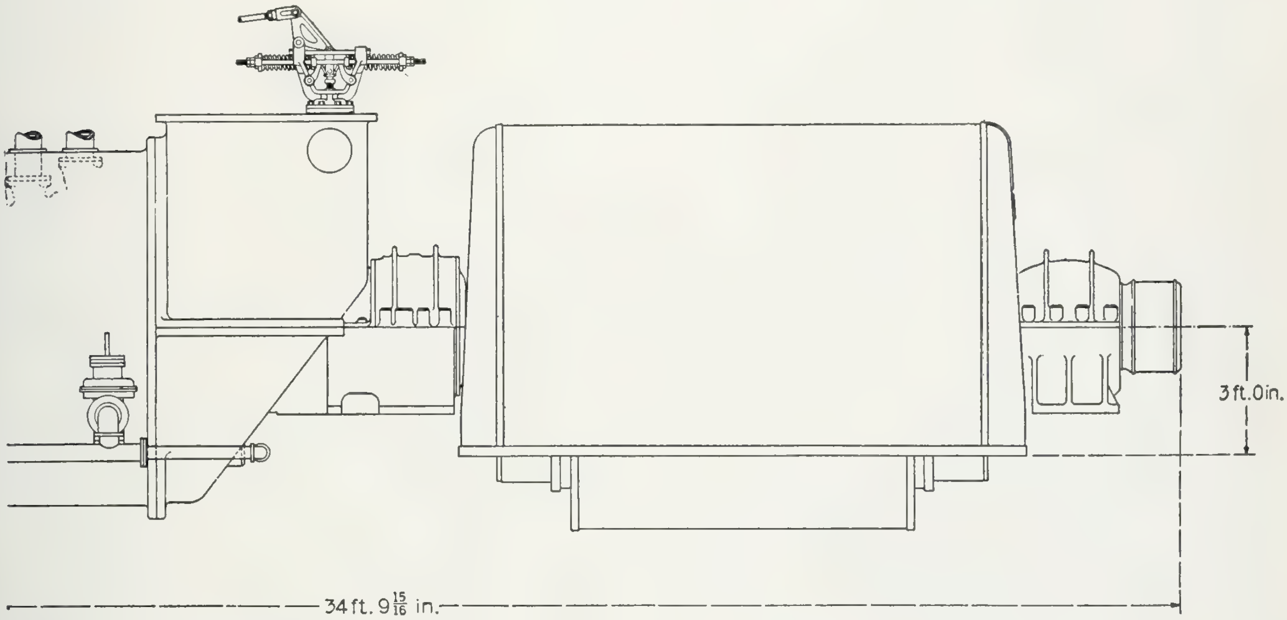
The primary leads from each motor will be connected to the switching structure above described through a group of hand-operated switches by which any motor can be entirely disconnected when desired.

The secondary of each motor will be connected through collector rings to a group of water-cooled resistances, and means will be provided by which each resistance can be short-circuited by a pair of oil switches mounted as a part of the operating structure. The connections of the motor secondaries will be such that the resistances are always neutral on the 24-pole connection, but are active unless short-circuited on the 36-pole connection. The leads from both motor primaries on each side of the ship will run to a group of pole-changing switches in the operating structures and this group will change the poles simultaneously on both motors on the same side of the ship. In addition to these pole-changing switches, a group of reversing switches will also be carried in this structure, the movement of which changes the direction of rotation of both motors on the same side.

The process of operation will be as follows: When the ship is going ahead at full speed, both generators will be in operation and each will be connected to the two motors on its own side. The pole-changing switches will be in the 24-hole position, the motor resistances will not be short-circuited, and the reversing switch will be in the position used for backing with the 36-pole connection. This relation will be enforced by very simple mechanical interlocks. To reverse the ship at full speed, it will be necessary to move the field levers, and then pull the pole-changing switches to the 36-pole connection and re-establish the field. This will give reversal on the 36-pole connection with resistance and under this condition the ship may be operated ahead or astern with resistance by moving the reversing switches. To operate without resistance on the 36-pole connection, the resistance switches must be thrown into the short-circuiting position, but the arrangement will be such that the direction of rotation cannot be reversed except when the motor resistances are active. The motor resistances will be so proportioned as to give under any condition of operation a torque at least equivalent to the full power of that condition.

In addition to the hand control of turbine governors here mentioned, there will be installed a mechanism by which the movements of the rudder can be made to influence this governing mechanism in such a manner that excessive load cannot be imposed upon the motors on either side of the ship through the act of steering.

Ventilation: The generators will carry fans that positively impel the air necessary for ventilation; this will be about 32,000 cubic feet of air a minute for each generator. For the motors, motor-driven fans will be provided for the purpose of inducing the necessary ventilation. Each of the four motors will require about 20,000 cubic feet of air a minute.



—showing principal overall dimensions

Exhaust ventilation for the engine rooms will be provided by allowing the apparatus to draw air from the engine-room space.

The ventilating ducts on the generators will be so arranged that doors in them can be opened to the engine room and valves can be closed, shutting them off from the generators, so as to provide exhaust ventilation from the engine room when the generators are not running without passing the air through the generators. The ventilating trunks from the motors will be arranged with valves which can shut off the blowers from the motors and with doors opening into the motor rooms, so that when the motors are not running the blowers can be used for ventilating the motor rooms without taking the air through the motors.

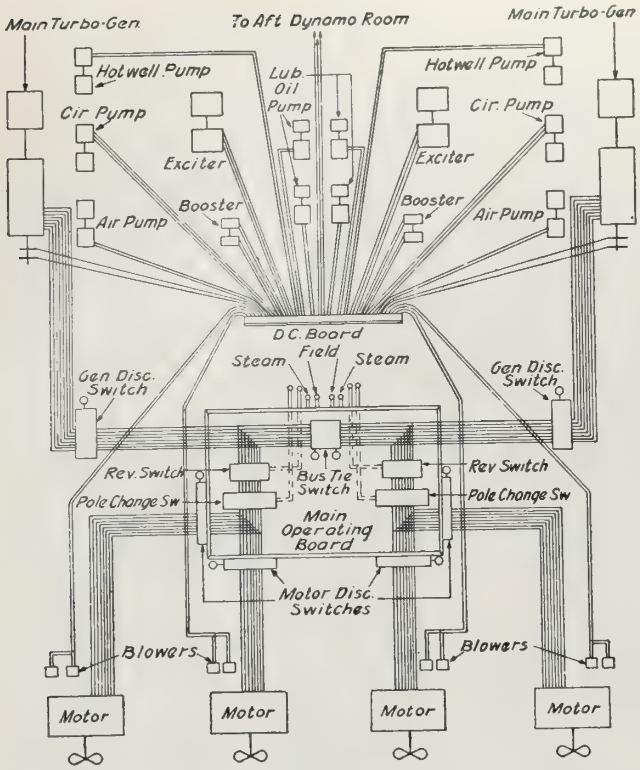
Excitation: In addition to the 300-kilowatt direct-current generating units provided for excitation and for the driving of auxiliaries, motor-driven boosters will also be provided through which the voltage delivered to the fields of alternators can be conveniently varied to suit the conditions of operation. These will provide a considerable variation in excitation. These exciting units will be of the same voltage as the ship's generating units and will be interchangeable with them, so that any unit will be able to supply excitation and to run engine-room auxiliaries or to deliver current to the ship's circuits.

Main Turbo-Generator Units

Turbine: The turbine will be of 10-stage construction, the first stage of 63½-inch pitch diameter, with a properly proportioned bronze nozzle registering with steam ports in the head to which it is bolted, and a wheel carrying two rows of buckets, with intermediate blading and the necessary steam shields secured to the casing. The other nine stages will be of pitch diameters stepping up from 57 to 76 inches, each wheel carrying a single row of buckets.

The casing of the turbine will be arranged for downward exhaust, and will consist of a cast-steel head carrying the first stage nozzle substantially bolted to a properly proportioned cast-iron shell carrying all diaphragms and forming the exhaust chamber. Both the head and shell will be made with horizontal joint, with carefully arranged bolting to facilitate inspection. The lower turbine head will be tied to and supported from the turbine end standard, with which amply proportioned thrust bearing will be incorporated, to insure against any radial expansion displacement, and by tying shaft and casing together prevent axial expansion troubles. The brackets on lower exhaust casing which form the other support of the casing will be anchored, the position of exhaust connection being maintained thereby; all expansion will be toward high-pressure end, and provision will be made for movement of turbine and standard. The support for the double middle bearing will also be incorporated with the lower exhaust casing to insure perfect alignment of parts and its maintenance. Arrangements will be made for the perfect drainage of all parts of turbine shell and, where necessary, under the control of valves.

All bearings will be of self-aligning type of substantial proportions. They will be arranged and grooved for force-feed oil lubrication and provided with passages for circulating water for cooling. Both bearings and pedestals will be arranged so that oil discharged will be carried away without



Diagrammatic arrangement of cables for propulsion Control

disturbance, and in addition devices will be provided at shaft openings to eliminate all oil throwing or discharge of vapor. The piping to all bearings will be so arranged that both oil and cooling water discharged may be observed and temperatures taken.

To insure proper distribution of load on the four bearings, a flexible coupling entirely enclosed in housing of middle bearing will be provided. Arrangements will be made by milling teeth in circumference of coupling flange for barring over the turbine rotor. The proportions of this coupling will be carefully determined to carry heaviest possible torsional stresses, also to take care of any variation of alignment of generator and turbine. Provision will be made for the correction of such possible misalignment by shimming under the separate generator outboard standard.

The throttle valve will be of special design to meet installation requirements, of combined throttle and emergency trip type, with self-contained steam strainer designed to protect the turbine against the introduction of anything that may interfere with proper working of valves, or cause damage to buckets and nozzles. The emergency trip of valve will be by mechanical connection to latch, thrown by an independent centrifugal governor on turbine shaft. Arrangements will also be made for the tripping of throttle valve by hand lever just above hand wheel, which lever will also reset a trip mechanism. Steam will pass from throttle valve into cast-steel steam chest, and from chest as determined by load requirements through ten controlling valves, both valves and seats proportioned to avoid injurious high velocities. From each valve steam will pass through port in turbine head to a group of first stage nozzles.

The shaft-packing at high-pressure end will be of mulitple labyrinth type, rings being of alloy and replaceable, and shaft sleeves of steel. Shaft-packing at exhaust end will be of double labyrinth type, also with replaceable sleeve. These packings will be so designed that sufficient leakage from high-pressure end will be used to seal exhaust packing and the excess be returned to an intermediate stage of the unit. Arrangements will also be made for proper sealing of both packings when required from external steam supply. The shaft packing at first diaphragm will be made by labyrinth rings, and at other diaphragms by semi-labyrinth rings. All packing rings will be replaceable.

For the speed control of the unit, a substantially constructed centrifugal governor, designed to operate with minimum friction, will be provided and will be driven at a reduced speed by worm gearing from the main shaft. The movement of governor weights will be transmitted mechanically to the pilot valve of an operating cylinder, taking oil from the turbine lubricating system; a differential mechanism will also be provided at pilot valve to maintain the balance between speed and steam flow; also provision will be made for adjusting speed to load over definite range. A positive stop will also be arranged for, to be set by the control mechanism, so that for each setting it will limit the number of valves which may be opened by the governor, but will not at any time prevent the closing of all valves. The piston rod will actuate, through piston and rack, a cam-shaft opening successively through a system of cam roller and levers the ten controlling valves in the steam chest. An adjustment will be provided in the main piston rod by which the number of valves corresponding to a definite setting may be reduced materially, this having the effect of reducing the load carried by one unit and shifting it to the other.

There will also be provided a governor-controlled valve governing the admission of auxiliary or exciter exhausts to the main condensers.

Openings suitably covered will be arranged for access to exhaust casing and for checking clearance of rotor.

Generator: The stator frame will be constructed of circular cast-iron I-beam section, spaced and supported to give maximum rigidity.

Punchings will be assembled on machinery steel dove-tail ribs, these ribs being securely fastened to the stator I-beams. The core will be constructed with radial air ducts at frequent intervals, allowing free circulation of air around stator coils and through the core. Punchings will be securely clamped together by continuous cast-steel rings keyed to dovetail ribs. The stator coils will be imbedded in slots provided in stator punchings and will be form wound.

Projecting ends of the stator coils will be securely blocked and fastened to the retaining rings, these rings being supported from the armature-core clasping flanges.

To reduce noise to a minimum and to give the generator a workmanlike finish, lagging will be fastened to the I-beams sections of stator frame. Provision for openings in the lagging will be made to allow exit of heated air from the generator. Stator shields will be made of cast-iron and serve as a protection to the ends of stator coils; they will also form a duct for the entrance of cool air to the generator and provide a clearance space for ventilating fans, which will be fastened to each end of rotor.

The rotor will be made of solid carbon steel forging, having radial slots machined in it to receive the rotor winding. The winding will consist of several coils connected in series, each turn being insulated with mica tape. Each coil will be insulated from the rotor core by a trough of mica and asbestos. External insulation on the portion of coils projecting beyond the core will consist of mica tape and asbestos tape. This insulation must safely withstand the maximum load required and will be treated to make it moisture proof.

To secure the rotor windings against centrifugal stresses, wedges will be provided in the slots of the rotor core. Coils projecting beyond rotor core will be encased in nickel-steel binding rings, shrunk onto centering plates.

Dimensions of the rotor forging will be so proportioned that the critical speed will be above maximum revolutions per minute required. Collector rings will be mounted outside the collector end bearing and will be provided with ventilated cover. This cover will be provided with a hinged cover, giving easy access to brushes and brush rigging.

Ventilating fans will be fastened to each end of rotor and will be designed to draw air from any convenient source, forcing it through the gap between rotor and and stator at each end of the machine, and then through radial ducts in the stator core. Exit for air will be provided back of the stator core by annular ducts formed by I-beam sections in stator frame. The heated air will be led away from the generator by a duct which will be attached to the outer periphery of the stator frame.

The air intake and outlet of generators will be provided with quick-closing valves for use in case of fire. A steam-extinguishing connection will also be provided for each generator; this will be fitted with two-way cocks operated by a single handle so arranged that when steam is shut off from the generators any leakage will be directed into the bilge.

A steam-heating coil will be provided for each end of the generators; it will be placed in the lower half of the stator and all joints will be external to the machine, thus insuring that no steam from leaks will pass into the machine.

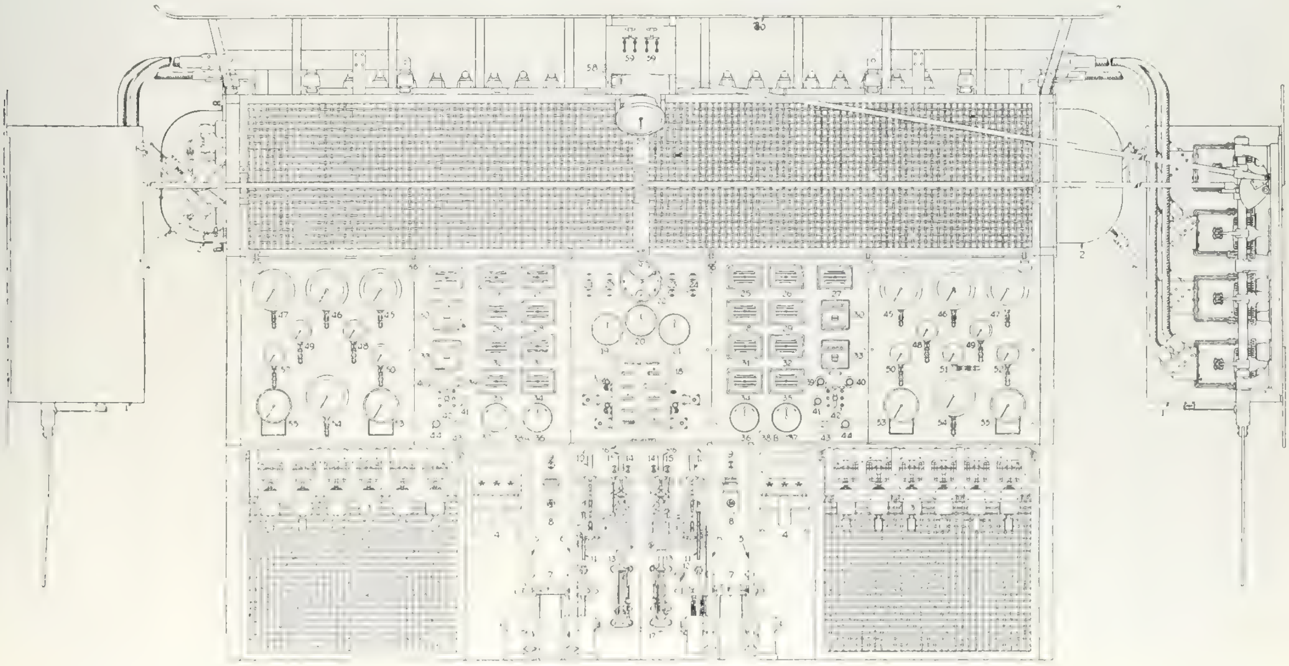
Propeller Motors

Characteristics: The motors will be quarter-phase with a primary winding in the stator, so arranged that the motor can be operated with 24 or 36 poles in either forward or reverse rotation. The change in poles and rotation will be made by means of switches external to the motor.

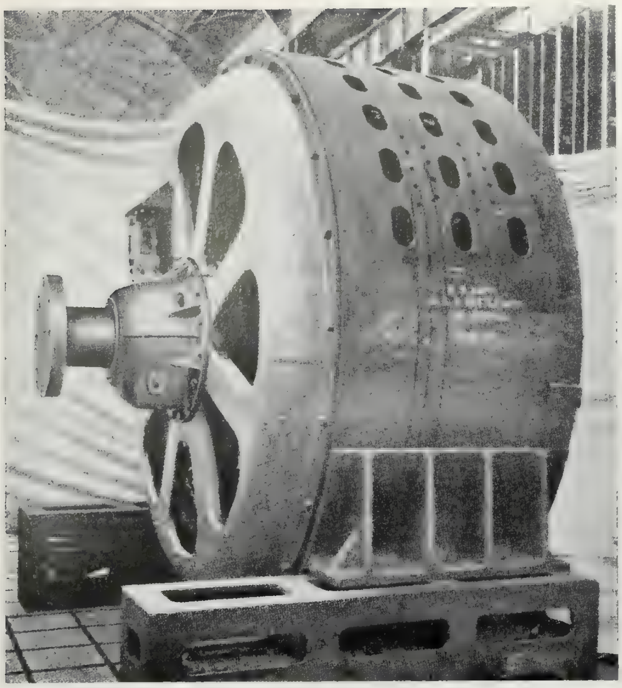
The rotor will be phase-wound and will be connected through collector rings to a resistance which can be cut out by short-circuiting switches when operating on the 36-pole connection. On the 24-pole connection the rotor windings will automatically short-circuit the collector rings and operate as a phase-wound short-circuited rotor.

Stator: The stator frame will be a series of cast-steel I-beam section spaced and rigidly held in position. The whole frame will be proportioned so that the laminations and windings will be supported with practically no deviation from a perfect circle. The core will be built up of segmental laminations, each segment to be independently held by slots in dovetail ribs securely fastened to or a part of the I-beam sections forming a part of the stator frame, each layer to break joints with the next by half a segment. Eddy currents will be prevented by enameling both sides of laminations. Radial air ducts will be provided at frequent intervals along the length of the core, opposite to and in line with similar ducts in the rotor, to provide space for ventilation through the core and around the winding. The ducts will be maintained by means of steel fingers of I-beam section, securely spot-welded to one adjacent lamination. The laminations will be well clamped between stiff-end plates with fingers for supporting the teeth, and held in position by the heavy bolts. The internal diameter of the assembled core will be perfectly parallel and circular to secure a uniform air gap.

The winding will consist of form-wound coils of rectangular wire thoroughly formed and insulated before being placed in the slot. The complete coil



Main Control Switch Board and Cell



Propulsion Motor for U. S. S. California

will be firmly wedged in slots provided in the stator punchings.

Direct current electric heaters will be provided in the base of each propelling motor.

Rotor: The rotor will be built up on a cast-steel spider securely keyed to the shaft.

The core will be built up of segmental laminations, each segment being independently held by slots in dovetail ribs in the rotor spider, each layer to brake joints with the next by half a segment. Eddy currents will be prevented by enameling both sides of the laminations.

Radial air ducts will be provided at frequent intervals along the length of the core, opposite to and in line with similar ducts in the stator, to provide ventilation through the core and around the windings. The ducts will be maintained by means of steel fingers of I-beam sections, securely spotwelded to one adjacent lamination. The laminations will be held together by continuous cast-steel rings held together by heavy bolts. The external diameter of the assembled core will be parallel and finished to a true circle.

The winding will be a phase-wound bar winding and thoroughly insulated before being placed in the slots. The bars will be wedged tightly under the overhanging parts of the teeth, preventing displacement by centrifugal force. The ends of the bars outside of the slots will be bound tightly to a projection on the cast-steel end rings.

Collectors: The collector rings will be made from special alloy and securely mounted on a cast-steel sleeve between the rotor spider and bearing. The collector rings will be thoroughly insulated from the sleeve and from each other.

Brushes and Brush Gear: The brushes will be securely held in holders supported by studs of ample capacity to hold them rigidly in place. The brushes will be of ample capacity to insure cool running under all load conditions.

Resistance: The rotor of each motor will be connected through collector rings to a water-cooled resistance similar in character to those used on the collier Jupiter, but cooled by natural circulation through convection instead of forced circulation. These resistances will be cut out by short-circuiting with oil switches.

There will be in each engine room a generator switchboard with a panel for the engine-room auxiliaries. The switchboard and panel will be so arranged that any of the generators in one engine room can be connected to the auxiliary panel in that engine room independently of the rest of the ship's circuits. All the power for the motor-driven engine-room auxiliaries, ventilating motors for the two engine rooms and motors, and the excitation will be taken from the auxiliary panel. The connections from the generator to this panel will be taken off the generator leads, after passing through the reverse current through circuit breakers, in such a way that the ship's circuits and engine-room circuits will be independent of each other. The auxiliary panels in the two engine rooms will be arranged so that they can be energized from either engine room by means of inter-connecting bus feeders.

The instruments will be mounted upon panels carried on the upper part of the switching structure so that they can conveniently be observed by the operator. The insulators used in connection with switches and other points of cable connection will be attached to special spring terminals so that shocks to the insulators through gun fire or other causes will be minimized.

Main Exhaust Trunks: From each main turbine exhaust end there will be a rectangular exhaust trunk leading to the condensers.

Working Platform: The revolution indicators, the clocks, gauges, telegraph dials, and other engine-room fittings, will be so placed near the switchboard as to be in full view while working the engines, and telegraph levers will be conveniently placed.

Oil Cooler Circulating Pumps: (To be furnished by the General Electric Company.)

There will be an oil cooler circulating pump in each engine room; they will be motor-driven and will each have a capacity of 300 gallons a minute against a head of 115 feet. They will also furnish water for the water service and be arranged so that they can furnish water for the after-flushing system.

The casing will be of the horizontally-split type, made of the best material, with the suction and discharge openings cast integral with the lower half to permit of the quick and easy access to the interior of the pump, for inspection or repairs, without disturbing the pipe connections or alignment of the pump. The two suction openings will be combined around the casing converging into a single suction opening.

TRADE NOTE

The Chicago Pneumatic Tool Company announces the appointment of Mr. L. C. Sprague, formerly district manager of sales at New York, as manager of Western railroad sales, with headquarters at Fisher Building, Chicago, and Mr. H. G. Bargee as manager of Eastern railroad sales, with headquarters at 52 Vanderbilt avenue, New York City. Mr. Nelson B. Gatch, formerly district manager of sales at Chicago, has been appointed district manager of sales at New York, succeeding Mr. Sprague. Announcement of Mr. Gatch's successor at Chicago will be made later.

AMERICAN BOYS FOR AMERICAN SHIPS

An Analysis of the Seamen's or La Follette Act

With Reference to its Effect on the Encouragement of American Seamen and the Upbuilding of an American Merchant Marine

By I. N. Hibberd

THE official title of the act is "To promote the welfare of American seamen in the merchant marine of the United States; to abolish arrest and imprisonment as a penalty for desertion, and to secure the abrogation of treaty provisions in relation thereto; and to promote safety at sea." To determine what the real effect of the various provisions are, it is necessary to consider each one separately.

Section 1. This section covers the subject of replacing men who are absent from the ship either by desertion or casualty.

The main point in this section is the provision which requires that the master must fill the places of those absent either by desertion or casualty with men of equal grade or better. This, taken in conjunction with the requirements of Section 13 as to the specific qualifications of members of the crew, might result in an indefinite detention of an American vessel at either a foreign or an outlying American port where it would be difficult, if not impossible, to get men **technically** able to meet the requirements of Section 13.

It is possible that the crew of a vessel might desert in a body under these circumstances, knowing that the master of the ship could not help re-engaging them, even at much higher wages, in order to avoid serious delay and expense, as well as possible danger to the vessel and cargo, and the possibility of jeopardizing the lives of passengers, if the vessel was engaged in the passenger service, even though men whose abilities as seamen were satisfactory might be obtainable. This would give any foreign competitor a decided advantage. It would seem that the responsibility for seeing that the ship was provided with a competent crew should be borne by the master thereof.

Section 2. This section has to do with the division of the different watches, and gives the force of law to what is now almost a uniform practice and thus prevents any unusual demands by unscrupulous operators, and therefore is one to which no reasonable objection can be made.

Section 3. This section covers the payment of wages and is in the interest of fair play to the crews and should be retained.

Section 4. This section requires the payment of one-half of the wages due a seaman when requested by him at any port where the vessel shall load or discharge cargo, provided not less than five days have elapsed since a similar request was made. There have been some arguments advanced against this practice because of its tendency to interfere with discipline on shipboard and thereby place in jeopardy the safety of the passengers, crew and cargo of the ship. There were unquestionably many abuses in this regard in former years when sailors in foreign ports were refused small advances by operators and masters, even though they had a substantial amount due them for wages earned—a situation which is certainly not in the interest of fair play—and it would seem that the section should stand unless something mutually satisfactory can be substituted.

Section 5. This section covers the seaworthiness of a vessel and does not seem unreasonable, and no changes are apparently necessary.

Section 6. This section provides conditions under which quarters for the crew shall be arranged, the requirements of which are not excessive, for, if the new ships are to carry American crews, the quarters and living conditions on shipboard must be somewhat similar to those the men are accustomed to having on shore.

Sections 7 and 8. These sections provide penalties for desertion, insubordination, smuggling, etc. There would not seem to be any necessity for changes here.

Section 9. This section abolishes flogging and other corporal punishments. As all such practices have been abandoned for many years, and are in direct violation of other laws, it would appear that

this provision was put in to create a false impression in the minds of members of Congress as to the need for such a provision in the law, and so secure their support for the desired legislation. Except for the false impression which this provision gives as to the conditions governing life at sea, it makes no difference whether the provision is retained or not.

Section 10. This section, which specifies the amount of water and butter to be furnished each seaman, was also probably inserted for the same reason, for the standard of living on all American ships is, and always has been, much higher than required by the government regulations, and therefore there was no good reason for inserting such a provision.

Sections 10a, 10b, 10c, 10d, 10e, 10f, 11 and 12. All of these sections have to do with the payment of advance wages on American vessels and foreign vessels in American ports, with the object of making it difficult or impossible for unprincipled shipping masters and other unreliable characters who gather around the sailor when he comes ashore to exploit him for their personal advantage, and should be retained, at least as far as American ships and American seamen are concerned.

Section 13. This is the most important section of the Seamen's—or, as it is more generally known, the La Follette—Act, as far as its effect on American seamen and American ships is concerned, as it provides for the proportion of able seamen each ship must carry as compared to her entire crew, and states exactly what qualifications a man must have to become an able seaman. At the outbreak of the war, the total number of ships flying the American flag, engaged in both the trans-Atlantic and trans-Pacific trade, was thirteen—a very small proportion of whose crews were Americans. These ships, and the various small steamers trading to the West Indies, Mexico, Central and South America, as well as the few sailing ships then in operation, all of whose crews were composed largely of foreigners, combined, were carrying less than 10 per cent of American foreign trade, while the remaining 90 per cent was being cared for by ships of other nations.

When you consider the large proportion of trade carried by the foreigners compared with the small amount handled by American ships, it is not unreasonable to question the motives of the sponsors of the bill, most of whom were of Scandinavian or Teutonic origin, and therefore more concerned in caring for the interests of the foreign than of the American sailor or ship. It certainly was not in the interest of their native countries to have America develop a race of seamen or ship owners who could care for her ocean traffic, which these foreigners were handling for her with so much profit to themselves, as, by so doing, America would create a merchant fleet which could care for her commercial needs in time of peace, or serve as transports in time of war, and provide training for American crews to man them. Who can be sure, in the light of what has taken place in the last four years, that this bill was not one of the many plans by which Germany and those friendly to her hoped to render this country helpless if the time ever came when she needed to transport an overseas force?

The provision which requires that an able seaman must have had not less than three years' experience at sea before he can qualify as such, and that 65 per cent of the deck crew must consist of men of this rating, is certainly not in the interest of Americans who wish to follow the sea and to man the new ships which the country is building, especially when taken in conjunction with the fact that even a foreigner can go before a United States steamboat inspector and, on his unsupported affidavit that he has served three years at sea on deck, be given a certificate by these American officials certifying that he is a competent, able seaman and so considered by the American government.

The program of the United States Shipping Board calls for 25,000,000 tons of new ships by 1921. If only half are built it means 2000 ships of over 6000 tons each, which will require 30,000 sailors to man them, and, in addition, will need at least 45,000 officers, firemen and stewards to complete the crews. If the provision of the act calling for three years' experience at sea before a man can sign as an able seaman is enforced, these new ships will nearly all have to be manned by foreigners. This is certainly not in the interest of this country. These new ships, which offer such good industrial openings, should be reserved for the men of this country, especially those who have been discharged from the army and navy.

There is a provision in the bill which states that graduates of school ships who have had one year's experience may pass an examination, and, if found competent, be given an able seaman's certificate, but such men may not compose more than 25 per cent of the able seamen required to complete the crew, and, in addition, these American boys must pass an examination as to their eyesight, hearing and general physical condition — an examination which is not required of the foreign seaman. All this would certainly seem to indicate that there was an influence at work which was opposed to the development of the American sailor and ship.

There is another provision in the same section which certainly is not in the interest of Americans, and that is the one specifying that no vessel may leave any American port unless 75 per cent of the crew in each department understand the language of the officers. The result of this provision is that, when the crews of French, Swedish, Norwegian and other foreign vessels leave their ships in this country, which Section 16 of the bill provides for, they cannot be replaced by Americans, but must be replaced by Frenchmen, Swedes or Norwegians, as the case may be. Surely a native-born American should not be prevented by law from securing such a position if the opportunity presents itself and he cares to take advantage of it.

The Seamen's Bill has never been enforced, except for a few months after its passage in 1915, and during that short time caused much annoyance, expense and delay, because of the scarcity of certificated seamen. Had there been any attempt to enforce it since America entered the war, not 5 per cent of the soldiers taken to Europe could have been carried in American ships or provided with food and supplies while there. If any proof were needed to show the fallacy of the provision of the act requiring 65 per cent of the deck crew of an American ship to have had three years' sea experience before they could qualify as seamen, surely the record made by the American boy in the manning and handling of the vessels, both of the navy and the commercial fleet, is conclusive. These boys, most of whom had only three months' service in training camps and school ships, took our troops to Europe and supplied them with provisions and equipment while there, all this service being performed under adverse conditions caused by the need for speed, attacks by submarines, as well as the normal perils of the sea. This is a definite answer as to whether or not an extended apprenticeship is necessary for the American seaman.

One of the apparent inequalities of the situation is the fact that any American, or a foreigner who has secured his final naturalization papers, can pass an examination and secure his license as a third officer after two years at sea, or, if he is a graduate of a high school or college, he need only have one year's experience, but the able seamen under him must have had at least three years.

The records made by American boys in the navy, merchant marine and army training camps show how rapidly they can qualify for any position when given an opportunity to do so, and if America is to receive full value from the ships she has built and paid for by developing a foreign trade with them, she must man these ships with citizens of this country. There are many reliable records available which show that American boys, after only a few weeks' service on the various training ships of the Shipping Board, have shipped on commercial vessels as able seamen and given entire satisfaction in this position. Now that such a vital question as to whether or not this country can own and operate its own merchant fleet is before the people, these boys should be allowed to give the answer, and not be refused a chance to help themselves and the country because their success would interfere with foreign interests whose friendship for America may be of doubtful sincerity.

Sections 14 and 15. These sections are devoted to lifeboat requirements, all of which are, to a certain extent, technical, and so come under the supervision of the steamboat inspection service. It would seem to be advisable that all requirements of this kind should be left to the board of supervising inspectors, who should have authority to make such changes from time to time as may, in their judgment, seem necessary or advisable.

Section 16. This section repeals the provisions of the old law which provided for the arrest and detention of deserters both on American ships in foreign ports and foreign ships in the ports of this country. This question has been debated from both angles. The ship owner and operator who is responsible for the safety of the lives and property committed to his care insists that there should be some provision by which the sailor who engages to perform a certain service should be obliged to complete his contract, and not be in a position to walk ashore with the same freedom that any ordinary civilian employe has. It is claimed that service at sea should be compared, to a certain extent, to service in the army and navy, and that the seaman, having voluntarily agreed to do a certain thing, should be required to complete his contract. On the other hand, the seamen claim that, whenever the vessel is in port, they should be allowed the same freedom as is enjoyed by workers on shore. It would seem that some method might be employed by which a seaman could be required to complete his contract without imposing any substantial injustice on him, while at the same time care was taken to see that the rights of the innocent third party were properly protected.

Sections 17, 18, 19 and 20. These sections provide regulations by which the different provisions of the act may be carried out, especially with reference to foreign vessels in America and American vessels in foreign countries.

Daily Routine Aboard the Training Ship Iris

At 5:30 a. m. reveille is called. All deck apprentices, except those on quartermaster duty, turn out. They fold their blankets neatly and place them underneath their pillow, then wash themselves and return to the mess deck, where they are served coffee and bread and butter or crackers, and are allowed to smoke.

At 6 a. m. they turn to. Time is allowed three times a week, from 6 until 6:45, to scrub and wash clothes. At 6:45 the clothes line is hoisted. After 6:45, and on the remaining days of the week, they are employed in washing down decks, cleaning paint work, and various other duties in cleaning the ship, until 7:15, when they are allowed ten minutes to wash their hands and faces before assembly blows. They are lined up awaiting the mess call, when they march down to breakfast. Each apprentice is assigned by the second steward to a seat at the table, and he stands at attention until all are ready to be seated at a signal from the master-at-arms. They are allowed one hour for breakfast and smoking.

At 8:30 they are assembled again and are assigned to the various work with their instructors. The doctor's call is blown at this time, and any boy who requires medical attention may see the surgeon for treatment, and if his case warrants it, he is issued a pass excusing him from work. Classes are held in seamanship, which includes short splicing, long splicing in rope and wire, the various knots and hitches and their different uses, also the uses of the hand-lead and the patent deep-sea sounding machine. These are all taught by actual practice. The compass is explained thoroughly to them, and each apprentice is required to memorize the same for examination. The international code flags are also learned and memorized.

Each apprentice is assigned alternately to one of the quartermaster watches, where he learns to steer by actual practice, taking an hour's trick at the wheel. They are also assigned alternately to details to police and clean up the berth decks. This includes scrubbing the decks, cleaning the paint work and the general care and upkeep of the decks.

This work is carried on each morning from 8:30 to 11:40, with an interval for boat drill at 10 o'clock. In this drill they are taught how to launch a boat by hoisting it up on the davit tackles to clear her from the chocks or beds where she rests on the deck, and letting go the grips or lashings with which the boat is secured to the deck.

When the abandon ship drill is held with new apprentices, it takes usually from ten to twelve minutes to get twelve boats clear of the ship's side. These boats carry on an average thirty-one men. At the second drill the boats are launched in from seven to eight minutes, and the third time the drill is held the boats are cleared in from six to six and one-half minutes. In the abandon ship drills the boats are lowered into the water with two apprentices in them. The davits are then allowed to swing fore and aft, which enables the remaining apprentices on deck to take hold of the boat's falls and the life-lines which are stretched from the davits, allowing five apprentices to slide down at one time. Jacob's ladders are used only when coming aboard the ship after the drill has been held.

After the abandon ship drill is finished, the boats are recalled and all apprentices except ten are taken out of each boat. The remaining ten are then given instructions in rowing, handling of life-boats, under the guidance of an instructor. All hands, including officers, instructors and apprentices, take part in the abandon ship drill, the only officers and instructors excused being the executive officer, the chief engineer, and the really necessary men in the engine room and galley.

At 11:40 recall from work is blown. Apprentices are then required to wash and dress themselves ready for their noon meal. At 11:55 they are assembled in lines, awaiting the mess call, when the same routine is gone through as at breakfast. They are allowed one hour for the noon meal and smoking.

At 1 p. m. they turn to again and follow up their seamanship and compass classes, until 3:45 p. m., when fire and boat drills are held. At 4:15 they are recalled from this drill and are assembled for physical drill for one-half hour, under supervision of the Y. M. C. A. secretary, when they are expected to wash and get ready for supper at 5 o'clock, when the same routine is gone through as at breakfast and dinner.

From 6 to 7 p. m., Y. M. C. A. games are held on the main deck, allowing the steward department time to wash the dishes and clean up the mess hall, when all apprentices are allowed down on the mess deck to hold social service recreation, such as moving pictures, music and vocal instruction, under the supervision of the Y. M. C. A. secretary.

At 9:30 p. m. at sea all apprentices not on watch are expected to turn in and are allowed fifteen minutes in which to get into bed, when taps is blown, and silence is demanded for the night. In port their bedtime is extended three quarters of an hour. Taps is blown and silence demanded at 10:15 p. m.

On Sundays while at sea non-sectarian religious services are held under the supervision of the Y. M. C. A. secretary. On Sundays while in port apprentices are allowed passes on their own request to attend divine service wherever they may wish.

In port a daily muster is held at 8:30 a. m., and all apprentices absent without leave are reported to the paymaster. If an apprentice breaks or overstays his leave, unless he has a good excuse, he is restricted from liberty, according to the length of his over-stay, at the next liberty.

Before being assigned to the ship, apprentices are given an inspection to see that each one has the clothes necessary for his personal cleanliness and hygiene, viz., two or more suits of underwear, at least four pairs of socks, two pairs of shoes and the issued uniforms, two suits of working clothes and one of dress blues.

All apprentices in the various departments before graduating have to pass an examination—deck, before the executive officer; engine, before the chief engineer; and steward, before the chief steward, which encourages the boy to pay strict attention to his work while in training, so that he will pass a creditable examination when called upon. A graduation certificate is then issued to him, rated as to his proficiency.

The U. S. Navy Sixty-five Foot Motor Tug

DUE to the large increase during the war in the work along the waterfronts at navy yards and stations to be done by navy yard tugs, it very soon became apparent that a considerable number of additional tugs had to be provided. The naval practice had been to use only heavily built harbor tugs, with reciprocating steam engines having a displacement of about 350 tons. This type could not be provided quickly enough to meet the shortage, all shipbuilding facilities being already engaged upon war work and consideration had to be given to building smaller tugs, 65 feet to 90 feet in length, either steam or gasoline driven. In considering the type of machinery plant for these smaller tugs, the gasoline-driven tug seemed to have the following advantages over the steam-driven tug for navy yard use:

(a) Lower first cost.
(b) Shorter period for construction.
(c) Smaller complement for operation.
(d) Lower upkeep cost.
(e) Good maneuvering qualities.
(f) Ample power for work required.

As an experiment, the Mare Island Navy Yard was authorized by the Bureau of Construction and Repair, in April of 1918, to build four 65-foot tugs, to be of a suitable type for the purpose. Complete working plans for the type were prepared at Mare Island, the lines and general arrangement being shown on plans herewith. The tug, upon completion, was found to be staunch and efficient, suitable for harbor use but with good sea-going qualities, and their performance would indicate that their type will be generally adopted in the navy. As the tugs were built at a Pacific Coast navy yard and are engined with a plant supplied by an Oakland manufacturer, a more complete description is believed to be of interest.

These tugs are built of wood, are single screw with combined engine and pilot house located on main deck, all as shown on the general arrangement, Mare Island Plan No. 20294. Details of design and arrangement have been worked out to give maximum serviceability for general towing work. The features of this boat are the unusually heavy construction, large fuel capacity and economical operation.

The tug is powered with a 150-horsepower, four-cylinder, heavy-duty engine, manufactured by the Union Gas Engine Company, giving an average speed of ten knots, with the motor turning 290 r. p. m. The propeller is of 58-inch diameter and 48-inch pitch. The general dimensions are:

Length over fender	65′- 0″
Beam moulded	16′- 2″
Depth moulded	7′- 6″
Mean draft	5′-10½″
Displacement, tons	60
Metacentric height above C. G., feet	2.57

The pilot house is raised so as to give good observation ahead. Complete control of the engine is carried by means of governor and clutch to the pilot house, which, in turn, is open at the after end and located just a step away from the towing bitts. In this way, one man can pilot the boat, operate the motor, and watch the hawsers and tow, all from one position. A crew of three has been found sufficient for handling the boat. The engine-room trunk is high enough to give ample head room in the engine room, and the pilot house is located aft of the engine house, with steps from the pilot house to the engine room. A transom locker has been installed in the house, arranged with an upholstered seat. This locker can be used as a berth if necessary on long trips. . A temporary galley is located on the port side of the house, consisting of an electric hot plate, fresh water pump and sink, and lockers for gear.

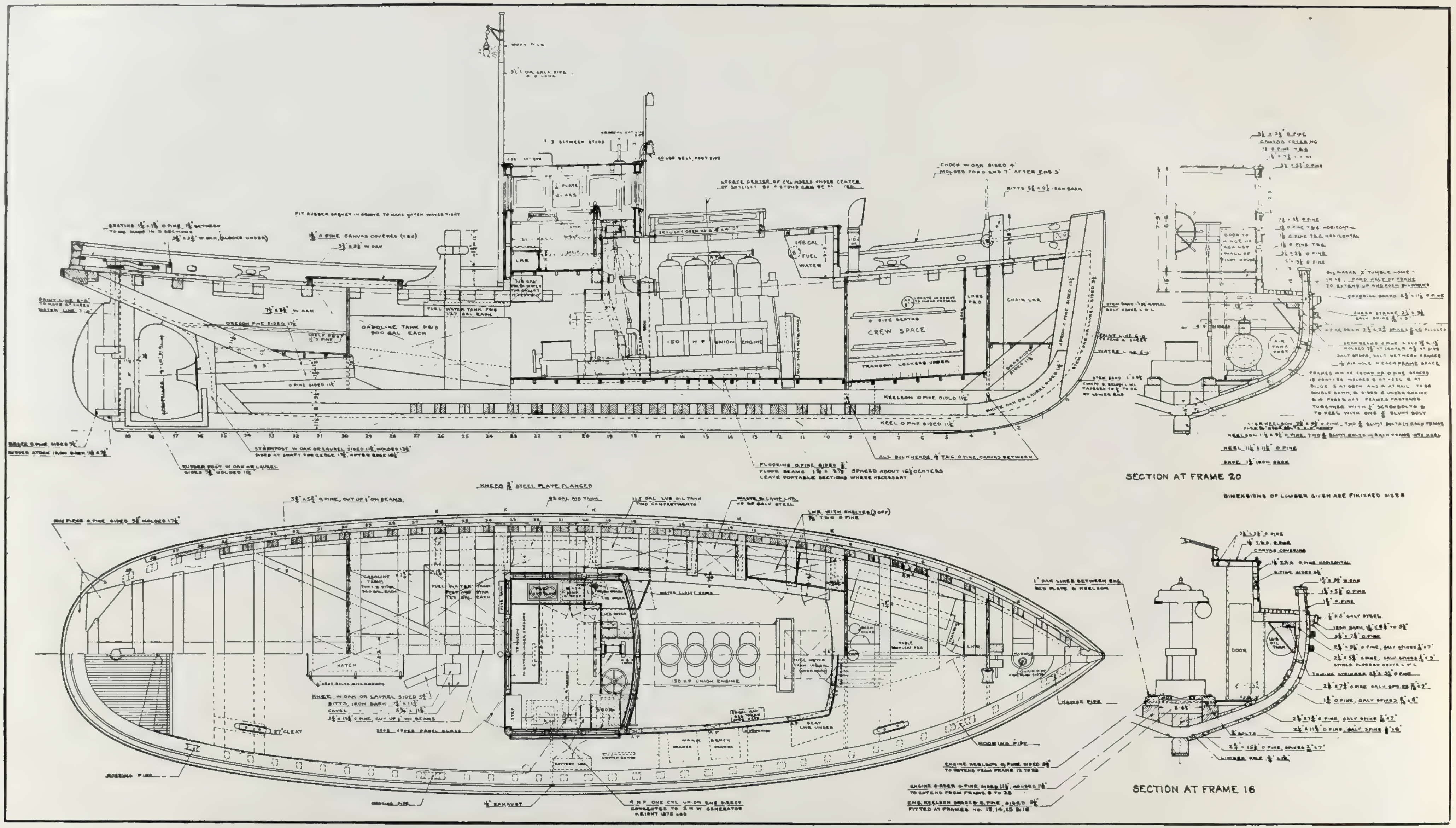
The main fuel tanks are under the pilot house floor with a capacity of 1800 gallons. This ensures a cruising radius of 1000 nautical miles. In order that the tugs may make long trips, they have been given unusually good accommodations for a towboat. The crews' quarters are roomy and will accommodate four men comfortably in the two folding berths in each side. Ventilation to this compartment is provided by a large intake cowl ventilator. This forecastle also contains a folding mess table and ample locker space and is separated forward from the chain locker by a double diagonal bulkhead and aft from the engine room by a similar bulkhead. Access is gained through an escape scuttle on the forward deck or through the engine room from the pilot house.

The engine room contains, besides the 150-horsepower engine, a 4-horsepower auxiliary set which is direct connected to a 2-kilowatt generator, and also drives the auxiliary air compressor by belt. The generator, in addition to lighting the boat, furnishes current to a large searchlight on the forward top of the pilot house, and also for a 2-burner electric hot plate installed in the galley. The center of the cylinders of the main set are located under the center of the skylight, so that pistons can be readily removed. Ample stowage has been provided for lubricating oil and fresh water, and the engine room is equipped with a work bench, lamp and waste locker, engineer's locker and toilet.

The space aft of the engine room is utilized as a hold for stowage of lines and gear. Each tug is provided with two 50-fm., 6-inch circular manila towing lines, and three 15-fm., 4-inch circular manila mooring lines.

These tugs are not only heavily powered, but are also heavily constructed. The keel is 11½-inch by 11½-inch Oregon pine and of one length, the shoe of 1¾-inch iron bark. The keelson is 11½-inch by

Sixty-five foot Navy Motor Tug in action



Plan, Sectional Elevation, and Transverse Sections of U. S. Navy Sixty-five Foot Motor Tug

Length Over Fender	65'- 0"	Mean Draft	5'-10½"
Beam Moulded	16'- 2"	Displacement	60 tons
Depth Moulded	7'- 6"	Metacentric Height	2.57

9½-inch Oregon pine, and the sister keelsons are 9½ inches by 9½ inches in one length. A spacing of 18 inches center to center is used for the frames, which are of pine, double sawn, and sided 6 inches under engine and 4 inches forward and aft, moulded 8 inches at keel, 6 inches at bilge, and 5 inches at deck, and extend up to form bulwark stanchions. The garboard strake is 2¾ inches by 15½ inches, the balance of the planking is 2¼ inches thick, and the ceiling 1¾ inches thick. Salt stops are fitted between frames three feet below covering board and spaces are filled with salt to under side of covering board. There is a 1¼-inch air hole in each frame space, and, to further protect the wood, all members of the foundation group and the frames are brushed with carbolineum. The deck beams are moulded 7¾ inches at center and 4¾ inches at side. The deck is of 2¾-inch by 2¾-inch Oregon pine.

The boat has an upper fender of Oregon pine 3¾ inches by 7¾ inches, which is faced with 1¾-inch by 6-inch iron bark, covered by a chafing strip of ½-inch by 5-inch galvanized steel. As it was anticipated that the tugs would be often used in towing piling, two lower fenders of white oak have also been provided. Towing bitts are of iron bark; the after bitts are 7¾ inches by 11¾ inches, and the forward bitts are 5¾ inches by 9¾ inches.

Two of these tugs, on runs to San Diego, covered the distance of 520 miles in an average of 49 hours, 41 minutes, with an average distillate consumption of 17.3 gallons an hour. The distillate consumption on trial runs about San Francisco Bay was even less than this figure.

The Mare Island Yard has building ways and facilities for the construction of five of these tugs at one time. Four of these motor tugs have been in service six months, two at Mare Island and two at San Diego, and have proved remarkably efficient in towing barges, dredgers and rafts of piling. For such general service the boats have proved staunch, amply powerful, and considerably more economical and satisfactory than the larger steam tugs with their continual fuel consumption, their large crews, and cost of upkeep. These four tugs proved so successful that the navy yard has been authorized to construct ten additional tugs, to proceed under their own power to the East Coast.

TURNING AN AUXILIARY CONDENSER INTO AN OIL COOLER

THE steamship Anoka of the American-Hawaiian Steamship Company recently arrived in New York harbor from Portland, Oregon, bearing evidence that her chief engineer, Arthur Sheridan, is a clever and capable man. During much of her voyage the Anoka ran through very warm seas, the log book showing sea water temperatures of 88 degrees day after day. This condition made it very difficult to keep the lubricating oil cool, especially as the boat was equipped with only one cooler. In fact, the oil entered the cooler at 124 degrees and came out but one degree lower.

As a result of the use of this hot oil, the bearings of her Westinghouse turbines grew hotter and hotter, and at last, when they reached 164 degrees, Mr. Sheridan decided that something had to be done. Casting about for a remedy, he conceived the novel idea of transforming his auxiliary condenser into an oil cooler, and this he proceeded to do with the aid of such tools and piping as he had on board. The success of this plan was complete, as the oil temperature was immediately reduced to 103 degrees and the bearings kept in proper condition.

After reaching port, Mr. Sheridan boiled out the condenser with soda and kerosene and it was ready for port operation.

The Anoka was built by the Peninsula Shipyards of Portland, Oregon, and has covered 10,000 miles since leaving port. Sheridan states that she is in excellent shape and speaks very highly of her propelling equipment.

DEVELOPMENT IN SPAIN

An order has been placed with the Electric Furnace Construction Company, Finance Building, Philadelphia, for an electric furnace for the manufacture of Ferro-alloys from Spanish ores, by the Sociedad Espanola de Construccion Naval, the advisory committee of which includes the firms of Sir W. G. Armstrong, Whitworth & Company, Vickers, Ltd., and John Brown & Company. This is the first furnace of its kind to be erected in Spain for this purpose.

Broadside view of Motor Tug

Audible Electric Signals in Industrial Plants

By **V. Karapetoff**
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Extract from a paper presented before the American Institute of Electrical Engineers

NO industrial plant of any magnitude may be considered fully efficient unless means are provided for promptly locating any important employe, no matter where he may be within the plant. A private telephone system, however extensive, serves this purpose only so long as the needed man is at his desk, but as soon as he leaves his desk the problem of locating him becomes a hit or miss proposition. On the other hand, a superintendent, a foreman, a millright, a repair man, is ordinarily useful only insofar as he can freely move about the shop without the fear that someone of importance may need him. Thus, within the last few years, under the tremendous impetus of the pressure for an increase in the production of munitions of war, audible electric signals have been introduced into many industrial plants.

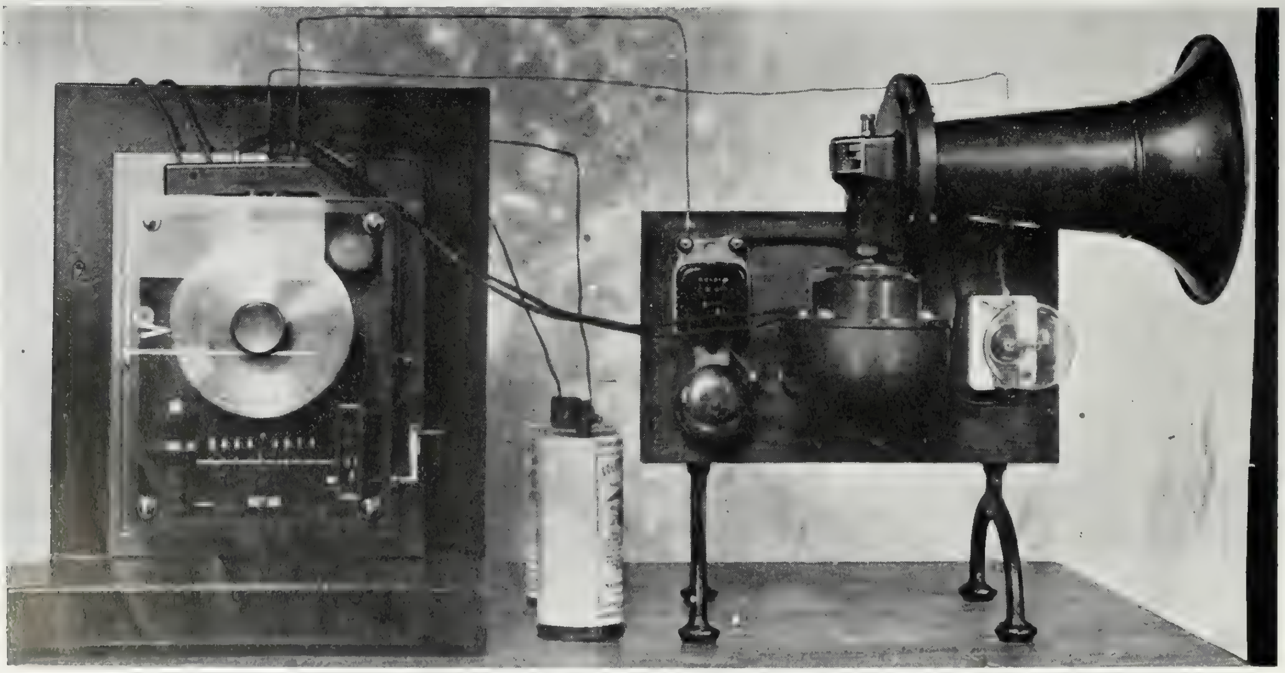
Such an electric signal is usually similar in construction to the familiar electric "horn" used on automobiles. It consists of a diaphragm with an anvil at its center. A toothed wheel driven by a small electric motor strikes the anvil many times a second and causes it to vibrate vigorously. These vibrations produce the well-known warning tone, which carries over a considerable distance. The device is provided with a projector or horn, the shape of which depends on whether it is desired to scatter the sound, to intensify it in horizontal direction, or to deflect it downward. Such motor-driven signals are now made much more powerful than automobile horns, and are wound for 110 or 220 volts, direct or alternating current, so that they can be connected to a lighting or power circuit, and do not require a separate low-voltage battery.

With such electric audible signals scattered throughout the plant, it becomes an easy matter to instantly locate any person to whom a code number has been assigned. For example, when the manager wishes to speak to one of the assistant superintendents, who may be anywhere in the plant, he simply tells the telephone operator to sound this particular man's call. As soon as this assistant superintendent hears his call, he comes to the nearest telephone, and reports, whereupon the operator connects him with the manager.

It would be rather inconvenient for the telephone operator to sound various calls by hand; therefore a special code-calling automatic instrument has been developed for this purpose. The operator merely sets the desired person's code number on a dial and pulls a lever, a contact-making mechanism is thereby set in motion, which closes the electric circuit and operates the code signals throughout the plant the required number of times (usually three times) and then stops automatically.

In noisy and in open places, or in large factory lofts, the electric horns mentioned above constitute the most suitable type of signal. In offices they may be replaced by less loud electric gongs, bells, buzzers, air whistles, or incandescent lamps. In some cases two separate circuits are run from the code-calling mechanism, one circuit for ordinary calls, the other for fire-alarm gongs, or for some other special purpose. Sometimes two allied plants are operated side by side with a separate staff in each. Then the same code combinations can be assigned in both plants, but the horns in one or the other plant will sound according to which of the two circuits is closed.

A further application of loud electric horns in industrial plants is for extensions to telephone bells. The ordinary telephone ringer is not loud enough in many shops when the foreman is away from his desk. In this case, a relay is connected in parallel with or in place of the telephone ringer, and when it is actuated, it closes a secondary circuit which causes an electric horn to sound. This



Automatic Code-Calling Industrial Signaling Apparatus call should be a single blast to distinguish it from code calls.

Audible electric signal systems are also used in various plants as warning signals on cranes and hoists, also to call a shifting locomotive, to indicate the beginning or the end of a certain operation, and for other local purposes. Once such an electric signal system has been installed, the superintendent, the foreman, and even the operatives themselves, will find new uses for it.

Signals in Shipyards

Shipyards have buildings scattered over a large area with wide yards between. Taking into consideration also the noisy character of shipyards, the importance of acoustic signals will become at once apparent. The three chief uses for acoustic signals in shipyards are:

(a) To sound code calls for important employes.
(b) To replace telephone bells in noisy places.
(c) To sound warnings on cranes and other moving machinery.

The large capital involved in the production of ships, the necessity for high-priced experts and for a rigid, closely-connected organization, make the installation of an efficient code system imperative; the trifling expense involved is entirely insignificant in comparison with the beneficial results achieved.

Now that such code-calling systems are available, it is almost incredible that a large shipyard should continue in operation without any provision whereby the important members of the staff could be instantly put in communication instead of playing hide and seek with each other. If one could compute the loss in production and the increased overhead charges because of such delays, the figures would be unbelievable.

Due to the inconvenience of direct communication between two parts of a ship hull or between two ships under construction, makes it necessary to have a more elaborate code, telling each important man not only that he is needed, but also where he is to go and whether or not it is an emergency call. This saves a great deal of climbing of stairs and ladders and permits the overseeing force to utilize their time much more efficiently.

Marine Applications of Signals

The hazards of the sea today demand an equipment which will not only fill the needs of routine service, but will also prove unfailingly efficient under the stress of emergency. The intercommunication and signal equipment is the nerve system of the ship. During emergencies it becomes the one and only means which enables the officers to direct and co-ordinate the operations of the ship and its crew. Upon the signal equipment may depend the ship's safety. Voice tubes, gongs, whistles, etc., find their place, but for some purposes powerful electric horns are indispensable. A large number of such horns have recently been installed on various United States naval vessels. They can be used as a warning of hazards, as fire-alarm signals for general alarms, as hoist signals, and also for code calls throughout the ship.

Another use which has not received sufficient attention is for communication between ships at a short distance from each other, or between a ship and the shore. Audible signals should have a distinct, useful field for distances beyond the carrying power of the megaphone, and where wireless communication is not available. They can be operated at a much higher speed than an inconvenient and sluggish steam whistle, which moreover is supposed to be sounded for other purposes.

Custance of the Arcadian

By R. E. Cropley

IT might just as well be Haddock of the Olympic, McKinstry of the Oceanic, Rostrom of the Carpathia and Mauretania, Claret of the Minnehaha, or any other merchant ship captain well known to the traveling public. Custance of the Arcadian I use simply because I have a more complete record of his part in the war. The stories of each man differ only as to detail, the valor not at all.

Captain Frank M. Custance, R. N. R., D. S. O.—to use his official title—"Cussy" as his friends call him, prior to the war commanded the big cruising steamer Arcadian in service during the winter between Bermuda and New York, and in the summer taking scores of American tourists to the Norwegian Fjords and the Land of the Midnight Sun. Except for the fact that his hair has become totally gray, today, after four years and more of hell, he is still the same modest little slip of a man who was adored by his officers and passengers when captain of the palatial Arcadian.

Like most sailors, his greatest ambition in life seems to be to have a garden in which he can potter around. He once told me, as I sat in his cabin en route to Bermuda and we sipped our Scotch and soda, that he would enjoy being a vicar in some country parish in England. I was rather taken aback, for I knew full well how he detested Sunday at sea, when in his best bib and tucker he had to conduct church services in the saloon and pray for as many kings, queens and presidents as there were nationalities aboard. Yes, an old vicarage garden, snugly walled off from the church, in its peace and quietness, Custance felt was an ideal corner of the world. To sit there at ease with every flower he could wish for near at hand, and as he sipped his wine compose a vehement sermon against the increase of drinking and the fearful sin of idleness,—well,—he would like to be a vicar if only for ten days, so long as there were two Sundays. For it certainly would be a great thing to tell people what he thought of them and get away with it as vicars do.

The day war was declared by Austria on Serbia the Arcadian, full of American tourists, was in a Norwegian fjord, anchored but a short distance from the Imperial German yacht Hohenzollern on which William II was trying to camouflage the world into believing he was not responsible for the war, as he was away on his vacation. The Arcadian was bedecked with flags in honor of the then emperor. As she pulled up her anchor and passed the imperial yacht, her band played the German national anthem; her officers, at their stations, saluted; her crew were lined up in naval order. His majesty was seen on deck watching her. As she passed and dipped her flag the man who has brought all this distress to the world ignored the courtesy extended to him and not only that, but turned about and crossed to the other

Captain Frank M. Custance, R. N. R., D. S. O.

side of the Hohenzollern and stood with his back to the English steamer. The marked discourtesy was plainly witnessed by the passengers who lined the rail cheering the man who they little thought was even then letting hell loose. Three days later England entered the war and this particular Hun said he never expected she would do such a contemptible thing.

During those three days the Arcadian unconcernedly continued her cruise. At each Norwegian port she accosted German warships. As soon as England came into the conflict it depended on Custance alone to outwit the Germans and save his ship. In the darkness of that famous Monday night of August 4, 1914, without a pilot, he took her through the dangerous Fjords to sea. 'Twas a feat indeed. After several days of anxious steaming, dodging this way and that to avoid every ship that poked its nose above the horizon, he brought the Arcadian into Liverpool, thereby saving his American passengers from the possible risk of exposure in open boats on the high seas.

It was over two months before the Admiralty called Custance into active service with the Navy. Four weeks of this time he was tied to a dock in New York, having brought the Arcadian across with stranded Americans. I don't know of a man who begged harder to become active in this war than Custance. He could have remained in the merchant service and done his bit trooping. Still he felt all the hard work should not fall upon the shoulders of the young. At the age of forty-six, with a wife and two kiddies, both under seven, he had every reason to seek a vital war job such as trooping where the risk was minimized. But no, that wasn't Custance! His soul was bigger than the body the Lord had given him. He must be right in the war and take every risk there was. So it was mighty hard on him those first few months to stand by and see the Admiralty call to the colors, one by one, the junior officers of the Arcadian and leave their commander.

Even when the Arcadian was taken as a transport and the beautiful ship he took such pride in was to be despoiled of her grandeur, it was only relief that Custance felt. There was no regret, for were not both of them about to do their bit? Across to England he took her full of Canadian troops. Then he deserted her and literally sat on the Admiralty's doorstep till somebody, possibly amazed at his persistency, gave him a real war job. And that job? Mine-sweeping during the winter up around the Orkney Islands, that hell place of storms and Huns. For two years he stuck at it, never seeing his family till he was called to London to receive the D. S. O. from the hands of his king.

Employed in this pleasant task of mine-sweeping were snubby-nosed, broad-beamed trawlers, which in times of peace went fishing.

Custance welcomed the hardships for he appreciated how vital was the work of the minesweepers and it was up to him to see that the work wasn't bungled. And what a life it was with your trawler attached to another at each side by a third of a mile of cable—a cable which frequently brought your little craft into the condition of a rock at half tide, never clear of the sweeping seas. If there have been frozen feet in the trenches, frozen fingers there have been at sea. It was a life of drudgery, monotonous drudgery, the only relief being that the next moment might see the end of you and your ship.

Mines were not the only worry of the sweeper. No, indeed! Quite frequently a submarine would shell the fleet, which, if armed at all, possessed guns inadequate for protection against a U-boat attack. It was in such a skirmish that Custance's trawler struck a mine and went down beneath him. The only remark I ever heard him make regarding the incident was: "You take it calmer the second time."

After losing his sweeper Custance became commander of the Mingary, which in her palmy days was a steam yacht. Her particular job was to go out on patrol alone, and, among other things, hunt for mines and submarines. On such undertakings we Americans have employed our youth. It was an extremely creepy sort of business, for you didn't worry about a floating mine, only the son-of-a-gun you couldn't see. And what a nice job it was to board and inspect neutral ships in the danger zone. In itself the launching of a lifeboat in an angry sea was a feat, without the risk of being blown to atoms by a well-directed shot from the neutral, which frequently turned out to be a raider. And not only that, once on board the neutral, if you forgot to fly a safety flag every five minutes your own ship might open fire and finish you. Then there was the getting back to your own ship in a lifeboat which tossed about like a cockleshell. In mentioning the boarding of a neutral Custance always spoke of it as a sort of joke, although he knew mighty well it wasn't.

The D. S. O.—Distinguished Service Order—one of the highest that England can bestow on her sons of the sea, was awarded Custance for valor exhibited the day succeeding the famous Jutland naval battle. Under cover of darkness the main German fleet had fled while the U-boats lingered to feed off the wounded. Such was the plight in which the big dreadnaught Warspite found herself. With her steering gear deranged she was limping home. As there were many other "lame ducks" to be assisted—many brave men to be rescued from the wreckage of ships which had fought valiantly and gone, the Warspite was not so well protected by destroyers and patrol boats as she might have been. The Mingary's task was to outmaneuver three big U-boats which were trying to get between her and the big Warspite. Custance apparently figured that he was a "gone goose," anyway, yet the time it would take the Germans to get him would be sufficient to allow the crippled Warspite to maneuver and protect herself with her own guns and depth charges. Considering that the Mingary was only an auxiliary yacht with guns of small calber in comparison to those which the U-boats mounted, for Custance to attack the three brutes at the same time seemed like suicide. Yet without hesitation, like a fox-terrier, he dashed into the cauldron and engaged the Huns. Because of his daring the first submarine was so taken by surprise that he was able to ram her. This allowed him to get close enough to the second for his tiny guns to reach her and he sank her by gunfire. The third was so scared by his achievements that like a frightened rat it scurried from the scene of action.

The second Mingary affair occurred in December. Custance was coming off patrol and his crew were anxiously looking forward to a few days' rest in port. Suddenly the radio picked up an S. O. S. call and Custance learned that on another patrol route a collier, an auxiliary yacht and a trawler had been attacked by submarines and were sinking. As fast as the tired engines of the Mingary would revolve they drove the little fighter toward the scene of disaster. About half way there a trawler was accosted. She signalled that she also had been going to the rescue but that two giant U-boats had barred the way and driven her off. Still, Custance kept on, for might there not be men floundering in the wintry sea as they clung to the wreckage of the vessels the Germans had destroyed? Bucked up by Custance's determination, the trawler faced about and just abeam went on with the Mingary. Another ten miles and the two big, sinister looking Huns were seen drifting idly on the surface. Straight at one of the beasts Custance drove his toy cruiser and his flotilla of two put up a wonderful show of fight. The Germans were bluffed. Not knowing what was coming they submerged and cleared out, allowing Custance to pass on. He rescued from death twenty-six men.

The next assignment Custance received was to another ex-yacht, bearing the name of the Maid of Honor. Her particular duty was convoying colliers each night across the English Channel. As the Huns occupied the coal districts of France, all the fuel, not only for France but for Italy as well, had to be brought from England, so that the work of the Maid of Honor was a vital part of the war machinery. Daily the colliers gathered and were rushed over in convoys, protected by the blessed shades of night. Although the darkness might hide them from the Boches, the risk of sinking one another was great. Think what it would have meant to the Allies to have lost even a part of one day's coal supply!

S. S. Arcadian

To keep these slow moving deeply laden colliers in lines of convoy, to do this without a light, to avoid the troopships similarly darkened, and ships coming the other way, was a task testing the skill of man, and yet without a whistle to warn one another, through fog the convoy went, closely guarded by ships like the Maid of Honor, commanded by a Custance, a Haddock or a McKinstry. When daylight found them all safely at Brest, Havre or Cherbourg, home again the guard ship would rush in order to bring over another batch that same evening.

As a diversion for her crew—a rest from the convoy strain—the Maid of Honor intermittently went out U-boating, acting as a stool pigeon for an English submarine. To sea she would put with her grim companion, who would clear out and for a specific time remain submerged, patrolling a given area in which the Maid of Honor would hover, hoping a U-boat would attack her. If the luck were good she would get the German with her own guns. If he sank her the British submarine would be able to creep up and get him. It was indeed a most pleasing rest from convoy duty, this acting as submarine bait! No wonder Custance and others like him eventually enjoyed the comfort of a little white hospital cot.

Indeed, convoying was an art. To zig-zag one vessel and keep its ultimate course correct, is difficult; but to perform the act with twenty or thirty vessels in five or six different Indian files—to instruct skippers of each vessel and see that they did it day and night—to do this for hundreds of miles—to be on time to meet the destroyer guard at a given position in the waste of the ocean,— well, the admiral of the convoy on a journey which sometimes took twenty days, whenever he got a cat-nap it was caught in a chair and for a week at least he never had his clothes off for a bath and the last few days of the voyage he never slept at all. Custance is very proud of the fact that out of all his convoys, both coming and going, only three ships were torpedoed and only two were lost.

Still, the Huns occasionally bagged a vessel in the midst of a convoy. The Helenius would have been lost if it hadn't been for Custance himself. Using her as his flagship, about seventy miles off France, he had separated the convoy and turned the American section over to our destroyers. As he approached the British section, a torpedo missed the bow of another vessel and crashed into the Helenius. The explosion occurred in No. 5 cargo hatch, just abaft of the engine-room. As the hatch had been battened down and made water-tight the gases freed, blew a hole in the ship's side 17 feet by 24. Luckily the hatch covering flew off and by so doing the damage confined itself to the one cargo hold,—a hold loaded with Quaker oats and unrefined fuel oil. Fortunately, not a soul happened to be in that particular portion of the Helenius, so there were no casualties. Other ships of the convoy took on a new form of camouflage for they were pasted with a mixture of oil and cereal which the explosion wafted through the air.

It was a wild sea. Custance saw that even if the boats could have been safely launched they would have difficulty in living, for the other vessels of the convoy would not dare stop to rescue the Helenius' survivors. The pirate shot his bolt at 4 p. m. The nearest haven was Falmouth, seventy miles distant. A quick survey showed Custance that the wounded ship could limp on for a bit and though she might eventually succumb the nearer she got to the patrol boats which were rushing to her from all sides, the less would be the loss of life. Still, he wanted to save the Helenius if there were a ghost of a chance, for he appreciated that her vast holds were more valuable to the Allies than scores of graceful Mauretanias.

He had a crew of Chinamen who as soon as the Helenius was "strafed," panicked, stripped themselves stark naked and piled into the lifeboats, sitting there patiently in the December wind, their teeth chattering in harmony with the surging sea. Custance said it was the sight of those heathens in their birthday suits which saved the day for him. They made him smile. With a gun he had to drive them below decks to keep the boilers fired. It was his personality—the personality which had so endeared him to the American traveling public—that he injected into the souls of his assistants on the bridge and in the engine-room. It made them save themselves and the ship. A man like Custance is always trusted.

As she struggled on, the Helenius settled lower in the water, her stern sinking until her forefoot nearly protruded. Her shaft tunnel gradually filled with water and momentarily her engineers expected the sea would seep in and put the fires out, or the bulkhead separating the engine-room from No. 5 hold would give way. For seventy tedious miles Custance kept all hands at it and in twelve hours the Helenius shoved her nose aground in Falmouth Harbor. When she touched, only two feet of freeboard at the stern remained above the surface of the sea.

For six months after the Helenius affair nothing serious occurred to mar his life other than the usual routine of crossing and recrossing the Atlantic in convoy, as fast as he could. Then occurred the torpedoing of the Justicia, one of the biggest hauls the Huns succeeded in bagging. She remained afloat for twenty-four hours and Custance would have saved her if a German hadn't dived under the ring of patrol boats which surrounded her and fired a finishing torpedo in the short interval of grace allowed him before he went to hell. In getting off the Justicia Custance nearly lost his life. I received a very apologetic letter stating he was sorry he hadn't been able to save the cigarettes he was bringing over to me, especially sorry as he wouldn't be in New York again for some time, as the Admiralty had appointed him head convoy officer in London. There he remained until the Armistice was signed, then going to Germany for ships, and at this writing he is in command of an old Bermuda ship, the Trent, returning troops from France to England. Some day he will be back in the Bermuda service—some day again he will be taking Americans to Norway. What we Americans owe to him—to his fellow captains like Haddock, McKinstry, Rostrom, Pigeon, Pentecost, Owen, Redhead, Ransom, Charles, Pritchard, Finch, Prothero, besides all our American merchant ship captains and officers who navigated the war zone, I am afraid will never be appreciated.

Without their valor this war would have been over long ago and Germany have won. I say this without reserve, for it is the truth. It has only been by their untiring sacrifices that the soldiers have gotten to the trenches at all and been kept supplied with munitions and food. The merchant ship men have done work which gold cannot pay for. They never have thought of themselves, but simply of the great cause which to them has meant the end of cruelty and the punishment of those responsible for the crucifying of little children. That Germany full well appreciated the value to the Allies of merchant ship men is readily proved by the crimes she has committed on the sea in order to terrify them.

The Electric Drive of the U. S. S. Tennessee

By William H. Easton

U. S. S. Tennessee

THE U. S. S. Tennessee, launched April 30 at the Brooklyn Navy Yard, will, like all the new American battleships, be electrically propelled. This type of drive has been adopted for battleships by the Navy Department, after long study and careful experimentation, mainly because it permits great flexibility in the design of the ship. With all other types of drive, the propellers and the prime movers must be connected together by means of the propeller shafts, thereby creating certain unavoidable limitations in the arrangement of the machinery, bulkheads, etc. But with electric drive the propellers and turbo-generators are mechanically independent and the latter can be placed in a variety of locations.

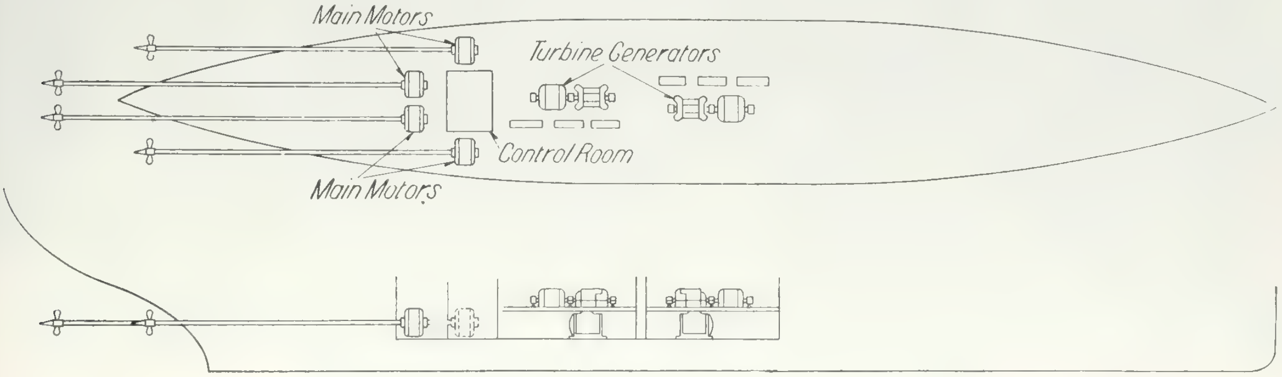
The main propelling equipment of the U. S. S. Tennessee, which is being supplied by the Westinghouse Electric & Manufacturing Company, consists of two turbo-generators and four propeller motors. The turbo-generators are identical units and each consists of a steam turbine and an electric generator of 20,000 horsepower capacity, so that the total engine power of the ship is 40,000 horsepower. Each motor is directly connected to a propeller and can develop a maximum horsepower of 8375 continuously.

The speed of the ship is controlled in the following manner: The speed of the turbines can be varied over a range of from 1500 to 2270 r.p.m. by means of a manually-operated governor. The speed of the motors varies proportionately with the speed of the turbines, but in order to provide a sufficiently wide range, each motor has two windings, one giving a motor speed (and therefore a propeller speed) of from 83 to 126 r.p.m. for the full speed range of the turbines, and the second giving a motor speed range of from 126 to 186 r.p.m. One turbo-generator is sufficient for low speeds of the ship and both are used for high speeds.

In other words, for ship speeds of from 9 to 15 knots an hour, the motors are operated on their low speed windings and one turbo-generator is used; for speeds of from 15 to 17 knots an hour, the motors are operated on their high speed windings by means of one turbo-generator; and for speeds of from 17 to 21 knots an hour the motors are operated on their high speed windings by means of both turbo-generators.

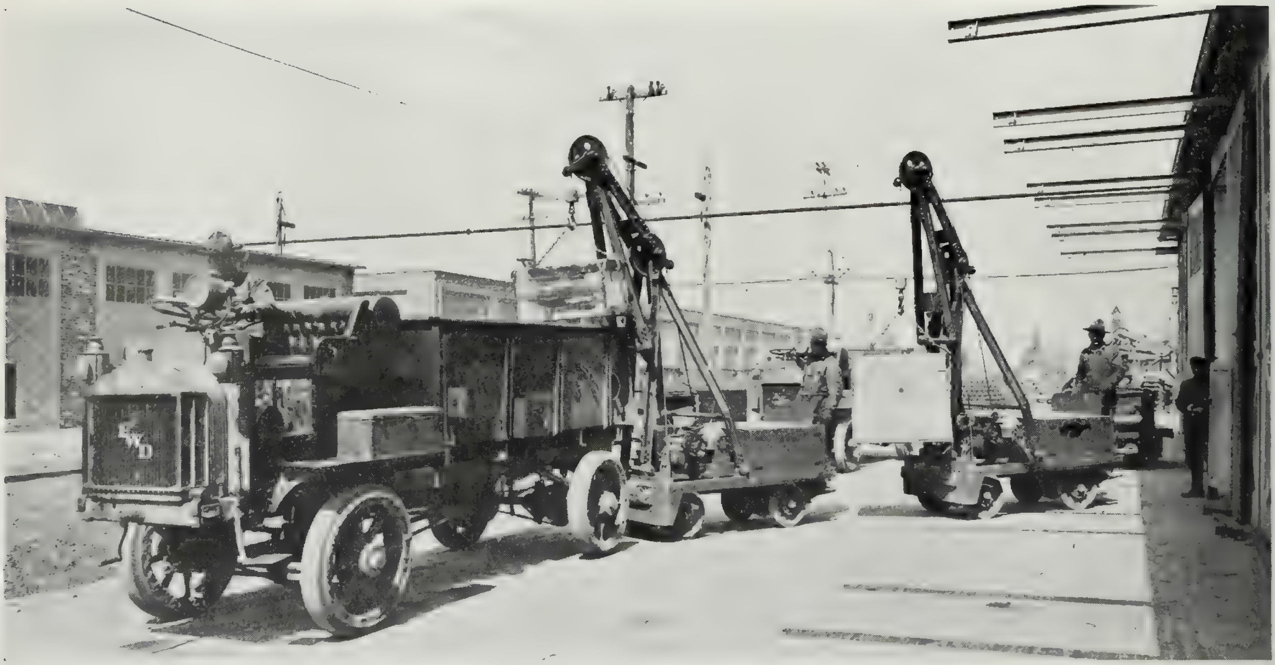
The control of both the turbo-generators and the motors is located in a central control room where the operator has at his command everything necessary for the operation of the equipment. Special attention has been given to the insulation of the cables so as to obtain the highest degree of reliability, and the arrangement is such that the failure of any single cable will not seriously interfere with the operation of the ship.

When completed, the U. S. S. Tennessee will have an overall length of 624 feet; beam, 97 feet; draught, 31 feet; and full load displacement of 33,000 tons. She will mount twelve 14-inch guns, a number of smaller pieces, and two submerged torpedo tubes. Her belt armor will be 14 inches thick, and her complement will be 1119 officers and men.



Diagrammatic arrangement, Propulsion Equipment U. S. S. Tennessee

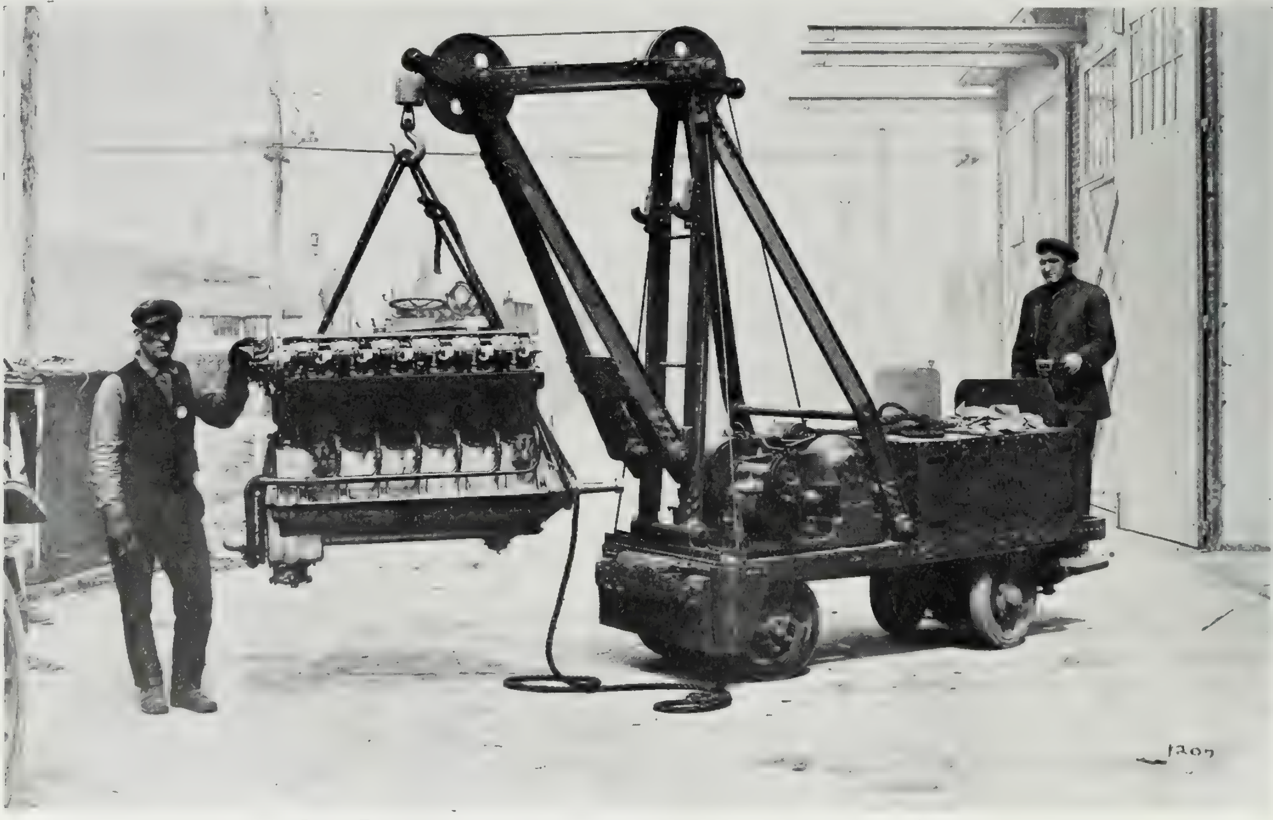
Electric Industrial Tractors



Two Crane Type Electric Industrial Tractors moving heavy cases from warehouse to truck

During the war the United States government, both in the army and navy departments, has handled a tremendous amount of miscellaneous freight, and its experience in this handling has shown that the electric tractor in its various forms is a very efficient means of conveying material, especially where the same is housed in warehouses and has to be moved therefrom to cars, trucks or ships.

Notable among the machines of this type that have recently come to the fore in cargo handling is the Baker R. & L. line of electric tractors. The two illustrations on this page show one type of this sturdy machine handling heavy loads. In one instance a heavy case has been lifted direct from the warehouse floor, conveyed to the loading platform and lifted to a motor truck without rehandling; in the other, an electric truck of the crane type is shown handling a "Liberty-Twelve" airplane motor, eliminating all possibility of damage or loss of time which might result from ordinary manhandling on hand trucks.



Crane Type Electric Industrial Tractor handling a "Liberty Twelve" Motor

European Marine Notes

Exclusive Correspondence of Pacific Marine Review

IT is doubtful whether any of the British shiprepairing establishments were ever busier than they are at the time of writing these notes. The reason, of course, is to be found in the accumulation of work held up by the war, with which is also connected the fact that repairs which in peace time would have been regarded as necessary were not allowed to interfere with the ships' continued trading when every vessel was wanted. Along with this boom in repairing there will also be a boom in litigation and arbitration as to who is responsible financially for the cost of these various repairs. For example, the repair yards are now receiving ships which have sustained two or more separate damages. In times of peace each of these would have laid the ship up for a time until proper restoration had been effected. The apportionment of liability for this damage would in that case no doubt easily have been arranged, but now that there are whole strings of these casualties attached to some of the vessels complications and complexities are ensuing.

Take, for example, the case of a vessel requisitioned by the Admiralty struck by a mine while acting as a transport, hastily repaired, and again damaged by collision—a marine risk, while under the control of the Ministry of Shipping. The work of repairing and refitting a large liner which has been damaged in such ways may run into months, whereas each idle day involves a substantial loss of earning power, and the rent of the dry dock and the cost of the necessary work will amount to very considerable sums.

As regards the apportionment of liability, the Admiralty are interested because the ship was originally chartered by them and was first damaged while in their employment. The Ministry of Shipping are concerned, since the vessel was requisitioned later by them and they accepted liability for certain war risks; the marine underwriters, because they had covered the vessel against the risk of marine perils; and the owners, because the ship is their property, and naturally they desire that the ship should be returned to them in good condition to resume their original trade. The correct course to be pursued is clearly for each interest to bear the cost of the damage for which it is liable when the effect of the different casualties can be completely distinguished, but the view of the ordinary man is likely to be that where a distinct line cannot be drawn the owners should not be placed in a worse position because of the war service than they would have been if the peaceful trade of the vessel had been uninterrupted. In many cases owners cannot be adequately compensated for the exceptional wear and tear to which their ships have been subjected during the war. The chairman of one of the leading companies referred at a meeting of shareholders held during hostilities to the strain which was imposed on their ships employed in unaccustomed services, and his warning that injuries must be expected is now proved to be true.

National Shipyards

A shipbuilder who recently went over the national yards on the Bristol Channel says that since the places came under the authority of the shipping controller a great change has taken place. There is nothing like the expenditure of money there was. Even the work of carrying the more backward yards toward completion has been suspended, the idea apparently being that buyers when they come along may more profitably be left to fulfill their own requirements in respect of layout, etc. A good deal of equipment will necessarily have to be provided if ordinary shipbuilding is to be carried on, as the places have been designed for ship fabrication. Even the large building at Beachley, in which the fabricated parts for all three yards were to have been handled, is only equipped for the treatment of "straight" material. But the places are nevertheless held by some experts to be capable of successful development, and since Henry Boyd became director, No. 1 yard—that is, the Chepstow yard—has been run on ordinary business lines. Four straight frame ships are well forward on the stocks, and good progress is being made with their construction. Labor does not appear to be difficult to obtain. As many men are, in fact, available as there are houses for, and the expectation is that as the housing scheme progresses others will be attracted. Several private interests have, it may be added, examined the possibilities of the establishments with a view to purchase.

These shipyards, by the way, were offered on very attractive terms bodily to the national shipyard workers' trade unions as represented by the Federation of Engineering and Shipbuilding Trades Unions. This federation, representing practically all the workmen in the country engaged in the manufacture of ships, held a special conference at Cardiff, in South Wales, to discuss the government's offer, and after a long debate the offer was refused, the unions declaring that while they were opposed to these national yards being sold to private firms they were also opposed to their being handed over to trade unions. What they favored was government control with the workmen having a share in the control; but, apparently, no responsibility for financial loss.

Wages of Shipyard Workers

No date has yet been definitely fixed for the next periodical review of engineering and shipbuilding wages, but the probability is that a court of arbitration will hear the men's applications some time toward the end of next month. The unions of skilled workers are asking for an increase of $3.75 a week and the addition of all the war-period advances to ordinary rates. The unskilled workers are seeking no increase, I believe, but, like the others, they desire the temporary increases awarded during the war to be made permanent. On the facts, so far as they are known, the state of trade does not seem to warrant an advance, but the new line of argument—that the standard of life ought to be raised—taken at the last hearing, will no doubt be further developed.

A Shipping Share Boom

Some explanation will presumably shortly be afforded of the remarkable movement in certain shipping securities which has taken place on the London Stock Exchange during recent weeks. Prices of a number of well-known issues have advanced in sensational fashion, and it is certain that known facts afford no justification for current levels. It has been persistently stated here that the British portion of the international mercantile marine which it is proposed to dispose of to certain interests on this side would ultimately pass into the hands of the Peninsula & Oriental, Royal Mail and perhaps some other companies, and the suggestion made on your side of the Atlantic, I understand, that at the price named the sale would be something near a gift to the new British owners, is supposed to have been one of the causes of the recent further great rise, although it has created substantial opposition to the conclusion of the deal. If there is anything to tell, it is high time that the position was made clear. Statements associating some of the big shipping lines in important arrangements have been made before without having a very solid foundation, but the present rumor is supposed to be strongly inspired.

Studying American Shipbuilding Costs

British shipbuilders are still, in their associations and allied meetings, discussing the prospects of competition in shipbuilding from America in all its phases. The position appears to be pretty clearly understood here, and, even where in some cases design and workmanship of some of the new American ships have been criticised, it has been remembered that these ships were built in a very great hurry. During the war one ship produced immediately was worth two or three that would only be finished six months later. The question of the high wages that American shipbuilders have to meet is noted as a point possibly in favor of the British competitor who pays wages not so high (although the rise here, by the way, is always going on); but against this the superior mechanical equipment and labor-saving machines used in North America are recognized as methods of enabling the higher wage payers to compete successfully with other nations in shipbuilding costs. A great deal is held here to depend upon whether massed production carried to unusual lengths in shipbuilding will be successful. The principle, apparently, is theoretically sound, but the tests will be upon the open seas. If these tests are passed, the production of a great number of standardized mercantile vessels at comparatively cheap rates will be only a question of time; it is upon this point that the British shipbuilder is fixing his attention, as he appears to hold that if this multiple production is, after all, found to have only narrow limits, American shipbuilding costs must remain comparatively high, despite the adoption of the most ingenious machinery. With the cost remaining high, the Britisher sees a chance—and a good sized one.

NEW CHIEF AT MORSE DRAFTING ROOM

James A. Kelley

JAMES A. KELLEY, new chief draftsman at the Morse Dry Dock & Repair Company, Brooklyn, is recognized among shipbuilders as being one of the best actively engaged naval architects in this country at the present time.

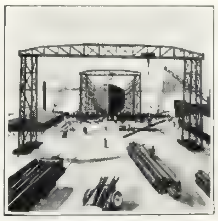
Mr. Kelley is a graduate of the old school of shipbuilding and has spent practically all of his life at the business of building ships. He learned his profession at the old Roach yard, Chester, Pennsylvania, a yard which has been the schooling place of many of the eminent shipbuilders of today. He spent eleven years at the Roach yard, working during that time in practically every department. While there he came to be a personal protege of the late John D. Roach and under his tutelage was afforded exceptional opportunities to learn all the finer points of the steel shipbuilding game.

After the Roach yard closed, Mr. Kelley became connected with the Newport News Shipbuilding & Dry Dock Company, where he was employed for a period of twelve years in the scientific department, working with such well-known naval architects as William Gatewood and Alexander Wills. During the war period he was naval architect of the concrete division, United States Shipping Board Emergency Fleet Corporation, and later served in the same capacity for the La Salle Engineering Company of Chicago, where he made designs and full fabrication plans for several types of vessels used by the Emergency Fleet Corporation. Just previous to his connection with the Morse Company, Mr. Kelley was engaged in consultation work in New York City.

The acquisition of Mr. Kelley by the Morse Company is only another step being made by that enterprising Atlantic Coast repair yard to gain for itself the best that may be had in all departments of its organization. The Morse yard is at the present time one of the most completely equipped repair yards that can be found anywhere in the United States, and by reason of its splendid location offers exceptional facilities for repair work of all kinds.

Mr. F. G. Echols, for many years general manager of the small tools department of Pratt-Whitney Company of Hartford, Connecticut, has accepted a position as vice-president of the Greenfield Tap & Die Corporation, Greenfield, Massachusetts.

Material Handling



Modern Terminal Machinery Investment Justified by Increased Port Revenues

By H. McL. Harding
Consulting Engineer, Milwaukee Harbor Commission

BONDS issued by cities for the improvement of port terminals are in the same class as water bonds, inasmuch as such terminals can earn the interest on the bonds and provide for maintenance, amortization and working expenses, and in addition leave a surplus for further waterfront improvements.

This has been clearly demonstrated at foreign, ports, including Liverpool. It is, however, preferable to take as examples port terminals which are similar to what American terminals would become under like circumstances, such as the duration of the terminal existence, density of population, language and methods of operation, and especially the experience under the late war conditions.

Fortunately, we have English colonies, the ports of which may be studied to advantage. These ports are of comparatively recent origin and have just passed through a war never before equaled as to its strain on financial resources, stoppage of shipping and severity of operating conditions.

Sydney a Model Port

Among these colonial ports may be mentioned Sydney, Australia. Its records, data and the financial results from its inception in 1901 to June, 1918, are of great value as a forecast of what may be expected in the development of most American ports in respect to gross and net revenues, proportional capital expenditures, wharfage and other rates, renewals and replacements, wharves, sheds and warehouses, receipts, tonnage, berthing and trans-shipments.

The revenue collected at Sydney during the year to June, 1918, amounted to £576,459, 3s 8d ($2,707,004.08). Working expenditures, including salaries, amounted to £151,016 15s 4d ($724,880.28), or only 26.19 per cent of the above gross income. Renewals and replacements, £19,387 4s 3d ($93,058.62). The surplus for the year's transactions amounted to £57,583 5s 9d ($276,399.78); gross revenue, 6.68 per cent on capital; net revenue, 4.89 per cent.

The above figures indicate a satisfactory year from the revenue point of view, even though under war conditions.

It was found necessary, due to the war, to somewhat increase the wharfage rates.

Harbor Handled Many Ships

The number of vessels entering the port during the year ending June 30, 1918, was 7535 with a gross registered tonnage of 9,058,568 and a net tonnage of 5,320,400. The goods imported amounted to 3,447,656 tons. The value of imports into Sydney was £55,371,749 ($265,304,395.20), and of exports £36,289,589 ($174,190,027.20). There was expended in the completion of work which had been commenced before the war the sum of £209,851 ($1,007,284.80).

The ratio of 26.19 per cent of working expenses to gross receipts, while excellent, does not represent the ultimate possibilities as the net income of a terminal, as this terminal is not yet fully equipped.

The following are the requirements to secure the best results:

There should be a correct, comprehensive plan or design, embodying the whole port, which may serve as the basis for all future improvements, and an initial plan more in detail for immediate development.

If the plan be incorrectly designed, or incomplete, or such that there are one or more points of congestion, causing delay or rehandling, then the initial investment and the cost of transference or handling is greatly increased, with a corresponding decrease in income.

May Obtain Great Results

If, however, all the elements of the whole terminal are correctly proportioned to each other, so that there is sufficient shed capacity for the berthing frontage with water and rail co-ordination, and sufficient machinery for transferring between vessel and shore, and necessary mechanisms for handling, assorting, distributing and tiering on the shore, wonderful results are attained in the speed of discharging and loading ships and in all other terminal movements. For example, by the use of electric traveling gantry jib cranes of proper size, with congestion eliminated by internal traveling cranes, capacity per linear foot of frontage can be increased on the average from 150 tons per foot per year to 450 tons, or even more.

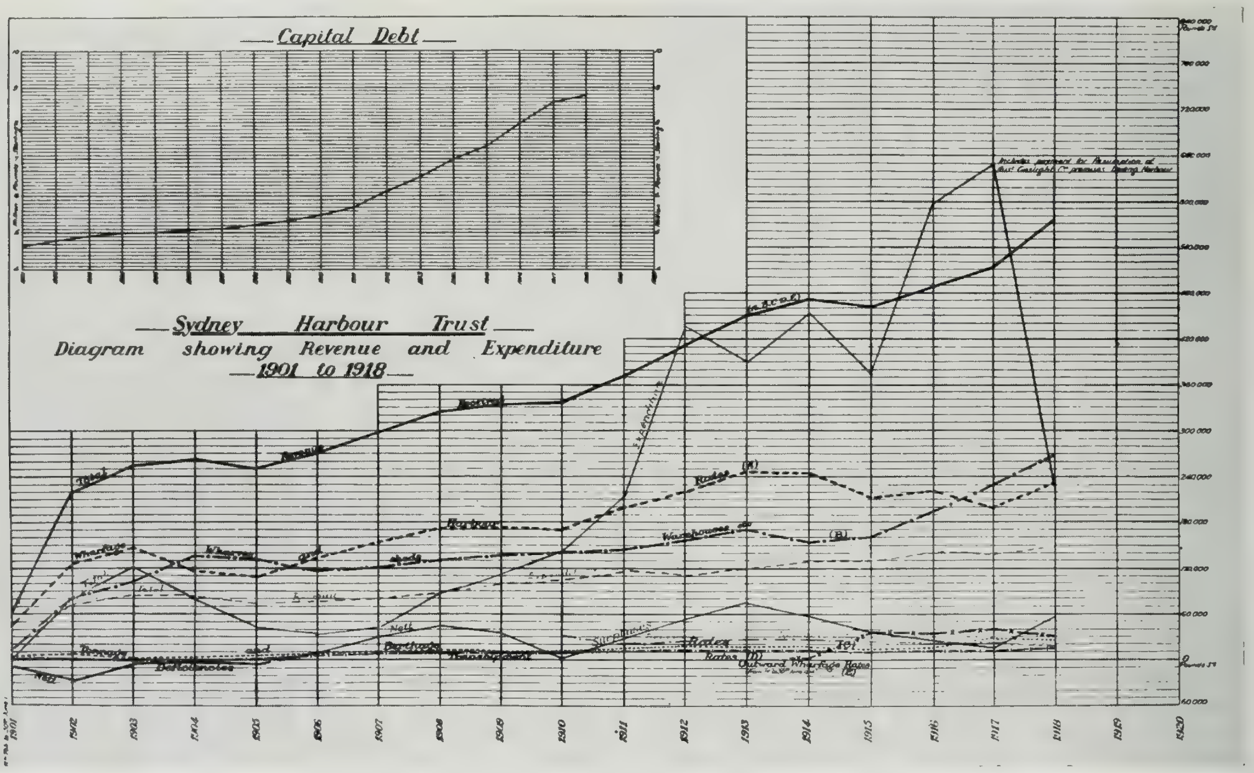
This means that for an investment for a specified linear berthing frontage, three times as many tons can be transferred, thereby saving the investment in two more frontage berths, two more sheds and other terminal elements, as railway tracks, drayways and paving. There is also the advantage of concentrating the terminal activities within the smallest area. Waterfront areas are of the greatest value and therefore should be worked as intensively as possible.

Shore Work by Machinery

In addition to the above, three times the tonnage can be handled on the shore by machinery as by hand. The operating cost will be less than one-third of what it was, even before the war, and one-fourth at least at present prices. On account of this greatly increased speed of discharging and loading the ships, there will be a large saving in the time the ship is detained at the port, probably less than one-fourth the usual time now considered necessary.

While the American ports have only lately realized the importance and the necessity of correct terminal engineering design with modern facilities and equipment, nevertheless data and figures are now being tabulated, and the following, though necessarily fragmentary, are of value in indicating the possible results:

At the port of Seattle the gross business of the port in 1918 was $2,400,000, of which $700,000 was net profit.



The harbor bill for the year was $944,383.90 for longshoremen, truckers and checkers. The installation of more modern machinery will effect a great saving of labor.

As to speed of loading on the Pacific Coast, 1,300,000 feet of lumber was loaded in the schooner Phyllis at the Stimson mill, Ballard, destined for San Pedro, California, within twenty hours' actual loading time.

The port of Astoria earnings for the first three months of 1919 show a total net gain of $24,122.57.

The revenue earned on Pier No. 1 was derived from wharfage, storage and berthing of vessels. This paid interest of 4 per cent on an investment of $1,080,000.

Pier No. 2 earned its income through bunkers, wharfage, traveling cranes and storage, netting 5.8 per cent on its cost. The operating expenses for the three months' period was $20,482.47 for the two piers and the gross receipts $44,605.04, being a net balance as above of $24,122.57.

Operating Crane Costs in the United States

While there are many figures giving the costs of operation of traveling gantry jib cranes in Europe and South America, yet it is important to have these costs for cranes now being operated in the United States under the present prices for electricity and labor.

It is also necessary to know what is the charge to the shipper or consignee by the municipality, which should not only be the operating costs of the cranes with the expenses of maintenance, interest and amortization, but also include any profits for the use of the cranes added and for ready comparison should be reduced to a common tonnage basis. The following letter of March 6, 1919, gives most completely this information. The city of Beaumont, Texas, charged the shipper four and four-tenths (4.4) cents per ton for cranage, as expressed in the letter:

"On this date we handled the following amount of freight, from ship to pier: 2103 barrels of asphalt, lift 40 feet, swing 50 feet, in eight hours and thirty minutes, at a cost to shippers of $25.16 for use of gantry cranes, or 1,051,500 pounds of freight at a cost of $.002 per pound, or 4⅛ barrels asphalt per minute at a cost of $.012 per barrel.

"(Signed) O. S. Hunter, Harbor Master.

"Beaumont, Texas."

Data from other ports are being collected and the measure of the value of the port management will be the net income from terminal operation.

U. S. Army Supply Base, Brooklyn

By Maurice W. Williams

Maurice W. Williams

ONE of the problems referred to the writer when consulting engineer to the director of storage, War Department, was the determination of the equipment necessary for moving freight into, at and out of the army supply base erected at Brooklyn. The quotations are from his report to the director of storage.

Although this base has been in construction since early last year and has been in operation a few months, the military situation has forbidden publicity much sooner than the present time.

In all the army supply bases (previously called quartermaster's terminals) erected at the coastal ports, every consideration was subordinated to the single desideratum of winning the war in the shortest time. In those bases which were constructed in a permanent manner, however, such as those at Boston, Brooklyn, Philadelphia and Norfolk, a second consideration was involved, that of making them useful for commerce and industry after the war. The Boston base should, therefore, be valuable for maintaining the supremacy of that city's wool trade, while the Brooklyn base may well serve as the nucleus of any free port necessary for that vicinity. The other permanent bases have their corresponding local advantages. The freight-handling equipment was in each case recommended by the writer on a war-time basis, it being considered unwise to turn into construction of peace-time equipment any labor or materials so sorely needed in hostilities. Most of the equipment not worn out in war uses would probably be useful later in the civil operation of the bases.

Believing thoroughly in the mechanical handling of freight so far as economically possible, the writer felt bound to go beyond this strict limit in order to secure expedition and to release men for active duty elsewhere. Had the flow of freight been inbound as well as out-bound, a condition of peace but not of war, a very different series of movements would have ensued and led to a modification in types and quantities of equipment.

"From: Maurice W. Williams, Consulting Engineer. To: Col. F. B. Wells, Q. M. C., N. A., Director of Storage.

"A list of permanent equipment necessary for the operation of this terminal is found at the close of the report. It is possible to take any one of several bases for preparing this list, among them being (a) a peak condition of twelve ships loading at a time at the piers, all freight being delivered alongside during loading; (b) assuming that most of the outbound freight will pass through the warehouses, which would then have to be worked twenty-four hours a day, and without regard to maximum number of ships berthed at the piers; (c) some combination or variation of these two conditions. Simultaneous peak movements of twelve ships loading, with no freight previously stored on the piers, and of a maximum warehouses based on sliding platform capac- movement from cars to ity is here assumed. It is possible that more than twelve ships may be berthed at the piers but, even with the convoy system in effect, the ground is here taken that transfer and loading facilities for twelve ships is sufficient and should prove adequate for some slight expansion to cover an occasional extreme case. A simultaneous movement into the warehouses, based on platform siding capacity, is also assumed.

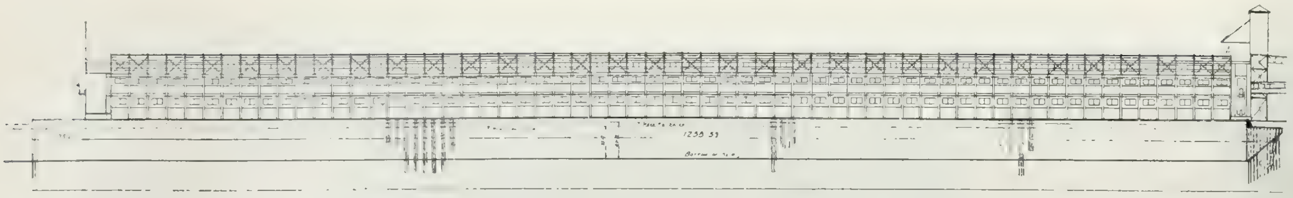
"It is necessary to make some arbitrary assumption of the sources of freight loaded onto the ships. It is likely that at least 50 per cent of the freight placed in the ships will arrive either alongside ship or on the piers by lighter. Three other main avenues of access for freight to shipside will be open: (1) from the warehouses, (2) by railroad car on the pier, (3) by dray or motor truck to the pier. The opinion is held by the writer that every effort should be made to load out of railroad cars onto the pier deck in order to avoid handling through the warehouses. Necessarily a great amount of freight will have to be taken out of the warehouses (a) to complete cargo, sufficient quantities of certain kinds of freight not having arrived in time for loading, and (b) for periodically renewing certain stocks to keep them from spoiling, notably subsistence stores.

Equipment Recommended

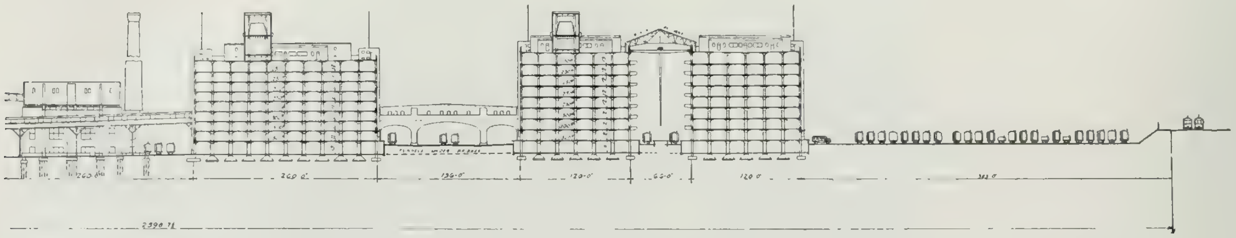
Electric winches, direct control, 39.

Electric storage battery tractors, 47.

Trailers 3 feet by 6½ feet, Reynolds type, 3000-pound capacity, 1000.



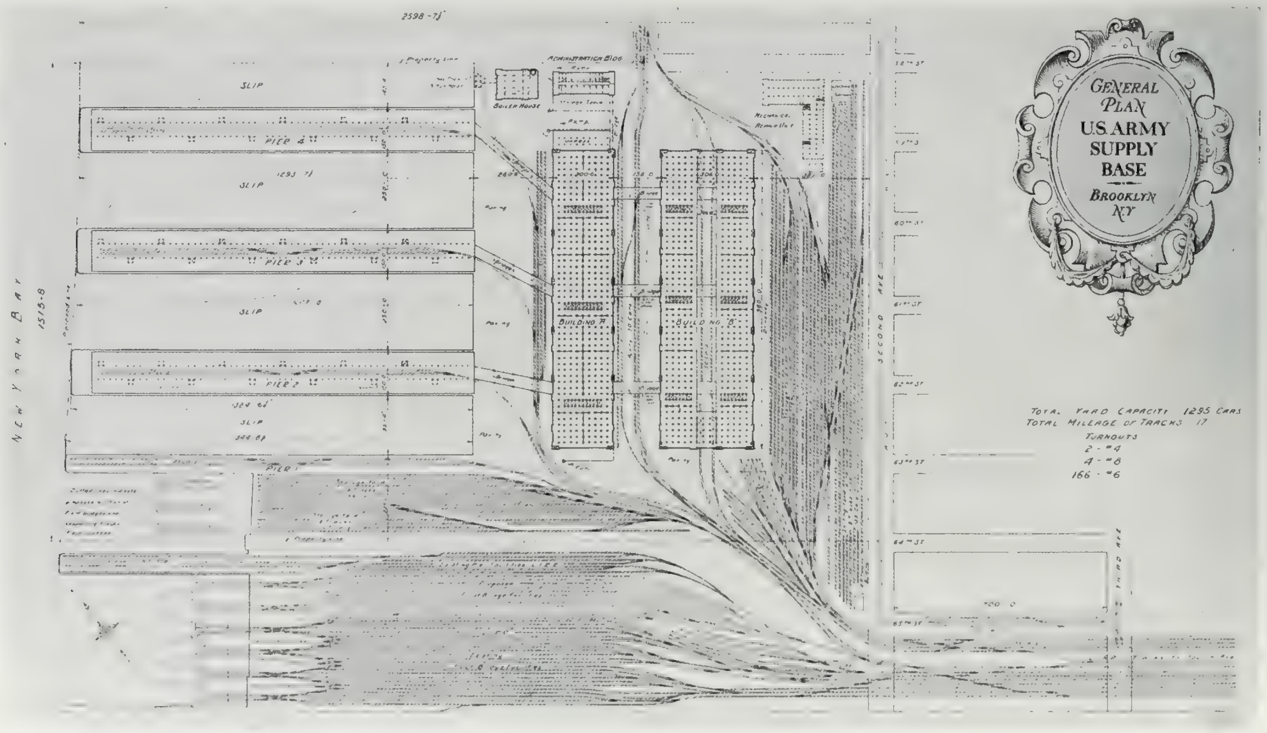
Elevation showing pier and pier shed, United States Army Supply Base, Brooklyn, New York



Elevation showing Power House, Warehouses and Car Storage Yard,, United States Army Supply Base, Brooklyn, New York

Locomotive cranes, 15-ton capacity, 50-foot jib, 2.
Locomotive cranes, 35-ton or 40-ton capacity, 40-foot jib, 1.
Car gang planks, 60.
Hand trucks, 150.
Sets portable conveyor, 6.
Vertical tiering machines, 12.
Inclined portable pilers, 4.
Steam locomotives, switching type, 7.
Electric locomotive, 1.
Donald's elevator conveyor, 1.
Scales, platform, 1000-pound capacity, self-indicating, 20.
Lighters, 110.
Car floats, standard for about 17 cars, 14.
Tugs, 13.
Trailers, 4 feet by 8 feet, Reynolds type, 5000-pound capacity, 120.
Motor trucks, 3-ton, 15.
Automobiles, 5-passenger, 5.
Roller gravity conveyor, special, 10-foot lengths, 4.
Flat cars, 10.
Gantry crane, 1.
Hand-elevating platform trucks, 4 or 5-ton capacity, 20.
Platforms for hand-elevating trailers, same, 200.
Car plates, 100.
Electric storage batteries for tractors, all told, 79.
Tractor jib crane, 1.
Wheel levers, 24.
Ballast tubs, 30.

"The ground is here taken that, during a peak movement, about 55 per cent of the freight loaded into ships will arrive by lighter, about 20 per cent will arrive on the piers by railroad cars, about 20 per cent will come out of the warehouses and about 5 per cent will be delivered by dray. Equipment provided for this peak movement should be sufficient for any subdivision of it at any time."



General arrangement plan of United States Army Supply Base, Brooklyn, New York

Co-Operative Advertising

An Address Delivered Before the Material Handling Machinery Manufacturers' Association

By Burdette Phillips

CO-OPERATIVE, or group, advertising is a comparatively new idea. And yet to my mind it is already the biggest thing in advertising today. It is fraught with tremendous possibilities. The wonder is that it has been so long in arriving. No doubt the war, which has taught us so many great lessons, has been responsible for bringing a new significance to that much maligned word, co-operation, which, after all, is the biggest word in the language. For large results there is nothing so effective as the long strong pull together.

Co-operative advertising is a big idea because it is logical, and takes the shortest cut, the straight line, to its goal. Its purpose is to create markets for general products before attempting to sell specific commodities. It recognizes that a man must first have an appetite before he is ready to enthuse much over the bill of fare. It sinks the petty jealousies of the individuals of a group of manufacturers who have certain vital common interests, and subordinates them to the good of the whole. It combines the efforts of the many in the creation of a general market without in any way hampering the individual members of the group in their respective selling and advertising plans.

It has long been recognized that there can be no advertising of a specific product which does not benefit, very directly, the sale of every other product of the same general class. And the pity of this situation is that all too many concerns have ever been ready to build up a parisitic business, by cashing in on the fruits of the other fellow's advertising. The remedy for this unhealthful business situation has been found in co-operative advertising.

In any co-operative advertising campaign there must be a common product to be sold. And the group advertising must be limited to that common product. In most cases it is an idea, or a service, and not a commodity at all. The paint and varnish makers are engaged in a co-operative campaign, selling an idea, embodied in the slogan "Preserve the Surface." The common product which the material handling machinery manufacturers have to sell is not a truck, a crane, a steel shovel, or a wheelbarrow. It is something far bigger, more important, and has an appeal which reaches all men and all classes. It is the idea of handling materials with machinery; of lightening the labor of human hands, thereby enabling thousands upon thousands of men and women to work with their heads instead. It is an idea which strikes at the very root of the subject of transportation costs, by far the largest factor in the price of many of life's necessities. Thus it touches vitally the interests of everybody. The idea which you have to sell makes possible the loading and unloading of ships at their docks in a matter of hours where it now takes days and weeks. You are increasing the capacity of railroad terminals by expediting the handling of their freight. You are speeding the construction of buildings, and increasing the production of manufacturing plants. You are lightening the burden of the laborer and making his work more productive. You have a story to tell that the whole world is waiting to hear, if you will but translate it into terms of service. Do this and you will have the greatest selling story of the age.

There are always those few who see a menace to labor in the introduction of labor-saving devices. The cotton-gin was held up for a number of years by just such men. But, happily for labor, it has long since been proved that every machine which lightens the labor of human hands has not only multiplied the laborer's opportunities, but has also resulted in the advancement of his wages and his standards of living.

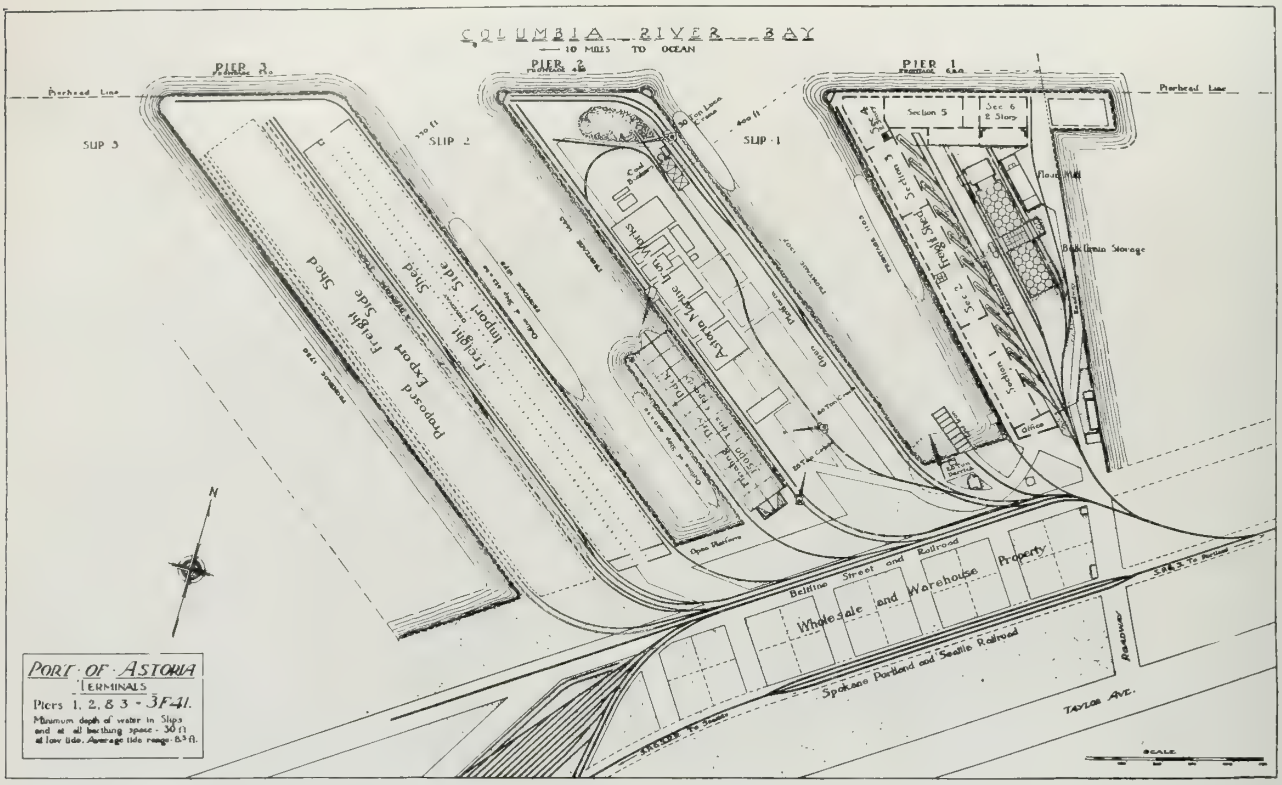
The leaders of labor today recognize that labor-saving machinery is labor's greatest friend and benefactor. Therefore, the laborer, as well as the employer, should be reached with your educational campaign. Make him your ally, for he is a powerful salesman.

Selling the idea is not only the essential in co-operative advertising, but the idea cannot be sold successfully except through co-operative advertising. Some may ask, "Why can we not all sell this idea, each in his own individual advertising and selling plan? Why must it be done by us as a group?" The answer is that the co-operative plan is not only less costly, but far more effectual. The National Cash Register Company set out with a big idea, and carried it through very successfully. Their plan was to sell a service and not a cash register. To sell the storekeeper a system which would stop the leaks in his cash drawer was the object of the salesman's visit. To be sure, there was just a wee bit of camouflage about it, and of course the average prospect saw it. But it is said that the plan worked very successfully; which only proves to my mind that it would have worked far better if there had been no camouflage at all; if, in truth, the salesman's object had not been to sell a cash register, and a particular kind of cash register at that; if he had in reality been in the position of selling a system, or a service, or an idea only. I hold that his argument would have carried farther with his prospect had it not been colored by a known desire to sell a particular machine.

When, as a group, you are selling an idea, or a service, and not a particular article, you at once put yourself on the side of the buyer, and are in a position to talk to him in his own language. You do not put him so much on the defensive, for you leave him something of latitude of choice.

I believe you are facing the greatest opportunity ever presented to any group of manufacturers, for putting over in a big way, through a co-operative advertising campaign, the biggest idea in the modern business world. To introduce material handling machinery wherever materials are handled by human hands, making new machines to meet new needs, means to speed production and lower costs of material handling, to raise the standards of human labor, and, in a word, to benefit all human kind. This, then, is your opportunity and your job. Do it in the same big and business-like way in which you have built your several businesses, and the results will be certain. Together plant the idea broad and deep, and then if each will follow up with his own advertising and selling, he will have a plentiful share in the harvest.

The Port of Astoria

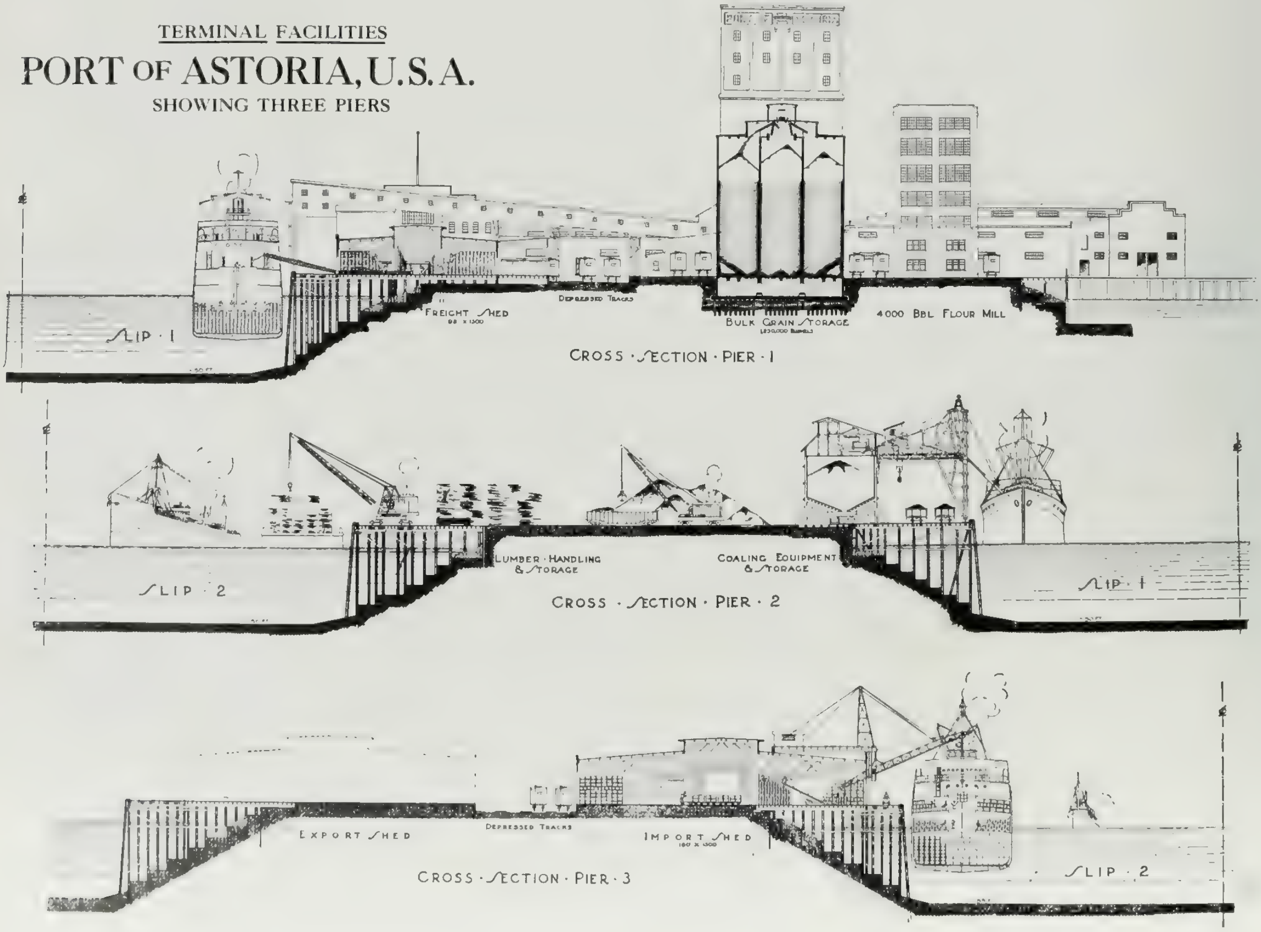


Above is shown a general plan of the Port improvements already installed as well as those projected for future installation at Astoria. Below are shown cross sections of the three piers. It will be seen from these illustrations that this terminal is being equipped to handle efficiently every variety of special and general cargo that is likely to be encountered in her future trade. For description of the contemplated additions see Port of Astoria notes in this issue.

TERMINAL FACILITIES

PORT OF ASTORIA, U.S.A.

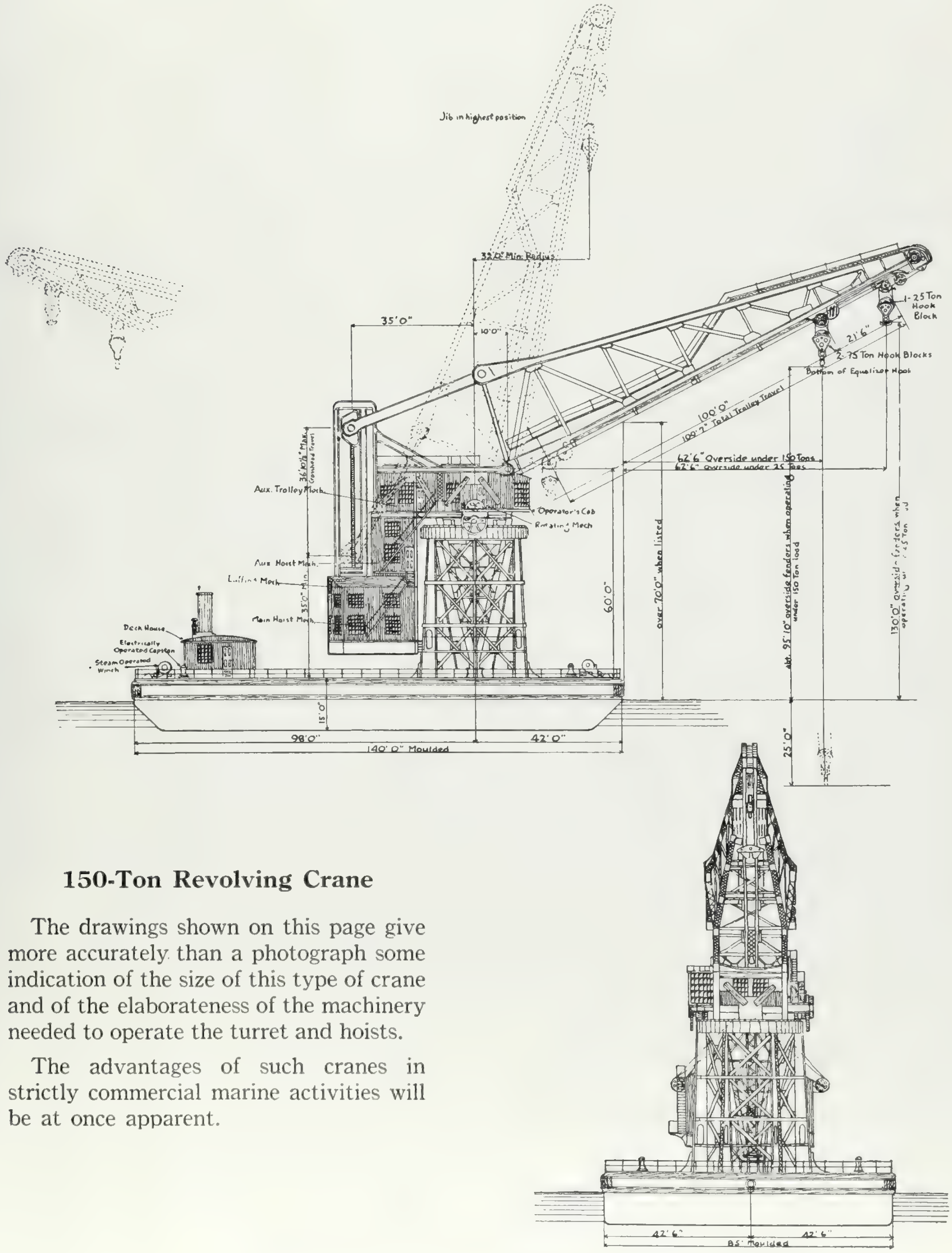
SHOWING THREE PIERS



Massive Floating Revolving Crane

TWO of the largest floating cranes ever built in the United States have recently been completed for the United States Navy and installed at the navy yards at Norfolk, Virginia, and Mare Island, California. On account of their great capacity, combined with portability and ease of control, these cranes have proved almost indispensable. They are used for placing of boilers, guns, armor plates, etc., and in many other places where accuracy of control is absolutely essential. During the war one of these cranes was used for launching small boats and the same crane has also been used to raise a sunken tug. Their utility is by no means limited to the uses enumerated above.

In all ports and harbors heavy pieces of machinery are constantly handled in and out of ships, often at a disadvantage, and it is seldom convenient or desirable to take the ship to a specially equipped pier for the purpose of handling a few heavy pieces of cargo. A floating crane, however, can be taken to the ship and handle such material at the ship's regular berth.

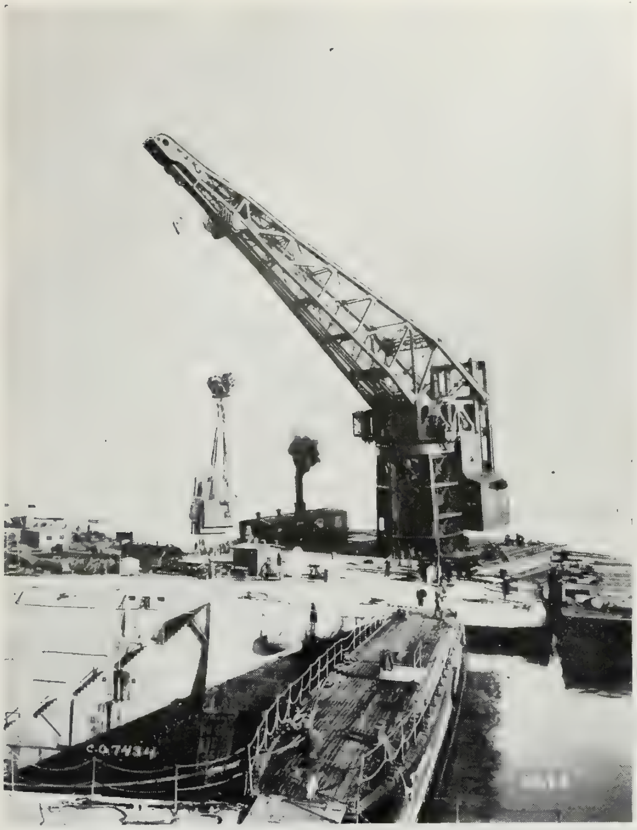


Plan and elevation of 150-ton Floating Revolving Crane

150-Ton Revolving Crane

The drawings shown on this page give more accurately than a photograph some indication of the size of this type of crane and of the elaborateness of the machinery needed to operate the turret and hoists.

The advantages of such cranes in strictly commercial marine activities will be at once apparent.



One Hundred and Fifty Ton Floating Crane at Mare Island Navy Yard with test load on the hook

The cranes are designed to lift 150 tons at a radius of 105 feet and at a speed of 4 feet a minute with a vertical range from 25 feet below to 95 feet above the level of the water.

The main hoist is comprised of two separate units of 75 tons' capacity each, and the hook blocks, being suspended from a fixed position on the jib, are arranged to be connected together when handling 150 tons.

A 25-ton capacity hook block is suspended on a trolley which travels along the under side of the jib. This hoist has a vertical range from 25 feet below to 130 feet above the surface of the water and hoists 25 tons at a speed of 12 feet a minute, or 5 tons at 60 feet a minute.

The jib, carrying the maximum load, is luffed from its lowest position to the highest point in fifteen minutes, and in the reverse direction in about eleven minutes. A complete rotation of 360 degrees under full load conditions requires between four and five minutes.

General

The crane may be briefly described as follows: The pontoon, which forms the support for the superstructure, is of steel throughout, 140 feet long, 85 feet wide and 15 feet deep.

Full depth collision compartments entirely surround the pontoon, the interior of which is provided with longitudinal and transverse bulkheads. Compartments for the boiler plant and generating unit are provided in the after end, and have an open hatchway covered by a deck house. One end of this deck house is enclosed and used as an office.

The crane superstructure is located on the longitudinal center line of the pontoon 42 feet from the forward end. A fixed tower 43 feet high is secured to six bulkhead plates extending through the deck of the pontoon, and surrounds the pintle section of the rotating structure.

There are three sections of this rotating structure which may be designated as the pintle section, the machinery section, and the jib. The pintle section rests on a heavy step bearing attached to the deck, and extends above the top of the fixed tower, within which it rotates. The jib is hinged to the front side of the pintle section 60 feet above the deck and the rear side is extended to form a support for the machinery section, in which all of the operating units are located.

All of the motions of the crane are controlled from the operator's cab, which is located on the rotating structure just below and to the right of the jib hinge pin.

The jib is luffed by a screw-operated cross head which travels in vertical guides at the rear of the machinery section and is connected to the upper cord of the jib by heavy links. The jib is approximately 125 feet long and when in its upper position the total height is 190 feet above the water.

Four electrically driven capstans are located near the corners of the pontoon. The equipment also includes two steam-driven windlasses and the usual chocks, cleats, fair leads, etc. The total floating weight of the crane is about 2600 tons.

Main Hoist Mechanism

Each of the 75-ton main hoist blocks is operated by a hoisting unit consisting of a winding drum connected by three cut spur gear reductions to a 40-horsepower series wound motor. An electrically-operated disk brake is attached to the motor pinion shaft, and so connected that it sets instantly when the current is cut off the motor. In addition to this, there is also a mechanically-operated band brake for emergency use only, this brake being attached to the intermediate shaft. This mechanism is supported on a heavy cast bed plate.

Two 1½-inch steel cables lead from the drum around deflecting sheaves to the 75-ton hook blocks. The gearing is properly proportioned to produce a hoisting speed of 4 feet a minute when handling a 75-ton load and 8 feet a minute at half load.

The two main hoisting units are located in the lower part of the machinery section of the rotating structure. When it is desirable to operate these two units simultaneously, they may be positively connected together by a clutch provided for this purpose.

A master switch in the operator's cab operates the magnetic switch controller which regulates the hoisting mechanism. The magnetic controller is provided with a dynamic braking device to give positive and accurate control when lowering heavy loads.

Auxiliary Hoist

The 25-ton auxiliary hoist block is operated by a hoisting unit located in the machinery section of the rotating structure directly above the main hoist units. This mechanism consists of a drum connected by spur gear reductions to a 40-horsepower series wound motor. Selective speed gears are introduced into this mechanism, which is required to hoist the full load of 25 tons at a speed of 12 feet a minute, or 5 tons at 60 feet a minute. The motor operating this mechanism is fitted with an electrically-operated disk brake so arranged as to set instantly when the current is cut off. A lever-operated mechanical brake is also provided on the intermediate shaft. This mechanism is also mounted on a heavy cast-iron bed plate. The control of the motor is identical to that of the main hoist units.

Auxiliary Trolley Mechanism

The 25-ton block is suspended from a movable trolley which travels along the under side of the jib. The mechanism for moving this trolley is located over the auxiliary hoisting mechanism. On account of the inclination of the jib, in its highest position, being nearly vertical, the front trolley ropes are required to take practically all of the hook load, and with the boom in its upper position the load is raised as the trolley is moved toward the outer end of the jib. On the other hand, very little pull is required in the reverse direction.

The mechanism for this motion consists of two drums geared by spur gear reductions to a 40-horsepower series wound motor. The drums are of different diameters. The ropes from the larger drum lead around deflecting sheaves at the outer end of the jib and connect to the trolley, forming a two-part system. The ropes from the small drum are attached directly to the trolley. The mechanism is mounted on a heavy cast bed plate and is controlled in the same manner as the hoisting units.

Jib Luffing Mechanism

The jib is luffed by a crosshead moving in vertical guides at the rear of the rotating structure and connected by two links to the back of the jib. The vertical movement of the cross head is controlled by two screws, geared by bevel and spur gearing to two 40-horsepower series motors.

The thrust on the screws is carried by two conical roller bearings, each of which is required to withstand a load of about 450,000 pounds. The screws are of forged steel 9½ inches in diameter and about 52 feet long, with sufficient thread to produce a cross head travel of about 37 feet. This travel is accomplished in about fifteen minutes under full load.

An electrically-operated disk brake is connected to each of the motor pinion shafts and an emergency brake, hand operated, is provided on the intermediate shaft.

Rotating Mechanism

The entire rotating structure is supported by a single step bearing secured to the deck of the pontoon in the center of the fixed tower. Under full load conditions the vertical pressure on this bearing is about 2,000,000 pounds, which is carried on bronze and steel disks about 44 inches in diameter. A horizontal thrust of about 700,000 pounds is also taken at this point.

The bearing proper is made of steel castings, the upper portion being in the form of a ball and socket to insure perfect alignment.

The rotating structure is maintained in a vertical position by a horizontal roller bearing ring completely enclosing the pintle section of the rotating structure. Sixty cast steel rollers held in a circular frame comprise this horizontal bearing. A circular path surrounding the rollers is secured to the top of the fixed structure about 43 feet above the deck. A bevel gear ring 29 feet in diameter is secured to the fixed structure and meshes with two bevel pinions carried on the rotating structure at diametrically opposite points.

The pinions are geared by three reductions of cut spur gearing to separate 40-horsepower series motors, and the gearing is proportioned to produce a complete revolution in four minutes under full load. The motors and the adjacent gearing are mounted on a cast bed plate, and each is fitted with an electrically-operated disk brake. Each motor jack shaft is also provided with a lever-operated emergency brake.

Generating Plant

Electric current for the operation of the motors and lights is supplied by a cross compound marine engine direct connected to a 150-kilowatt, 250-volt D. C. generator. The power leads from the main switch board terminate in contact shoes attached to the fixed tower and engaging collector rings on the rotating structure.

Boiler Plant

Steam for the engine generator set and for the windlasses is supplied by a 200-horsepower internal fired dry back return tubular Scotch marine boiler, having two corrugated furnaces and designed for a working pressure of 150 pounds. The equipment includes feed pumps, injectors, feed water heaters, etc. The boiler and generator are located in separate compartments in the after part of the pontoon.

Capstans

Four electrically-driven capstans are located at the corners of the pontoon. A 15-horsepower motor fitted with a single reduction of spur gears drives a horizontal worm and gear contained in a cast gear case secured to the bottom frames of the pontoon. A vertical worm wheel shaft extends through a bearing attached to the deck of the pontoon and supports a 16-inch capstan barrel. The machine is arranged for high or low speed power operation or the gearing may be disconnected and bars for hand operation inserted in the head. Internal gearing in the capstan barrel is so arranged that the change from high to low speed is effected by simply reversing the motor.

At 40 feet a minute the rope pull exerted is 3000 pounds, or 10,000 pounds at 10 feet a minute.

Windlasses

At each end of the pontoon, located on the longitudinal center line, is an anchor windlass. These machines are of single wildcat type, driven by a pair of 10-inch by 10-inch engines. Bevel gears on the crankshaft drive a vertical worm and worm wheel connected to the shaft carrying the wildcat. The engine is controlled by a steam reverse valve. This machine is designed to handle a 2-inch navy stud link chain, which is stowed in a locker built into the pontoon directly beneath the windlass. A chain stopper is also provided over the hawse pipe through which the chain passes through the anchor. This stopper is included for the purpose of taking the strain off the windlass when the crane is riding at anchor.

HANNA ENGINEERING WORKS SUCCESSOR TO VULCAN ENGINEERING SALES COMPANY

The Vulcan Engineering Sales Company, sales agent for Hanna Engineering Works, Mumford Molding Machine Company, Q M S Products, and the J. C. Busch Company, has been dissolved as of June 30, 1919, and on and after that date all business formerly done by the Vulcan Engineering Sales Company as sales agent will be transacted by Hanna Engineering Works.

It is believed the dissolution of the sales agency and consequent elimination of a third company will enable the Hanna Engineering Works, by dealing direct, more promptly and efficiently to serve the trade.

"Helping Herself"

By P. E. Kriebel

Marine Sales Manager, American Engineering Company

P. E. Kriebel

SHE has just passed through the Narrows and is cutting her maiden bow-wave in the Atlantic. I contemplated her as she passed. Impersonally, she was only a ship, a hull, power driven and capable of movement. Intimately, she grew and expanded in my mind until she represented a marvel of ingenuity — a miracle, in fact. I knew

"What masters laid her keel,
What workmen wrought
her ribs of steel."

I likewise knew, and knowing, revered the master mind which marshalled the multiplicity of parts and problems into proper sequence during her building.

Such thoughts lead to retrospection, and I began to visualize her for what she is and what she consists of—an intricate problem; too seldom considered as one looks casually upon the harbor and its floating contents.

She moves about, literally a living thing, impelled by her own power plant, self-dependent, self-sustaining, self-sufficient, and nothing short of accident can compel her to ask outside assistance.

When she stops, she still supports herself, handles her own anchor and warps herself along to her dock. Under those battened hatches are the cavernous cargo holds, the chief source of profit to her owners, the contents of which must be unloaded and loaded quickly, if revenue is not to be affected unfavorably.

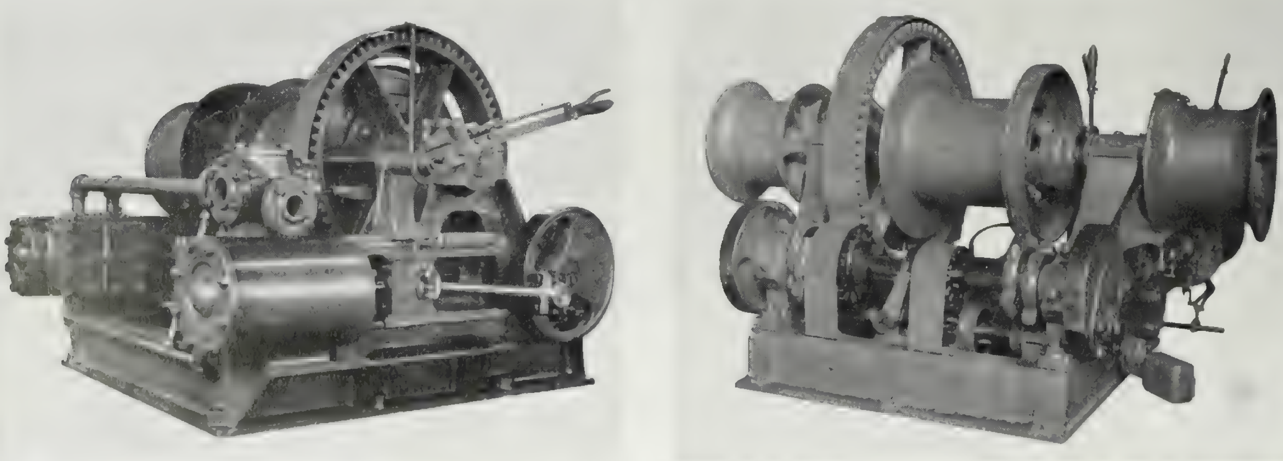
We hear a good deal nowadays about spending millions upon port and terminal facilities. But if our ship is loaded in her home port, by the most modern and up-to-date array of cranes, conveyors, trucks and lifts, without helping herself in the least, what of her when she leaves? Instantly she should become the proud, self-reliant thing she was meant to be. All the ports of call will not have these improved methods, and she will therefore have to unlimber her own arms and elbows and fingers and reach out and down and around,, accomplishing, by "helping herself," the expeditious results desired.

And helping herself in cargo handling presents one phase of the problem—one rapid turn around—which, to my mind, is a fertile field for research. The average ship's winch is at best a crude proposition, built rugged, because badly abused, efficient to a degree, but it represents a method handed down through generations.

Few ports will be equipped with up-to-date methods for many years to come; many ports never will. So, the natural lane for improvement lies right on board the ship herself. There are many possibilities in the situation which if properly developed, will truly add to the prowess of the ship, her revenues and time saved, thereby ably and efficiently aiding her to "help herself."

On the Great Lakes, bulk cargo handling has become improved to a degree hardly to be surpassed, all such loading and unloading being done from outside, since the ships call at fixed ports efficiently equipped. The nature of the general cargo for ocean trade presents a different and more difficult problem, not only as regards handling at the hatches, but stowage in the hold. Warehouses, terminals and piers are being equipped with appliances, the design of which is the result of studious analyses of general cargo handling. Surely, these same principles have within them some idea applicable aboard ship, which will enable the same speed and labor saving, when she is called upon to load or unload without assistance.

Then will she be able, without reservation, to shake off all shackles of dependence, and, by helping herself, to moor at a buoy and perform her functional duties with as much alacrity as when at the most up-to-date dock or pier.



Two well known types of Ships Cargo Winch

THE DIESEL POWERED SHIP

(Continued from Page 125)

on building ships that are so constructed with reference to their size and general design as will best serve us in our competition for the world trade.

In this country we have an abundant supply of oil, while our supply of coal (especially on the Pacific Coast) is not so plentiful.

With the question of the mechanical and commercial success of the Diesel engine disposed of as beyond a question of doubt, the logical thing for us to do is to adopt this class of machinery for the ships which we intend to send out into the world's market to secure us our portion of the world trade which rightfully belongs to us, as we know that this ship will be the hardest competitor for our foreign brothers and the one which will be the most difficult to chase off the seas.

It is now generally known that foreign shipowners and shipbuilders are making extensive plans to enter the Diesel engine field. Vessels of all sizes and classes are now building all over Europe. Ship operators in Great Britain have disposed of a great many of their older vessels to Italy, Spain and other countries, while they themselves are straining every point to rush along for their own use a large number of modern Diesel-powered ships.

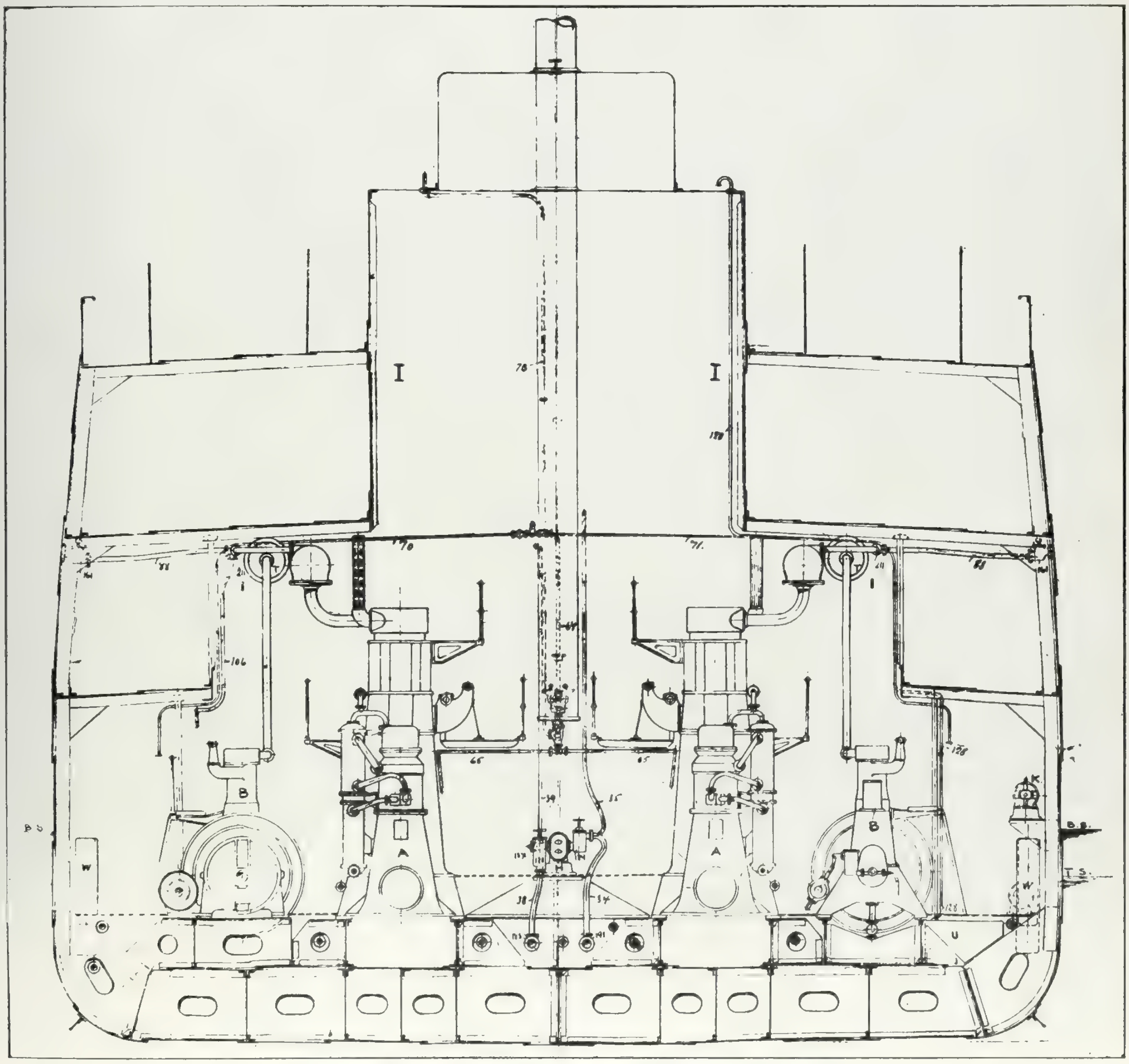
Norwegian yards are engaged in turning out a number of motorships, and the work is being rushed along as fast as the necessary materials can be obtained and the capacity of the yards as well as labor situation will allow.

Burmeister & Wain, Copenhagen, have contracts for all the work that can be turned out until 1927.

The Gottenburg Shipbuilding Company of Gottenburg, Sweden, has received a contract to build eight new motorships for the Transatlantic Shipping Company of approximately 12,000 tons' capacity each.

When we note that the foreign shipowners are so anxious to build motorships in preference to steamers, it is time for us to look into the reason why this is done.

The Diesel engine has come, and is here to stay. There is no longer a question as to its success, and its commercial advantages over our present method of propulsion are so enormous and manifold that it is incumbent upon those who are at the helm of our present extensive ship construction to see that an appropriate portion of our new merchant marine is fitted out with this most modern and economic marine machinery in order that it shall not be necessary for us in the not very distant future to lay up our vessels because they can-



Transverse section through engine room of motorship Borgland

Motorship Borgland in Panama Canal

not compete, or otherwise have to go to the added expense of removing the steam engines and boilers and installing Diesel engines in their place.

A proof that some of our shipowners are waking up to the reality of this is shown in the fact that a conservative firm like the Standard Oil Company of San Francisco recently let a contract for the construction of a small oil tanker to be fitted with two 500 b. h. p. Diesel engines.

This vessel will be fitted up approximately along the same lines as the ships built by Burmeister & Wain. There are to be three large auxiliary engines which are to drive electric generators and air compressors. Each of these generators will be large enough to furnish sufficient current to drive all the oil pumps and other auxiliary machinery.

A small donkey boiler will be fitted which will be used to furnish steam to the heaters in the rooms only.

The second vessel of the same class, but of a larger size, is now being planned. This ship is to be fitted with two 850 B. H. P. Diesel engines.

Below we give a brief description of the Norwegian motorship Borgland, which recently arrived in San Francisco on the second voyage from her home port. This ship was built at Akers Works near Christiania, Norway, and is one of a fleet of six motor vessels owned by the firm of Fred Olsen. One ship of the fleet, the M. S. Bonheur, a sister ship to the palatial motorship George Washington, was completed last winter and was sunk by a mine in the English Channel, outward bound on her maiden voyage. The principal dimensions of the Borgland are as follows:

Length over all, 377 feet.
Length B. P., 362 feet.
Beam moulded, 51½ feet.
Depth moulded to 'tween deck, 17 feet 6 inches.
Depth moulded to main deck, 25 feet 6 inches.
Depth moulded to shelter deck, 35 feet.
Draft loaded, 25 feet 8½ inches.

The double bottom throughout the ship is fitted to carry fuel oil and contains a total of 955 tons of oil when filled to capacity. The after peak tank is used for fresh water. The fore peak tank, while it is fitted to carry fresh water if necessary, is usually empty.

On her arrival at San Francisco, this ship was loaded with 7500 tons of coal for the United States government, which was discharged at California City. The vessel is fitted with two six-cylinder Burmeister & Wain engines, diameter of cylinders 21.3 inches and 28¾-inch stroke, each cylinder developing about 175 I. H. P., making a total of 2100 I. H. P. for the two engines, turning 150 R. P. M.; driving propellers 10 feet 4 inches diameter, 8 feet 3-inch pitch, and making an average speed in fair weather of 10 knots loaded. This vessel consumes 7.5 tons of oil a day under normal operating conditions, or a consumption of .31 pound of oil an indicated horsepower hour for all purposes. Total consumption of lubricating oil amounts to eight gallons a day. The above mentioned consumption also takes care of the auxiliary engine, which runs continuously while the ship is under way.

It will thus be seen that this ship has sufficient fuel capacity in the double bottom tanks to steam almost 130 days without a stop.

Three auxiliary engines are fitted, each driving 60 K. W. electric generators which furnish current for all the motor-driven auxiliary machinery. When in port with all winches running, it is necessary to operate two of these auxiliary motors to furnish sufficient current to take care of the sudden varying loads without overloading the motors. Under this condition, the fuel consumption for both engines will run to forty-four gallons a day, figuring that the winches will operate only nine hours, after which time one engine is shut down and the other is then operated to furnish light only.

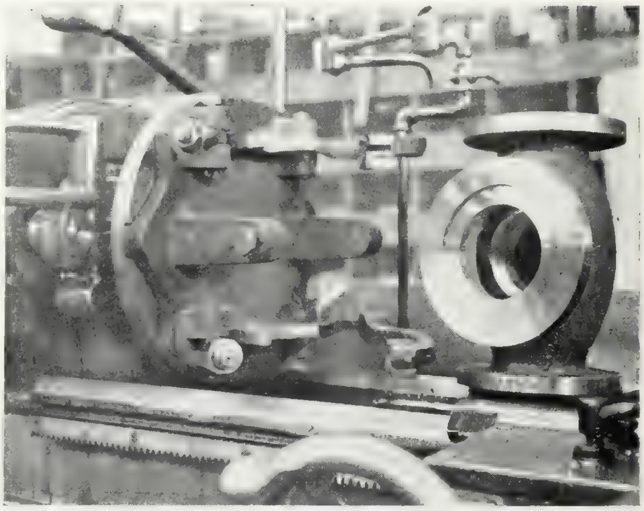
The remaining auxiliary machinery in the engine room consists of two bilge and sanitary pumps, two lubricating oil pumps, two lubricating pumps for engine cylinders, one ballast pump, one large two-stage air compressor furnishing air at 360 pounds for starting air tanks (this machine is driven by an 80 K. W. motor), two turning engines, one two-ton ice machine, all of which are motor driven. Deck machinery consists of ten winches, steering engine capstans, anchor windlass, all of which are motor driven, the steering engine being of the telemotor type. The ship has a total crew of thirty men, divided as follows: Engine room, 10; deck department, 15; steward's department, 5. The above vessel is the class of ship we shall have to compete with in the foreign trade, and from the description given it will readily be seen that it will be impossible even to approach this performance with the average steamer.

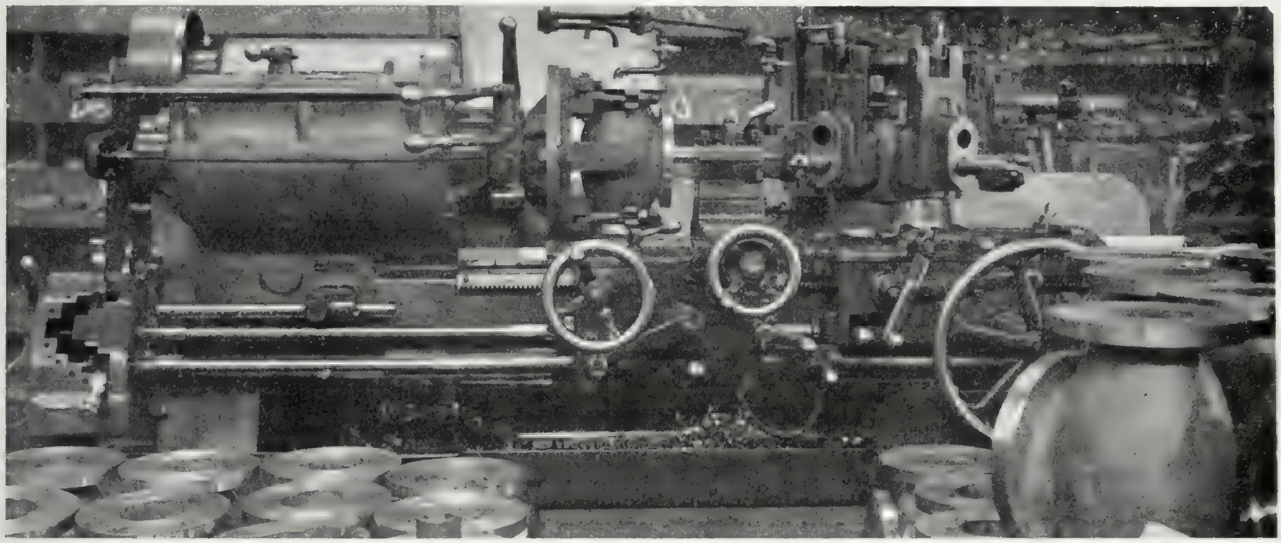
UNION GAS ENGINE COMPANY

THE Union Gas Engine Company has secured a contract for the construction of eighteen 300-horsepower four-cylinder heavy-duty Union marine engines and auxiliary equipment, for nine concrete tow-boats which are being built on the Atlantic Coast for the United States government. These engines weigh over thirty tons each, and will be shipped by rail or steamer to the Atlantic Coast. In addition to this work, the Union Gas Engine Company is working on a contract of sixteen 150-horsepower engines and sixteen electric light sets for the United States Navy Department, nearly all of them to be installed in towboats for the Atlantic Coast. The company is also working on 110-horsepower four-cylinder engines for the new airplane wrecking barges which are being built by Mare Island and New Orleans navy yards. In addition, they have a large volume of commercial marine work. The Union plant has been working three shifts for some time, and will be busy twenty-four hours a day for the next year and a half. Their airplane engine department is also busy, night and day, trying to keep up with navy orders for airplane engines.

Capacity of Turret Lathe Increased

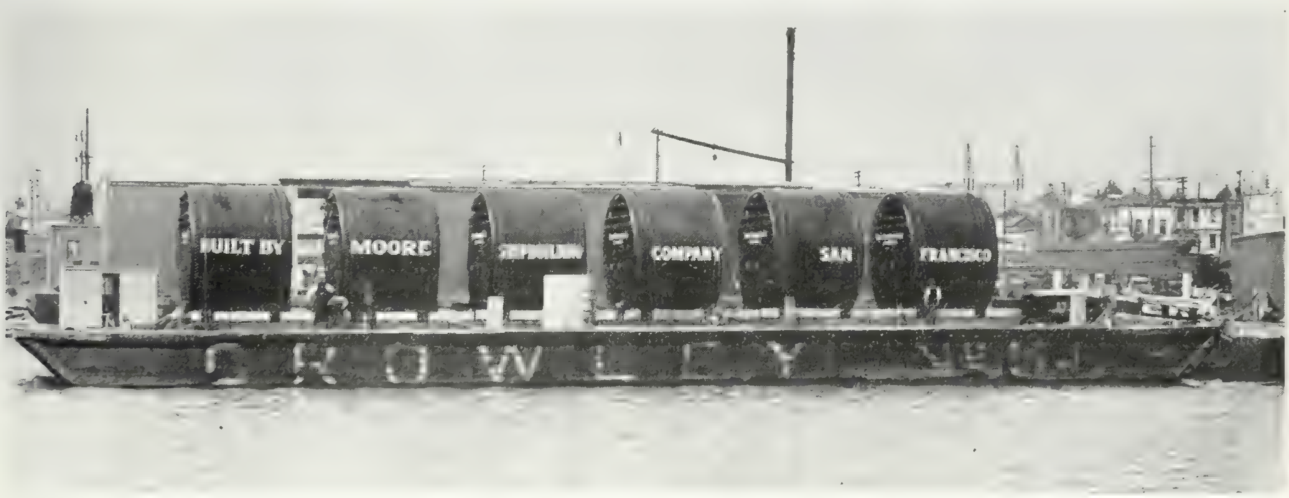
IN many of the shops of the Western manufacturers there have been developed in the war emergency machine processes which have led to changes in their methods of producing parts. One instance of this was observed recently in the brass finishing shop of W. T. Garrett & Company of San Francisco. W. T. Garrett & Company are manufacturers of valves and had taken a contract to supply large quantities of high-pressure valves for the torpedo boat destroyers for the United States Navy. In order to achieve greater speed in the production of small valves they had installed a 2-A Warner & Swasey Universal hollow hexagon turret lathe. The rapidity with which these valves were machined on this tool in comparison with the slow process of machining the larger valves on an engine lathe caused the foreman to do some thinking, with the result that he made the jigs and holders and special tools necessary to fit up the turret lathe to take the larger valves. It was found that the lathe stood the strain perfectly and that the production time on these valves was reduced by this method over 30 per cent. Our picture shows the Warner & Swasey lathe set up to machine 3½-inch high-pressure globe and angle valves of "Composition M" navy bronze.





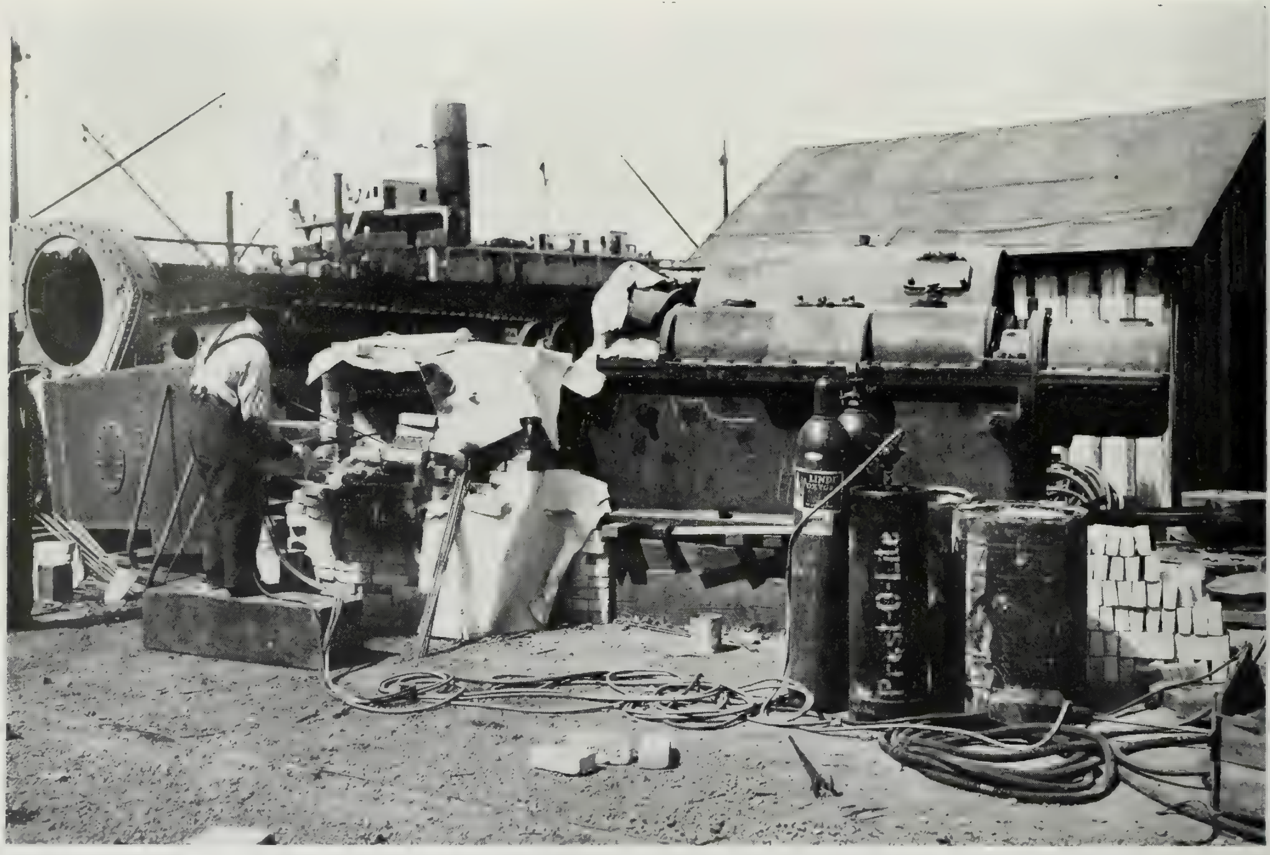
Warner-Swasey Number 2-A hollow hexagon turret lathe at the brass finishing shop, W. T. Garrett & Company, fitted with special holder to machine 3½-inch high-pressure globe valve. Upper view shows closeup of holder and valve

With proper advice from the engineering organizations of machine tool manufacturers, many operations of this kind might be installed with great saving in the ordinary machine shop.



Six Scotch marine boilers lashed to a Crowley barge to be towed from the Moore Shipbuilding Company's plant on the Oakland Estuary to San Pedro. This is said to be the first instance of shipment by sea in this way. The boilers on flat cars could not be taken through the tunnels of the Tehachapi and it was impossible to obtain steamer space in time for delivery. The Crowley Launch & Tugboat Company proposed delivering these boilers on a seagoing barge under tow of one of their powerful tugs and the experiment was made and carried out without a hitch.

A Large Welding Job



Welding of a thirty-five-ton Westinghouse marine reduction gear case at a local yard

RECENTLY at a Pacific Coast shipyard a Westinghouse marine reduction gear case slipped off the hook of the yard crane while being unloaded from the car, and one end was completely broken off. The shipbuilders, knowing that the ordering of a new case would mean a delay of several months, called into consultation some oxy-acetylene welding experts. L. Stettner, mechanical engineer of the Victor Oxy-Acetylene Equipment Company, undertook to make a perfect weld on this broken case without delay and at a nominal cost.

Four bearings at the broken end were removed from the case and the part broken off was put back and held into place by heavy angle irons which were machined especially for this job to fit the gear case. A temporary furnace was erected around that end of the case, as shown in our illustration. Two thousand bricks were used in this furnace and a heavy charcoal fire was started at eight o'clock in the morning. This fire was kept going all day and at five o'clock in the evening it was judged that the temperature of the case was right to commence welding.

Two Victor water-cooled torches were used and the weld was completed in less than five hours, the majority of the welding being done upon a perpendicular lined crack. The thickness of the casting at the point broken varied from two to three inches. There was just one crack, the total length of which was thirty-six inches. Two welders worked on the job, using in all fifty-two pounds of cast iron filler rods and two pounds of Victor flux with a gas consumption of 410 feet of Linde oxygen and the same amount of Prest-O-Lite acetylene.

The furnace fire was withdrawn slowly, the cooling process taking thirty-eight hours, after which the bricks were removed and the case dressed down to its original condition. It was found that the weld was practically the same as the original metal and, when the dressing was completed, it was hard to find the weld on the case. This achievement resulted in a financial saving of above $15,000 and avoided a delay of at least four months.

Summary

Weight of casting, 35 tons.
Thickness of casting, 2 to 3 inches.
Total length of crack, 36 inches.
Time preheating casting, 9 hours.
Time welding casting, 5 hours.
Linde oxygen consumed, 410 feet.
Prest-O-Lite acetylene consumed, 410 feet.
Cast iron filler rod used, 52 pounds.
Victor flux used, 2 pounds.
Number of welders, 2.

NAVY YARD DEVELOPMENT

An interesting development took place at the League Island navy yard, Philadelphia, on July 1, when the first heat of steel was made in the "Greaves-Etchells" furnace recently installed by the Electric Furnace Construction Company, Finance Building, Philadelphia, in the new foundry.

The foundry itself is said to be one of the most modern and up to date in the whole of the United States, and the manufacture of steel in this yard opens up very interesting possibilities for larger future development.

PORTLAND

By Special Correspondent

NO single trade prospect in the annals of the Columbia River district has offered more permanency than is promised from the visit to Portland, July 7, of a party of vessel owners, shipping men and tradesmen representing Norway, Sweden ,Denmark and Iceland, who spent a greater part of the month in the vicinity. They are concerned in contracting for future requirements all the way from 6000-ton steel steamers, 1100-ton vessels and trawlers, to canned fruits, wool, lumber packing-house products and, in fact, everything for which Northern Europe is dependent on the outside world. The first means of delivering the shipments to the purchasers is via the line Williams, Dimond & Company are establishing from Pacific Coast ports.

The party came here through the efforts of the Pacific International Corporation, of which Emery Olmstead, president of the Northwestern National Bank, is the head. J. Fred Larson is vice-president and he made a special trip to Scandinavian countries in March, organizing the party and returning with it. Arthur C. Callan, secretary and treasurer of the corporation, has looked after numerous inquiries at this end, and with the arrival of the visitors the three have shared in directing an itinerary that has carried them to all sections and plants, fields and orchards, in the output of which they are interested. Trips have been made in the harbor, with the Commission of Public Docks and the Port of Portland Commission as cicerones, and the Chamber of Commerce has entertained them and assisted in supplying data to aid in their contracts.

The visitors include Tryggve Prosch and L. Sagam of Christiania; Christian Winther of Norway and Chile; F. J. E. Berner and Olaf Pay of Copenhagen; H. Malmstrom and F. Vernius of Stockholm, and Captain Hjalti Jonsson of Reykjavik, Iceland.

Members of the party hold commissions from steamship operators who propose to add some of their tonnage to the Northern Europe-Pacific Coast route, augmenting the regular services, and one organization will send a representative in August to go into the details of a Columbia River-Oriental line, believing that Norwegian steamers are the best prepared of the world's merchant marine to compete with the Japanese, from an economical standpoint. Captain Jonsson entered into negotiations at once with the Albina Engine & Machine Works for the construction of two steam trawlers, plans and specifications for which he brought from Iceland. The subject of cargo steamers has also been broached and indications are that contracts will be forthcoming.

Another steel ship construction development of the month has been negotiation on the part of Bayly Hipkins, Pacific Coast manager of the Foundation Company, though acting independently of his employers, for the purchase of the stock of A. O. Andersen & Company in the Albina Engine & Machine Works.

Rose float entered by the Albina Engine & Machine Works in the parade of the Portland Victory Rose Festival, June 11 to 13, 1919. This design won first prize as the most unique float. It was constructed entirely of out-door roses. The hull in pink with a waterline of moss, the deckhouses of white roses and the booms and masts of dark red. More than 60,000 roses were used in its construction.

TACOMA

By Special Correspondent

WITH the exception of some small building at the Tacoma Shipyard, work is at a standstill in the Tacoma wood shipbuilding yards. The plants are selling off a great deal of their machinery and it is believed that the sites occupied by the yards will be turned over to other industries within a few months. The Tacoma Shipyard is turning out a small cruiser for W. R. Rust of Tacoma to be used in connection with mining properties, it is said, in Alaska. Babare Brothers will continue in the small boatbuilding business and will probably take up large work if any is offered.

On a trip in which business and pleasure will be combined, J. A. Eves, vice-president and general manager of the Todd Drydock & Construction Corporation yards at Tacoma, left for New York July 12. Mr. Eves will be away about six weeks. During the time he is in the East, Mr. Eves will visit the various shipbuilding yards and look over the building situation.

Including their own steamers, the Pacific Steamship Company is now operating seventy-six vessels. These vessels are engaged in the various trades on the Pacific and some have gone around to the Atlantic. H. F. Alexander, president of the company, may leave for the East within a short time on business connected with his company and to confer with Shipping Board officials.

With a full cargo of flour manufactured by Tacoma mills, the steamer Quittacas sailed from Tacoma July 11 bound for the Atlantic Coast and possibly Europe. The departure of the vessel was of more than ordinary interest to Tacoma business interests, as it combined the sailing of a Tacoma-built ship loaded with Tacoma-manufactured freight.

Mrs. George Wiley, who sponsored the steamship Zarembo, launched by the Todd Dry Dock & Construction Corporation at Tacoma

The Quittacas is one of the 7500-ton type of vessel built at the shipbuilding plant of the Todd Drydock & Construction Corporation and was launched January 4 of this year. The vessel is in command of Captain Alexander F. Ogilvie, an old-time Tacoma shipmaster, who was in charge of the Westover when that vessel was torpedoed off the Coast of France during the war. At the time the Quittacas was loading, the Ossining, another of the Todd vessels, was taking a cargo of wheat from here for the East Coast.

Extensive changes have been made by the Commercial Dock Company in their offices at Tacoma, with the result, it is said, that the company have as fine offices as any dock company on the Sound. This dock is under the management of R. W. Gillam, one of the old-time pursers of the Pacific Steamship Company. Mr. H. F. Alexander of the Pacific Steamship Company is president of the Commercial Dock Company, and it was at this dock he began his career in the shipping game.

Lumber business out of Tacoma remains very good and there is a little movement of vessels in the lumber trade all the time. At present the schooner Mount Whitney is loading for the United Kingdom and the Robert Hind is loading for a Pacific port. The Eyota is also loading for the United Kingdom. In the California trade there is always one of the coasters loading.

New vessels will be added to the Tacoma-Japanese service of the Osaka Shosen Kaisha, replacing some of the smaller ships now in the trade, according to M. Higuchi, general manager of the company, who returned a few days ago from Japan. Mr. Higuchi was away nearly four months. He states that business conditions following the signing of the armistice are resuming normal again in Japan. The vessels now in the trade between Tacoma and the Orient will be maintained, aside from releasing chartered and extra vessels. The new ships, which are of the Manila Maru type, will go into service about the first of next year. The New Orleans-Cuba line will operate for the present one vessel a month. The line was inaugurated with the Panama Maru east-bound sailing from Tacoma July 6. Mr. Higuchi brought his family with him from Japan and will make his home here. While in Tacoma Mr. Higuchi has made many friends who were glad to welcome him back.

It is expected that condemnation suits will be started within a very short time covering a site of 240 acres proposed here for port commission docks. The land is being surveyed and the bonds voted upon by the city and county sold. It is said that there is already an inquiry for dock facilities from the port.

BIG SAVING BY QUICK WORK IN SEATTLE YARD

By Frank C. Doig

CUTTING the average time squarely in half, the Seattle shipbuilding firm of Skinner & Eddy recently completed repair work on the Japanese steamship Yomei Maru in twenty-one days, as against the usual time of six weeks. The saving to the owners in the ship's time was figured at a total of $44,000, based on a rate of $2000 a day.

The rudder post and rudder of the Yomei were carried away by heavy seas while the vessel was en route to Seattle from the Orient. The ship went into drydock on the morning of May 30 and was floated and returned to commission on the morning of June 19, refitted with a new stern frame, stern plates, rudder post and a 32-foot rudder.

From the minute the ship went into drydock the work was rushed, three eight-hour shifts being constantly engaged in the making and installing of new parts.

Stern plates were first removed and the stern frame taken out, the propeller and tail shaft also being dismantled. New parts were forged, machined and delivered ready for installation on the morning of June 13. Installation work started the next morning and was soon completed. Nearly 6000 new rivets were driven within twenty-four hours by an expert riveting crew.

Ray Anderson, Purchasing Agent, Skinner & Eddy Company

The rudder, weighing two and one-half tons, measured thirty-two feet in length and was five and one-half feet wide. The rudder post, together with arms and fittings, weighed nearly ten tons, while the massive stern frame weighed nearly twenty-one tons. Workers were hampered in the dismantling process by having to cut through a thick section of concrete in the after peak tank in order to get at and back out the rivets holding the stern plates and frame.

M. G. Thomle, President of the Norway Pacific Construction & Dry Dock Company

REORGANIZATION OF SHIPBUILDING PLANT

The reorganized Norway Pacific Construction & Dry Dock Company has secured several foreign contracts. Backed by Norwegian capital and under the able leadership of its energetic and efficient executive, M. G. Thomle, the company is looking forward to a career of increased usefulness.

LOS ANGELES

By Special Correspondent

THE strike of the employes of the Los Angeles Shipbuilding & Drydock Company here and the reopening of the plant has been the center of interest in shipyard circles in Southern California and on the Coast for the last two months. The strike originally was called by the machinists' union, who charged that the company in reducing its force had discharged union men and had kept non-union men. The machinists asked the aid of the Los Angeles Metal Trades Council and the latter, after conferring with the general shop committee, called the entire force of men from work in the plant.

After several conferences between the general shop committee and the representatives of the shipbuilding company, the company announced that it would make the three points of difference the policy of the yard. These points were collective bargaining, seniority rule (other things being equal), and reinstatement of men so that they may not lose their seniority. The company requested that the election of the shop committee be held in the yards, declaring that all employes of the yards should have a vote in the selection of that committee. To this the representatives of the employes refused, declaring that the shop committee had been elected in the various union halls since the institution of the yard and that they desired this practice to continue. It was on this point that the conferences split. On Thursday, July 10, the company opened its yards, requesting all former employes to return to work, but very few of the strikers did so.

In an effort to reach a compromise on the point of election of the shop committee, the company announced its willingness to rent a hall near the shipyard where all employes could meet and elect the committee and thus avoid an actual election in the yard. The company declared that this would be an election on neutral territory. This compromise was refused by the men.

Though the shipbuilding company refused to recognize the Metal Trades Council or union officers in the negotiations, the latter probably were carried on in a manner never before attempted in a labor dispute. Both the company and the union officers inserted signed statements in the daily newspapers and the attitude of each was learned in this manner by the other. One of the financial features of the strike was the loan of $15,000 by the First National Bank of San Pedro to the Boilermakers' Union to pay strike benefits. The loan was made on the security given through dues of the members due the union. At the present writing there seems to be no disposition on the part of either party to the strike to reach the middle ground of agreement, the shop committee election methods being the great difference of opinion.

With the announcement that President Wilson may attend a review of the Pacific fleet off San Pedro, preparations for the entertainment of the fleet are being made by the officers of the submarine base here and the city and port officials. According to statements of naval officers, many preliminary preparations should be completed. These include the procurement of ash lighters to care daily for the ashes from the coal-burning vessels of the fleet, the installation of many landing stages along the waterfront and the installation of telephone stations on the wharves. Some 28,000 men are expected to come as officers and crews of the fleet. Naval Secretary Daniels will be here and inspect the site of the submarine base, plans for which have been drawn. Among the vessels which will arouse interest here is the torpedo boat Farragut. The latter was the training ship for the naval militia of Southern California and was stationed here before America entered the war. She was sent East when this country entered the conflict.

The Union Oil refinery in the inner harbor has begun the shipment of the refined product. With but six stills working the company already is shipping ten cars of gasoline daily. Some 400 men now are employed in the refinery.

The steamer Bakersfield was launched from the yards of the Southwestern Shipbuilding Company, with Mrs. W. O. Todd, one of the prominent war workers of Bakersfield, as sponsor. The vessel had been named for the California city, owing to the record made in the Victory Loan drive. The West Inskip was another steamer launched from the yards of this company in the last month.

The McCrosky Packing Company, with plants here and at Tulare and Huneme, has entered the bankruptcy court. The company was engaged in the packing of fish, fruits and vegetables. The assets were given as $342,633 and the liabilities as $267,735.

The dredgemen of San Pedro who recently organized a union and then went on a strike against the Standard American Dredging Company have compromised their differences with the company and now are back at work.

Captain J. Hansen, for many years skipper of a steam schooner, was appointed port pilot here by the harbor commission in July.

The California-Mexican Steamship Company has been organized by Long Beach and San Francisco men and a contract for the construction of a steamer has been let with the Long Beach Shipbuilding Company. The company intends to enter the trade between Los Angeles and Mexican ports. John F. Craig has been elected president of the company, J. A. Rominger vice-president, Frank Philpot treasurer, and L. Swayne consulting engineer. The first steamer will be of 1500 tons and will cost $225,000. She will be 175 feet long, 34 feet beam, and 20 feet deep.

SAN FRANCISCO

CHANGES AT FIREMAN'S FUND

SEVERAL changes have been made in the arrangements of the head office of the Fireman's Fund Insurance in order to utilize their building to its utmost capacity.

The marine department has been moved from the second floor, replacing the general fire department, which now occupies part of the second floor. Private offices for the secretaries have been installed on the second floor and a general rearrangement has been made to increase the working capacity on this floor.

The automobile, marine and city fire departments now occupy the first floor. The general fire department and the private offices are on the second floor, and the accounting department is on the third floor. Convenient arrangements for files, purchasing and supply departments have been installed in the basement.

Nothing could show more graphically how the Fireman's Fund has grown than the way every inch of space is now being utilized, and in fact a portion of the mezzanine floor of the Insurance Exchange Building is also occupied by them.

The Fireman's Fund Insurance Company adjusted and paid its first aeroplane loss this week. The plane, a Curtiss model owned by Charles I. Stoffe of Vallejo, California, was completely destroyed by fire originating from damage done to the fuel supply system by a landing on poor ground which partially upset the plane and broke one blade of its propeller.

The pilot of the plane was forced to make a landing without choosing his ground because of the interference of his passenger with the plane's controlling mechanism during the flight. It seems that the controlling wires of the plane passed back through the passenger's seat, and that after leaving, the passenger began to meddle with these wires, making it almost impossible for the pilot to control his plane. The pilot, realizing the danger, made the best and quickest landing possible. He was unhurt, but the passenger, who turned out to be somewhat intoxicated, was rather seriously injured. Joy riding in planes is not apt to prove popular if this is any indication of the possible consequences.

A QUICK REPAIR JOB

ON a recent trip of the steamship Rose City, owned by the San Francisco & Portland Steamship Company, steam was discovered escaping between the high-pressure cylinder casting and the lagging. Upon removing the lagging for examination, it was found that the cylinder was cracked for a distance of about sixteen inches around the circumference. The chief fitted a jury patch as shown in the illustration. When finished, this job seemed good enough to warrant continued operation until a new cylinder could be conveniently made and installed. However, when the ship was ready to pull away from the San Francisco dock on her return to Portland, June 27, the crack suddenly extended for an additional seven inches.

It was considered unsafe to proceed, and her passengers who were already aboard were informed that the ship could not sail for some time. A new cylinder was ordered from the Bethlehem Shipbuilding Corporation and work begun immediately. The next evening at 7:30 p. m. the old cylinder was in the pattern shop. Drawings were made and the pattern was delivered to the foundry on the morning of the second of July. On July 9 the casting was taken to the machine shop, the morning of July 10 found the casting on the boring mill, and on July 17 the finished cylinder was taken down to the ship and ready to be installed. Installation was made and the ship could have sailed on her regular schedule on Sunday, July 20, but the sailing date had beet set and advertised for July 22.

The finishing of this job in twenty-one days is, we imagine, rather a record for such work in this port and shows that we have here the facilities and the will to help our ships in the rapid turn over The Bethlehem Shipbuilding Corporation are to be complimented upon the co-operation displayed by the heads of their different departments.

A NEW MOTOR TANKER

Considerable interest in shipbuilding circles has been aroused over the awarding of the contract by the Standard Oil Company to the Union Construction Company for a twenty-eight hundred ton Diesel engine oil tanker. The Union Construction Company's contract includes the construction of the hull and the installation of the machinery. The contract for the engines has been let separately to the Skandia Pacific Oil Engine Company, and calls for two 550-brake horsepower at 165 r. p. m. Werkspoor marine oil engines. All of the auxiliaries on these tankers will be driven by electric motors, and the performance of this installation will be watched with great interest.

ANNOUNCEMENT

At a meeting of the board of managers held in New York, July 1, Commodore Ellsworth P. Bertholf, formerly commandant, and Captain Charles A. McAllister, engineer-in-chief of the United States Coast Guard, were duly elected members of the board of managers of the American Bureau of Shipping, and were also elected vice-presidents.

PACIFIC COAST SHIPBUILDING RETURNS

The space usually given by Pacific Marine Review to the shipbuilding returns of this coast has been devoted this month to the list of steamship lines operating out of San Francisco. We wish to assure our readers, however, that this interesting feature of our magazine will be included in the September and subsequent numbers.

HONOLULU

By Special Correspondent

MID-SUMMER tropical calm has settled down over Honolulu harbor, but despite this being the slack season of the year, deep-sea visitors to the cross roads of the Pacific have held up with little diminution and the month of June showed a large number of entries. Several vessels arrived from Newcastle, among them being the brig Geneva, the schooner Olympic, and the barkentine Golden Gate, all carrying cargoes of coal consigned to the Inter-Island Steam Navigation Company, Ltd. Passage up from the southern latitudes is reported by the skippers to be unfavorable lately, due to the prevalence of strong head winds. A voyage of eighty days has been the average time.

With the exception of work on Pier 2, which is rapidly being reconstructed into a lumber wharf and should be finished shortly, and the commencement of work toward repairing Pier 14, the big improvement program for Honolulu harbor has not yet been launched. Plans for the improvements to Piers 8, 9 and 10 are still in the office of the harbor engineer and work of building sheds over the big piers will be put under way the latter part of next month. This latter project is by far the most important of the proposed improvements.

Coincident with the announcement that the big Matson liners, Maui, Matsonia and Wilhelmina, are expected to be back from transport duty on the Atlantic and on their old run between San Francisco and Honolulu by the first day of November, came the announcement a short time ago that the big Toyo Kisen Kaisha liner Siberia Maru will run in future direct between Yokohama and San Francisco, eliminating Honolulu. The China Mail liner Nanking was recently pulled off the run, which has made the shortage felt acutely.

Delegate Kuhio, now in Washington, seeks to extend the coastwise suspension regulation allowing foreign vessels to take passengers at this port for San Francisco, in order to make provision for relieving the traffic congestion. After the law is finally put back into effect, he would have the foreign vessels allowed to handle passengers from the Island to the coast by the payment of an additional 30 per cent of the price of the ticket, the bonus to go into the treasury of the United States, a concurrent resolution to this effect has been introduced in Congress by the delegate, but it is unlikely it will get action in less than two months.

Another sale of last month was the cruising yacht Kulamanu II, Hawaii's finest pleasure boat, which was auctioned off for $4850 to R. B. Booth, representing coast interests. The yacht has been here since 1909 and originally cost $16,000.

The Inter-Island Steam Navigation Company last week bid in the old marine railway at an auction held by the harbor board, paying $5200 for the lot of machinery and equipment. The land on which the railway is situated is needed for a new pier.

Residents of Midway Island received their first bag of mail in several weeks, or months, perhaps, when the auxiliary schooner Flaurence Ward, which has been anchored in the harbor since January 5, departed for a cruise to the lonely little cable island early last month. Only thirty-five people inhabit this islet.

Hawaii's "fleet" of warships was largely increased June 25, when six "R" type submarines, convoyed by the tender Beaver, arrived at Pearl harbor from San Francisco after less than eight days on the way. It has been announced here that Hawaii is to be the center of operations for sham battles and maneuvers on a vast scale to be held by the Atlantic and Pacific fleets at least once a year, alternating between Cuba and Hawaii. Such a program will insure Pearl Harbor becoming one of the most important naval bases under the American flag.

Last units of work for the completion of the dry dock at Pearl Harbor are rapidly being finished. The final layer of cement for the dry dock basin floor has been laid. A good portion of the keel block is in position and the giant pump is practically complete. The entire dock is to be ready in another month, according to Chief Engineer Francis B. Smith of the San Francisco Bridge Company, contractor for the dock.

Shipping Board steamer Guimba, which arrived ten days ago on her maiden voyage from San Francisco, encountered some of the hard luck that has attended a few of the Shipping Board steel vessels. Her rudder machinery got out of order two days out of Honolulu and she had considerable difficulty in docking. A number of new Shipping Board steamers have arrived this month to take sugar to New York, among the latest arrivals being the West Alcoz and West Cavanal, both of which are now in port.

Nautical men were exceedingly surprised last week to see Captain J. R. MacCaulay, veteran pilot of Honolulu harbor, back in the city. He recently resigned his post after twenty-seven years of continuous service in order to take a vacation trip to Scotland. When he reached San Francisco, however, he found that while he could get several opportunities to go, Mrs. MacCaulay must remain behind. Unwilling to go without her he returned to the land of the Aloha.

Coal imports into Hawaii the past year fell far below those of previous years, according to Raymond Sharp, acting collector of customs, who has just received figures on this commodity. In 1918 but 70,599 tons, valued at $374,412, were imported. Other years were as follows: 1916, 127,401 tons, valued at $348,693; 1917, 94,724 tons, valued at $287,499.

Marine Insurance

UNDERWRITING METHODS

By Charles F. Howell

THEFT and pilferage continue to supply marine underwriters with considerably more loss claims than should proportionately arise from these sources. Even so, many of the newcomers among those attracted to marine insurance by the large war risk profits have no hesitation in throwing in this coverage at almost nominal rates, under pressure of hunger for premium volume. Even at so good a figure as 5 per cent, the more experienced operators are not particularly anxious to have the business. The reason is the same as in the dissatisfaction that has long existed among Latin American merchants with respect of goods from the United States—inadequate packing. This serious shortcoming will have to be remedied if our people are to secure that large share of the world's trade for which they are preparing themselves. Goods are sent abroad in the flimsiest of containers, and it is no trick at all for even novices at pilfering to have all they want for the taking. For example, ginghams are shipped in either wrapping paper or frail boxes; whereas European exporters are accustomed to wrap them in oil-silk and pack them in tin-lined boxes bound with iron bands. Shippers should further bear in mind that after our goods have reached a South American port in reasonable shape they have still to be transported, in many instances, many miles inland on muleback, thus affording conscienceless carriers admirable opportunities for fitting out their families at the expense of the United States merchant. These are good and sufficient reasons for the coolness felt toward the theft and pilferage coverage by the old hand at marine insurance. The National Board of Marine Underwriters has the matter under consideration, and particularly with regard to the appalling state of this hazard at Genoa, Italy; but it is bound to be some time before even a report can be had, not to mention a suggestion of remedies. The cure of the ill appears to lie exclusively at the door of the exporter. Furthermore, the prevailing rates are insufficient; and the reason for this additional drawback is said to be the influence of the marine brokers, whose first care is always to get cheap coverage for their patrons.

Frustration Clause

Changes in marine insurance have been brought about by the war. One of the most interesting of them is the dethroning of the familiar old "capture clause" and the substitution of a more modern and more applicable arrangement that is to be known as the "frustration clause." England is taking the lead in this important and sensible readjustment of a vital portion of the policy form. Recently the House of Lords rendered a decision in the Sanday case to the effect that on the outbreak of war between Great Britain and another State all British-owned goods in British ships destined for enemy ports become constructive total losses owing to the frustration of the various adventures through the restraint of princes, as set forth in the ordinary marine policy. The decision has a similar application to the goods of other nationalities that may be bound, in ships of that nationality, for ports of a State with which war has broken out with the country of the shippers. It became evident that difficulties were likely to arise in the future through the application of this clause, and hence the substitution was deemed necessary. The old clause reads: "Warranted free of any claim arising from capture, seizure, arrest, restraint or detainment caused by the enemies of Great Britain or by the enemies of the country to which the assured or the ship belongs." This clause is shortly to come up before a meeting of Lloyds, for definite decision as to wording; and the British are of the opinion that it will surely be adopted by the marine underwriters of London, Liverpool and Glasgow. The new clause will probably run much as follows: "Warranted free of any claim based upon loss of, or frustration of, the insured voyage or adventure caused by restraints or detainments of kings, princes or people." It is said merchants will have no serious objection to the new clause, because the insurance of the war risk will cover the risks excepted by the clause in question, and it is agreed that under no circumstances shall the new clause be deleted from a policy by underwriters. If additional risks are to be covered a new policy must be written.

Collision Cases

As disputed cases are tried and adjudicated, belated loss claims keep dropping in on the underwriters. The majority of them are on account of collision. Within the last few days the British courts have been engaged on such instances of marine losses, several of which date back more than a year. In one of them, that of the collision between the Burutu and the City of Calcutta, in which both vessels were steaming without lights and in convoy, it has been held that there was no negligence in the case on either side, and that, in consequence, the loss would fall on the war risk policies.

French Decision

The French courts have recently held that shipowners may not always successfully set up the defense of non-responsibility in case they are unable to deliver cargo, when the bill of lading carries a clause disclaiming such responsibility. Such a decision has just been handed down by the Havre Tribunal of Commerce.

War Risks Still Imminent

The need for war risk coverage still exists, as witness the reports steadily coming in of losses from collisions with floating mines. It has been but a few days since the Hans Jost was lost, through such an accident, fourteen miles off the

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mouth of the Tyne; and, more recently, the Italian steamer Alcazar lost her propeller by striking a mine off Otranto, though, happily, she was subsequently towed safely into port. While it is true that the Germans were required by the terms of the armistice to give the location of their numerous mines, it is well known that neither they nor the Allies could at any time be sure that their mines had not got loose from their moorings.

Heavy Losses

With the close of the first half of 1919, marine insurance does not find itself in a condition that calls for much felicitation. Losses have been heavy in most of the lines. Particular average claims on business written last year, and heavy average claims on hulls covered in 1918, are being presented daily. New York marine underwriters report the marine losses encountered in the month of June to have been almost as heavy as were the war losses of June of last year, and that was when the German submarines were most active in our waters. Particular average and theft claims substantially exceed the premium received for the entire marine hazards.

Congressional Investigation

On July 7, investigation of the whole problem of American marine insurance was begun by a special sub-committee of the Congressional Committee on Merchant Marine and Fisheries. Of this committee Representative Lehlbach of New Jersey is chairman. The administration of the Bureau of War Risk Insurance will be thoroughly looked into and, according to the announcement of the chairman, "It will also investigate the capacity of existing American marine insurance companies to carry the risk of such insurance on the greatly augmented merchant marine of the country, and the possibilities of their expansion financially in order to assume such responsibility. It will compare methods of insurance, character and terms of the respective policies of insurance issued by American companies and those of Great Britain and other maritime countries. In short, it intends exhaustively to review the entire subject so that if necessary legislation may be enacted to permit the American merchant marine, when it has reached its full development, to have the benefit of insurance written practically entirely by American companies and backed by American capital." Such an investigation is of the very first importance to American shippers and shipowners, as well as to the marine underwriters themselves, and is the initial step in the direction of trade expansion and the American conquest of its proper share of the traffic of the world.

Floating Mine Hazard

In a preceding paragraph I called attention to the claims that are continuing to come in on account of war risk coverage, growing out of the hazard of floating mines. It might be well to emphasize this marine danger to shipowners and exporters; for it is very real. It may surprise some to learn that considerable volume of this coverage is being written every day. As a matter of fact, practically everything trans-Atlantic carries it. The rate is low—from one-tenth of 1 per cent up—but is regarded as adequate in view of the vast reduction in the hazard. Losses, while always threatening, are, of course, far from what they formerly were. The principal trans-Atlantic lanes have been swept fairly clean of floating mines, but there are too many in the less frequented waters to suit the underwriters and the shippers. They have not forgotten the sinking of vessels by floating mines, after the Russo-Japanese war, that had been drifting about for two or three years. That celebrated device for locating and exploding mines, "the beaver," did not always work perfectly, and danger still lurks where it was employed. The North Sea, as is well known, was thickly strewn with mines, and that still remains one of the most dangerous regions for shipping. Waters adjoining the well-swept main lanes are also taboo to seafarers. There is comparatively little danger to coastwise vessels, along our eastern seaboard, as the mine-laying effectiveness of the submarines that visited our waters was more or less negligible. It is quite possible, of course, that the war risk rates may be found to be insufficient; but the underwriters do not appear to be under much apprehension on that score.

Flood Hazard

Frequently requests come in to marine underwriters to give coverage against the hazard of flood. During the closing days of June there appeared to be a considerable market for this form of protection; but the marine underwriters have to give the regular reply that flood insurance is a fire insurance proposition. The regular marine policy covers dangers caused by rising navigable waters, and is concerned chiefly with possible damage to cargo on quays, docks, etc.

American Bureau of Shipping

Every loyal American marine insurance man is strongly behind the one classification society of which this country can boast—the American Bu-

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reau of Shipping—and keenly resents the slurs and disparagements that are systematically leveled at it by foreigners who covet our market. Practically all of the attacks against it can be traced to unfriendly alien sources. It is manifestly the duty of 100 per cent Americans to refute these sneers and speak a good word for the bureau in season and out. Well do our overseas competitors understand the importance of an American inspection, survey and classification society, realizing that it will greatly help to seal the doom of foreign monopoly of our shipbuilding and navigation. Americans interested in the future of our shipyards, our steamship companies and our marine insurance companies should be forewarned and forearmed against this form of foreign propaganda. It can be stated without fear of denial that eminently capable men manage and direct the bureau today, and that just as able ones have controlled it since its organization fifty-seven years ago. The soundest principles and the best practices of the world's shipbuilding are embodied in the rules prepared and enforced by the bureau for the building and classifying of steel vessels—rules that are precise and exacting, as indeed they need to be. Their purpose is to assure the construction of dependable ships capable of providing a highly efficient, economical and worthy service. There is a quite unusual diversity of types of hulls and machinery in the American merchant marine, and vessels of good capacity and light draft are demanded by the necessities of our local coastwise, river and lake traffic. Important steamers of the same general type as those utilized in the world's overseas carrying trade are required for our long-voyage coastwise commerce, notably for that between the Atlantic and Pacific seaboards. It may not be gainsaid that the very best rules and regulations for our merchant marine must be based upon American experience—including, as this experience does, considerable participation in long-voyage ocean carrying. No foreign organization can expect to have any such fund of practical experience and knowledge to guide its surveyors in American maritime matters. American shipyards are now constructing 4,185,000 tons of shipping, as contrasted with 2,254,845 tons in hand in the United Kingdom. Most of this new American tonnage is designed and built distinctively for ocean-going service. Seventy-five per cent of the newer American vessels now coming forward are being inspected, surveyed and classed by the American Bureau of Shipping, which, therefore, is in a fair way to attain a position of signal pre-eminence.

Repair Costs for Wooden Ships

It has to be borne in mind that the cost of making repairs to wooden ships is frequently considerably greater than is the case with those of steel construction. The current marine news of the hour illustrates this right along. For example, a wooden ship that recently put into Honolulu with boiler trouble had to be towed to Vancouver, her port of destination, to receive the attention she required. Still more recently the Okesa limped into Barbadoes in a leaking condition, but because there was no dock there of sufficient size, nor storeroom facilities adequate for her cargo that would have to be discharged, she was packed off to another of the West Indies, in her damaged condition, in order to secure the necessary attention that her injuries demanded.

Government Marine Insurance

The marine and seamen's division of the Bureau of War Risk Insurance has been closed down by Secretary of the Treasury Carter Glass for good and all. A balance of more than $67,000,000 is to be turned over to the government from the money on hand that has been derived from profits and from expense appropriations. This division was the first of the bureau to be inaugurated, and that was on September 2, 1914. Rates were withdrawn on January 4 of the present year. In that interval of four years and four months, an aggregate of $2,167,367,884 of insurance was written on cargoes, freights and bottoms. The net premiums amounted to $46,758,995, and the losses and operating expenses totalled $30,181,567. The department was created not only to write hulls,cargoes and freights, but to insure masters, officers and crews exposed to danger from submarines; and in this latter work policies were written aggregating no less than $321,857,430, with premiums totalling $842,148. The losses and expenses of operation amounted to $370,596. It is officially announced that 152 American vessels were lost, with an aggregate tonnage of 397,059, as a result of submarine activity. Losses and operating expenses of the marine and seamen's sections amounted to $30,579,163, and the premium receipts totalled $47,601,143. The remaining $17,000,000, plus the $50,000,000 originally appropriated by Congress, make up the $67,000,000 that goes back into the national treasury.

Steamship Lines Operating Out of San Francisco

THE Foreign Trade Department of the San Francisco Chamber of Commerce has prepared at considerable labor a list of the steamship lines operating out of San Francisco. It is believed that this is the only list so far published. Owing to the difficulty in getting responses from the various lines, it may have inaccuracies and some lines may be left out. The department would appreciate receiving any corrections or additions. Lines which only carry the product of their owners, such as many lumber lines, are not shown.

European

United States Shipping Board (Williams, Dimond & Company operating), 310 Sansome Street.
American vessels.
Operate between: San Francisco and Europe.
Regular service. Cargo—no passengers.

Johnson Line (W. R. Grace & Company, Agents), 332 Pine Street.
Number of vessels: Nine.
Nationality: Swedish.
Operate between: San Francisco and Scandinavian ports.
Regular service. Cargo—no passengers.

Blue Funnel Line (Dodwell & Company, Ltd., Agents), 2 Pine Street.
Nationality: British.
Operate between: San Francisco and United Kingdom.
Way ports: Panama Canal (Colon and Balboa).
Monthly sailings. Cargo—no passengers.

Norway-Pacific Line, 485 California Street.
Number of vessels: Four.
Nationality: Norwegian.
Operate between: San Francisco and Scandinavian ports.
Regular service. Cargo—no passengers.

Harrison Direct Line (Balfour, Guthrie & Company, Agents), 350 California Street.
Nationality: British.
Operate between: San Francisco and United Kingdom.
Monthly sailings. Cargo—no passengers.

Maple Leaf Line (E. C. Evans & Sons, Agents), 260 California Street.
Number of vessels: Seven.
Nationality: American.
Operate between: San Francisco and Channel ports.
Regular service. Cargo—No passengers.

East Asiatic Company, Ltd., 310 Sansome Street.
Number of vessels: One. (Expect to enlarge service soon.)
Nationality: Danish.
Operate between: San Francisco and Copenhagen.
Irregular service. Cargo—no passengers.

Trans-Pacific

Ocean Shipping Agencies, Inc., 485 California Street.
Nationality: Japanese.
Operate between: San Francisco and Oriental ports.
Irregular service: Cargo—no passengers.

Ocean Transport Co., Ltd., 310 Sansome Street.
Number of vessels: Twenty-seven.
Nationality: Japanese.
Operate between: San Francisco and Orient.
Regular and irregular service. Cargo—no passengers.

Toyo Kisen Kaisha Steamship Company, 625 Market Street.
Number of vessels: Six.
Nationality: Japanese.
Operate between: San Francisco and Orient.
Regular service. Passengers and Cargo.

Robert Dollar Company, 230 California Street.
Number of vessels: Four.
Nationality: Three British, one American.
Operate between: San Francisco (via Vancouver) and Oriental ports.
Regular service. Cargo—no passengers.

Struthers & Dixon, Inc., 343 Sansome Street.
Number of vessels: Four.
Nationality: American.
Operate between: San Francisco and Orient.
Regular service. Cargo—no passengers.

Pacific Mail Steamship Company, 508 California Street.
Number of vessels: Three.
Nationality: American.
Operate between: San Francisco and Orient.
Operate between: San Francisco and India.
Number of vessels: Two.
Regular service. Passengers and cargo.

Matson Navigation Company, 120 Market Street.
Number of vessels: Two.
Nationality: American.
Operate between: San Francisco and Philippine Islands.
Regular service. Cargo—No passengers.

Java Pacific Line (J. D. Spreckels & Brothers Company, Agents), 2 Pine Street.
Number of vessels: Five.
Nationality: Dutch.
Operate between: San Francisco and Dutch East Indies.
Regular monthly sailings. Passengers and cargo.

China Mail Steamship Company, 510 Montgomery Street.
Number of vessels: Three.
Nationality: American.
Operate between: San Francisco and Orient.
Way ports: Honolulu, Yokohama, Nagasaki, Shanghai.
Regular service. Passengers and cargo.

Gulf Mail Steamship Company, 1 Drumm Street.
Number of vessels: One.
Nationality: American.
Operate between: San Francisco and Orient.
Way ports: Samoa and Batavia.
Regular service. Cargo.

Oceania

Union Steamship Company of New Zealand (Hind, Rolph & Company, Agents), 230 California Street.
Number of vessels: Eight.
Nationality: British.
Operate between: San Francisco and Australia.
Way ports: Papeete, Rarotongo and Wellington.
Monthly sailings. Passengers and cargo.

Oceanic Steamship Company (J. D. Spreckles & Brothers Company, Agents), 2 Pine Street.
Number of vessels: Three.
Nationality: American.
Operate between San Francisco and Australia.
Way ports: Honolulu and Samoa.

South and Central America

Gulf Mail Steamship Company, 1 Drumm Street.
Number of vessels: Three.
Nationality: American.
Operate between: San Francisco to Callao, and intermediate way ports.
Regular service. Cargo.

South American Pacific Line, 280 Battery Street.
Number of vessels: Four.
Nationality: Norwegian.
Operate between: San Francisco, Seattle, Southern California and South American ports.
Way ports: Salina Cruz, Guayaquil, Callao, Mollendo. Antofagasta and Valparaiso.
Regular service. Cargo—No passengers.

Merchants Line (W. R. Grace & Company, Agents), 332 Pine Street.
Number of vessels: Four.
Nationality: American.
Operate between: San Francisco and ports in Ecuador, Peru and Chile.
Way ports: Guayaquil, Paita, Salaverry, Callao, Posco, Mallendo, Arica, Iquique, Antofogasta, Taltal, Coquimbo and Valparaiso.
Regular service: Cargo—no passengers.

Toyo Kisen Kaisha Steamship Company, 625 Market Street.
Number of vessels: Three.
Nationality: Japanese.

Operate between: San Francisco and South America (to and from Japan.)
Regular service. Passengers and cargo.

Pan-American Line, Merchants Exchange Building.
Number of vessels: Two.
Nationality: American.
Operate between: San Francisco and Mexico and Central America.
Way ports: La Libertad, La Union, Amapala and Corinto, Salina Cruz, San Jose de Guatemala and Acajutla.
Regular service. Cargo.

Davenport Steamship Company, 112 Market Street.
Number of vessels: One.
Nationality: American.
Operate between: San Francisco and Mexico and Central America.
Way ports: Mazatlan, Manzanillo and Salina Cruz, Champerico and San Jose de Guatemala.
Regular service: Cargo.

Pacific Mail Steamship Company, 508 California Street.
Nationality: American.
Number of vessels: Four.
Operate between: San Francisco and Balboa.
Regular service: Passengers and cargo.

Rolph Mail Steamship Company, 60 California Street.
Number of vessels: Three. (Two additional shortly.)
Nationality: American.
Operate between: San Francisco and Central and South American West Coast ports.
Regular service. Cargo—no passengers.

Mexico

Gulf Mail Steamship Company, 1 Drumm Street.
Number of vessels: Three.
Nationality: American.
Operate between: San Francisco and ports in Mexico.
Regular service. Cargo—no passengers.

Davenport Steamship Company, 112 Market Street.
Nationality: American.
Number of vessels: One.
Operate between: San Francisco and ports in Mexico.
Regular service. Cargo—no passengers.

Pan-American Line, Merchants Exchange Building.
Number of vessels: Two.
Nationality: American.
Operate between: San Francisco and ports in Mexico.
Regular service. Cargo—no passengers.

Pacific Mail Steamship Company, 508 California Street.
Nationality: American.
Number of vessels: Four.
Operate between: San Francisco and ports in Mexico.
Regular service: Passengers and cargo.

Albers Brothers Milling Company, 332 Pine Street.
Number of vessels: Two.
Nationality: American.
Operate between: San Francisco, Puget Sound, Mexico and Central America.

Rolph Mail Steamship Company, 60 California Street.
Number of vessels: Three. (Two additional shortly.)
Nationality: American.
Operate between: San Francisco and Mexican ports.
Regular service. Cargo—no passengers.

Coastwise

Parr-McCormick Steamship Line, 1 Drumm Street.
Number of vessels:
Nationality: American.
Operate between: San Francisco and Vancouver and Southern California.
Way ports: Portland and Seattle.
Irregular service. Cargo—no passengers.

Arrow Line (Swayne & Hoyt), 430 Sansome Street.
Number of vessels: One.
Nationality: American.
Operate between: San Francisco and Marshfield and North Bend, Oregon.
Regular service. Cargo—no passengers.

San Francisco & Portland Steamship Company, Monadnock Building.
Number of vessels: One.
Nationality: American.
Operate between: San Francisco and Portland, Ore.
Way port: Astoria.
Regular service. Passengers and cargo.

Little River Steamship Company, 112 Market Street.
Number of vessels: One.
Nationality: American.
Operate between: San Francisco and Humboldt Bay and Southern California.
Regular service. Cargo—no passengers.

Sudden & Christenson, 110 Market Street.
Number of vessels: Seven.
Nationality: American.
Operate between: San Francisco and Southern California and Oregon ports.
Regular service. Cargo—no passengers.

E. J. Dodge Company, 16 California Street.
Number of vessels: One.
Nationality: American.
Operate between: San Francisco, Southern California and Eureka.
Irregular service. Passengers and Cargo.

S. S. Freeman Company, 1 Drumm Street.
Number of vessels: Four.
Nationality: American.
Operate between: San Francisco, Southern California, Seattle, Columbia River and Puget Sound.
Irregular service. Cargo—no passengers.

Hobbs, Wall & Company, 1 Drumm Street.
Number of vessels: Two.
Nationality: American.
Operate between: San Francisco, Southern California and Crescent City.
Regular service. Cargo—no passengers.

The Chas. Nelson Company, 230 California Street.
Number of vessels: Nine.
Nationality: American.
Operate between: San Francisco, Puget Sound, Humboldt Bay and Columbia River.
Regular service. Passengers and cargo.

Matson Navigation Company, 120 Market Street.
Number of vessels: Eight.
Nationality: American.
Operate between: San Francisco and Honolulu.
Way ports: Kahului, Hana, Honolulu, Hilo, Mahukina, Port Allen, Kaanapali.
Regular service. Passengers and cargo.

Pacific Steamship Company, 112 Market Street.
Number of vessels: Twenty-one.
Nationality: American.
Operate between: San Francisco, Puget Sound, Alaska and Southern California.
Regular and tramp service. Passengers and cargo.

Chas. R. McCormick & Company, 1 Drumm Street.
Number of vessels: Nine.
Nationality: American.
Operate between: San Francisco, Southern California, Columbia River and Puget Sound.
Regular service. Passengers and cargo.

E. T. Kruse, 24 California Street.
Number of vessels: One.
Nationality: American.
Operate between: San Francisco and Bandon, Oregon.
Regular service. Passengers and cargo.

Union Lumber Company, Crocker Building.
Number of vessels: Four.
Nationality: American.
Operate between: San Francisco and Fort Bragg, Mendocino and Greenwood.
Irregular service. Cargo—no passengers.

Chas. H. Higgins, 116 Market Street.
Number of vessels: One.
Nationality: American.
Operate between: San Francisco and Point Arena and Mendocino.
Regular service. Passengers and cargo.

Hartwood Lumber Company, 1 Drumm Street.
Number of vessels: Five.
Nationality: American.
Operate between: San Francisco, Southern California, Raymond and Aberdeen.
Regular service. Passengers and cargo.

Pacific Mill & Timber Company, First National Bank Building.
Number of vessels: One.
Nationality: American.
Operate between: San Francisco and Coos Bay.
Regular service. Passengers and cargo.

On the Shores of Grays Harbor

SHIPBUILDING operations at the Grays Harbor Motorship yard in Aberdeen were resumed early in July, when keels were laid for two five-masted barkentines. The vessels are being built by the yard for its own account, and will be adapted especially to the lumber trade. Each will be of Ward design, and will be 260 feet long and capable of carrying over 1,000,000 feet of lumber.

With the wind-up of the government program and the prospects appearing more favorable for private contracts, it is interesting to note that the wooden shipbuilding industry on Grays Harbor began nearly thirty years ago. The first vessel built in Aberdeen shipyards was the J. A. Weatherwax, a three-masted schooner turned out by the yards of J. A. Weatherwax, which stood at the foot of South I street. The Weatherwax was built in 1890. She has not been seen on Grays Harbor for over twenty-three years, and when last heard of she was taking a cargo from Honolulu to Sydney, Australia.

But to John Lindstrom can be accorded the distinction of first establishing shipbuilding as a permanent industry on Grays Harbor. In 1899 Mr. Lindstrom, with his partner, C. R. Green, started the Lindstrom shipbuilding yard, which was the nucleus of the present Grays Harbor Motorship institution. The steam schooner San Pedro, still a familiar sight on Grays Harbor as a lumber carrier, was the first vessel to be built at the Lindstrom yards, in 1899. In the next eight years the plant turned out thirty-one steam schooners, seven sailing vessels and a number of big barges. The closing of the Lindstrom yards came in 1907. For nine years the shipyard remained idle and not a keel was laid.

The year 1916 marked the revival of shipbuilding on Grays Harbor. The old Lindstrom yards, renovated by the Grays Harbor Shipbuilding Company, which later was incorporated into the present style of Grays Harbor Motorship Corporation, in April, 1916, began laying the keel of two schooners, and shortly after the Oregon, the first vessel to leave the ways since 1906, was launched. Since then keel of ship after ship was laid, and from a force of 200 men in 1916 the Motorship plant grew to an organization of 3000 men during the government's war program.

A campaign seeking the placing of a steel lightship off the Grays Harbor bar, and also the establishment on North Beach of a boathouse containing a Dobbins lifeboat and beach life-saving equipment, has been inaugurated jointly by the Hoquiam Commercial Club and Aberdeen Chamber of Commerce. Plans for the campaign are being worked out by the River and Harbor committees of the two bodies, headed by H. M. Delanty of Aberdeen. These harbor aids will place Grays Harbor on a par with the Columbia River and Puget Sound in protection of shipping. The North Beach, it is said, is one of the longest stretches on the coast not protected with a life-saving station, and when the bar is rough it is difficult for the Westport life-savers to afford the necessary relief from their station, located on the south side of the entrance to Grays Harbor.

The name "Abercos" has been accepted by the United States Shipping Board for the naval vessel to be christened in honor of Aberdeen's record showing in the fourth Liberty Loan campaign. The name, selected from many suggestions as combining syllables from the names "Aberdeen" and "Cosmopolis," was second choice, as the name Aberdeen already is listed in the navy register and duplication is not allowed. The Abercos will be a torpedo boat destroyer of the latest type. Its hull will be built by the Standifer Construction Company, Seattle.

Grays Harbor has set another Emergency Fleet loading record by getting 1,452,000 feet of lumber aboard the steamer Mahanna, which cleared recently. According to the Federal shipping headquarters at Portland, this is the heaviest lumber cargo placed thus far on any Emergency Fleet carrier. Several months ago the local stevedore force set a record which still stands for the speedy loading of these vessels.

Steps have been taken by the Hoquiam Commercial Club thoroughly to investigate and consider plans for the improvement of the organization's eighty-acre tideland tract. It is proposed to carry on the improvement in connection with the dredging of the inner channel during the next few months. A committee has been appointed to consider the feasibility of bulkheading the tidelands so that the earth coming from the channel dredging could be taken to fill the property and make it available for factory sites. Members of the committee declare the prospects of the city and the present needs for factory sites, as well as for other harbor improvements, call for the proposed fill. One of the features under consideration is construction of a terminal railroad spur through the tract to deep water at channel front, if the fill is made, to provide trackage for industries using the property.

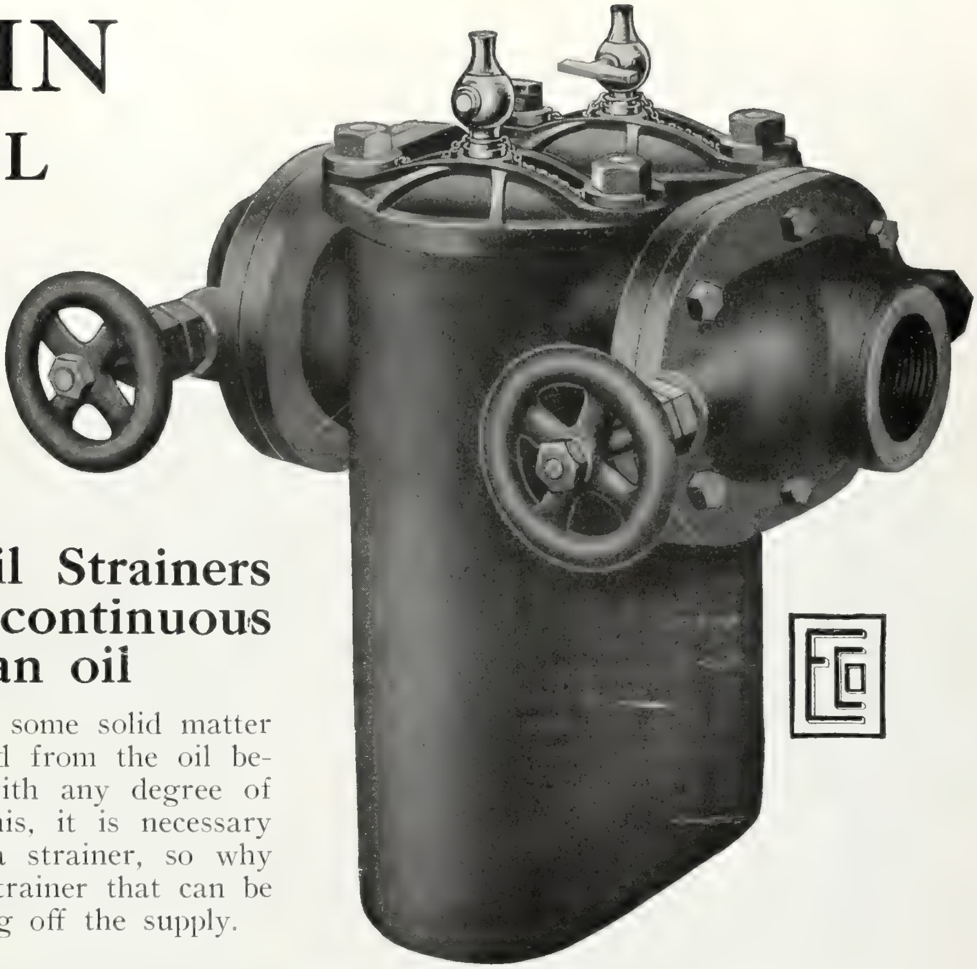
Approximately 14,000,000 feet of lumber was shipped from Grays Harbor to European and Atlantic ports during June. This amount does not include coastwise trade or lumber products shipped via rail to Seattle, Portland, San Francisco and Eastern points. Conservatively estimated, 40,000,000 feet were cleared from Grays Harbor through all sources of exportation during June.

Authorities who are familiar with local lumber producing conditions state that this 40,000,000 feet output is but a beginning of a lively pick-up in the Northwestern Washington lumber trade, in which Grays Harbor is actively participating. Especially is this prediction believed to be true in relation to the foreign trade. England, France and other European countries are at present undergoing an intense period of reconstruction, and are calling for an immense supply of lumber and timber stuff which European mills cannot turn out in sufficient quantities.

A great portion of local cargoes consigned to England and Atlantic ports consists of railway ties, which are being used in extensive European rebuilding. Many millions of feet of this sort of timber were shipped from Grays Harbor last spring and during the early summer, and there is no prospect of the demand diminishing.

(Section continued on Page 180)

STRAIN
YOUR OIL



Use Twin Oil Strainers and insure a continuous supply of clean oil

Oils commonly contain some solid matter which must be removed from the oil before it can be used with any degree of satisfaction. To do this, it is necessary to use some kind of a strainer, so why not use the Twin—a strainer that can be cleaned without shutting off the supply.

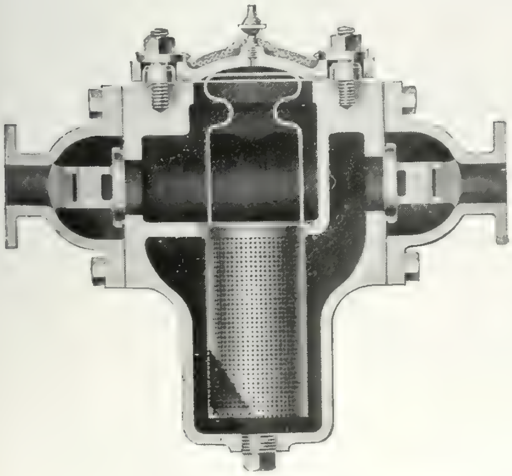
THE TWIN OIL STRAINER

gives the same service as two single strainers, but is more convenient to operate, requires less space for installation and does away with all extra valves and piping necessary to connect up. These are the features that led to its being used in submarines and destroyers now being built for the United States Navy and in cargo boats now being built for the United States Merchant Marine.

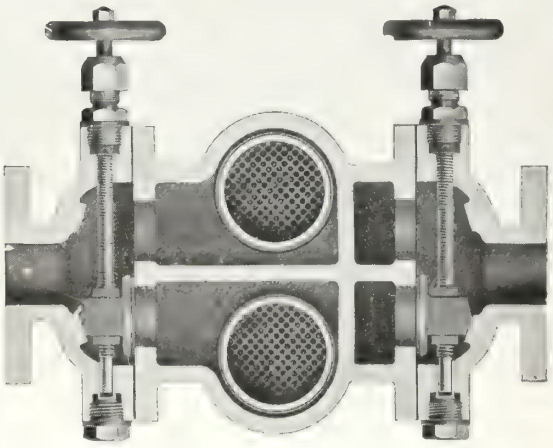
Sizes range from 1 to 5 inch, (2½ inch and larger sizes have flanged connections). Basket mesh 1/64 inch or larger. See Bulletin "AA" for details.

ELLIOTT COMPANY, 443 Grant St., Pittsburgh, Pa.

The oil enters the Strainer at the left and empties into and passes through the straining basket, then up and out at the right. All solid impurities are retained in the straining basket.



When a basket is clogged, the valves are shifted to direct the flow of oil into the clean basket, which is in reserve. The compartment containing the dirty basket is then opened up, the basket removed, cleaned and replaced, and held in reserve until the basket then in service needs cleaning.



Chicago Becomes Exporting Seaport

ON Thursday, June 27, the steamer Lake Granby of Chicago, with Captain John Klang in charge, left her slip in the Chicago River, bound for Liverpool, England, with a cargo of meat products which were shipped by Morris & Company, Swift & Company and Wilson & Company, to supply a part of their English trade, and this is said to inaugurate the first interoceanic shipment of goods direct from Chicago to a foreign port.

The steamer Lake Granby is one of the type of vessels which was built by the American Ship Building Company on the order of the United States Shipping Board, which should be suitable for construction in the lake ship yards and be capable of passing through the Welland Canal in order to reach the seaport. This boat was built in the Chicago yards and launched early in June.

After an elaborate luncheon, served by Morris & Company, to which the officials of the Chicago Association of Commerce and officers of the United States Shipping Board were invited, the formal dedication of the vessel to this service was performed by Mr. Harry H. Merrick, president of the Chicago Association of Commerce.

An interesting feature about this shipment which shows that Chicago may eventually become a port in competition with the Eastern Atlantic ports is the fact that the through freight rate from Chicago to Liverpool by this all-water route is only $1.25 per 100 pounds for the type of cargo carried, whereas the regular rail and water rates from Chicago to New York and New York to Liverpool for this same cargo would amount to $1.45 per cwt.

The complete view of the ship shows how far short of its full cargo capacity it is necessary to load this vessel in order that it may pass through the Welland Canal locks. These locks are only capable of passing ships of 14 feet draft, while this type draws 25 feet when loaded to the water line. However, it is planned to have the ship take on additional cargo at one of the Canadian ports, probably Montreal, so that it will be fully loaded before leaving on its European voyage.

(Section continued on Page 184)

S. S. Lake Granby loading meat products for Liverpool, England

To Shipbuilders

Do you realize that the day of the Standard Ship Is Waning?

Closer competition necessitates designing ships to suit capacity of your plant. Shipowners require ships to suit their trade requirements. The Standard Ship, the common plan, will no longer do, and the necessity of having a **fully experienced Naval Architect** in your own employ is becoming **urgent.**

DO YOU REALIZE THIS? The writer has had a lifetime's ship-designing experience and is just relinquishing a war-time appointment of highest responsibility.

If you are interested, write Box No. 10, Pacific Marine Review, San Francisco

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Surface Barometric and Jet Condensing Equipments for Power Plants.
Main, Auxiliary, Distilling Condensers and Evaporators for Marine Service.
Distilling Condensers for Refrigeration and Chemical Plants.
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A Malleable Cargo Hoist

built for steady, consistent service under any and all conditions. Only the finest material and workmanship enter into its construction. The special reinforced cheeks are so designed that they house the sheave, making a closer fitting sheave than any other block manufactured.

A heavier, hand forged steel strap extends throughout the length of the block, giving it greater strength and lasting qualities.

It stands abuse—is flexible and easy to handle—and its unusually long life makes for greater economy.

PARISH
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This Parish Block is representative of the entire line of high grade steel tackles. You will find the same understanding of the needs of shipbuilders has entered into the design of each block, and into the manufacture of every one of them goes the same unusual devotion to accuracy and detail.

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Steel Tackle Blocks and Shipyard Tools

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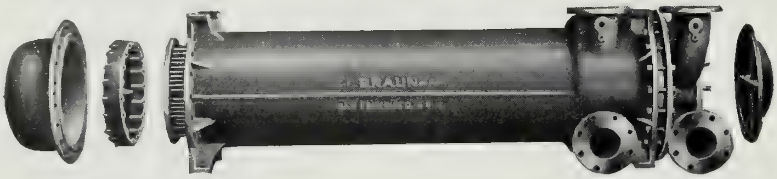
Braun Marine Auxiliaries

"The Standard of the Pacific"

(Made on the Pacific Coast)

Manufacturing Mechanical Engineers

C. F. Braun & Co.



Braun Marine Type Lubricating Oil Cooler Approved by Emergency Fleet Corporation

Condensing Apparatus
Feed Water Heaters
Twin Strainers

Oil Heaters and Oil Coolers
Evaporators and Distillers
Vertical Marine Pumps

Works: Folsom, Alice, Shipley and Louisa Streets
Pattern Shop—Foundry—Copper Coil Shop

Office: 503 Market Street, San Francisco
Plate Shop—Machine Shop

An Interesting Set of Booklets

CUTTING THE COST OF LUMBER PRODUCTION
TRANSPORTATION via the QUALITY P & H SERVICE LINE
CLEARANCE AND SPEED TABLES
AVOID WASTE SAVE TIME
KEEP THIS TIME TABLE

The P & H Time Table: a folder giving complete clearance dimensions, speeds, and application of electric cranes, hoists, and monorail systems. This pamphlet will give shipbuilder, foundryman, and manufacturer a practical suggestion when deciding upon overhead conveying equipment.

The P & H Blue Book:—of Horizontal Drilling and Boring Machines. A booklet giving valuable information on the drilling and boring of bulky, difficult pieces. Of great interest to machine builder and manufacturer.

Cutting the Cost of Lumber Production: a profusely illustrated booklet on the P & H Monorail System for conveying lumber. The majority of installations described are those of the South, West, and Northwest. Every large lumber manufacturer should have this manual.

Any one or all three of these booklets can be had by addressing our Western offices.

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Introducing

Williams' "Agrippa" Turning Tool Holders Set Screw Pattern

TO provide increased and abundant variety of selection in Williams' "Agrippa" line of Tool Holders, we offer this Set Screw Pattern of Turning-tools primarily for those who use Cutters made of steel which has been hammered or rolled with a greater variation in size than is common to usual mill practice. But for the majority of users who purchase Cutters of accurate size, we recommend the original "Agrippa" Turning-tool of Cam Pattern as being stronger, more reliable and more generally satisfactory than any other method of Cutter-fastening. Both patterns are illustrated above.

The Screws, made of a fine grade of Alloy Steel, are accurately machined and carefully heat-treated and hardened. They are unusually tough and strong and give the maximum efficiency obtainable from this type of Cutter-fastening.

Right and Left Hand Offset and Straight Shanks in stock at same prices as Cam Pattern of corresponding size.

A copy of our Machinists' Tools Booklet will be sent on request.

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4500 H. P. Engines, Anchor and Cargo Winches, and General Equipment

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Nickel Steel Hull, 170x17x5′ 11″
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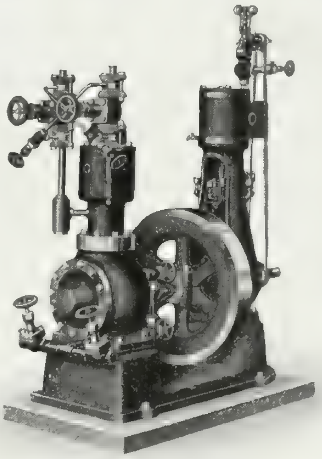
"ON-TIME" DELIVERY



Approved by Shipping Board

BEDELL ENGINEERING CO.

LOS ANGELES

We offer our experience of many years as specialists in Marine Refrigeration.

AN ENTERPRISING MACHINERY FIRM

HERBERTS Machinery & Supply Company are to be congratulated upon the establishment of attractive show rooms and sales offices in San Francisco at 168 Second street.

Mr. Curtis A. Herberts, who heads these enterprising machine tool jobbers, has always made a special study of the requirements of each prospective machine tool user. The personal attention given each sale has resulted in a very substantial machine tool business in Los Angeles, and for a further outlet of their fine line it has been necessary to open up the San Francisco headquarters.

Herberts Machinery & Supply Company are selling agents for a representative list of machine tool manufactures which includes the following:

Cincinnati Gear Cutting Machine Company.

Cincinnati Shaper Company shapers.

Catlin keyseaters.

Foster Machine Company screw machines and turret lathes.

Hamilton Machine Tool Company lathes and planers.

Holden & Morgan thread millers.

Loshbough Jordan power presses.

Modern Tool Company grinders.

Mueller Machine Company radial drills.

Merrill Manufacturing Company pipe machines.

Rahn-Larmon Company Q. C. lathes.

Rockford Milling Machine Company millers and lathes.

Rockford Drilling Machine Company drills.

Royersford punches and shears.

Racine Tool Company power saws.

Sidney Machine Company woodworking machinery.

South Bend Lathe Works engine lathes.

United States Machinery Tool Company band millers.

Universal Machine Company bolt cutters.

Woods Manufacturing Company Universal grinders.

Wilmarth & Norman drill grinders.

WESTINGHOUSE CIRCULAR ON ELECTRIC ARC WELDING

The Westinghouse Company has just recently issued quite an elaborate publication covering the process of electric arc welding and the necessary apparatus required for this process. This publication compares the different processes of welding, such as autogenous welding, forge welding, oxy-acetylene welding, thermit welding, and shows the advantages of electric arc welding over these.

Some of the advantages of electric arc welding shown are:

1. Economy.
2. Ease and convenience of application.
3. Speed of operation.
4. Reliability of results.
5. Reclaiming defective material.
6. Safety.
7. Conservation of material.
8. Less skilled labor required.

The field for electric arc welding is unlimited and the process has made enormous strides during the last few years until now it is widely used throughout those branches of the metal industry in which work is done on iron or steel in rolled, cast or fabricated forms.

Reliance tractor hauling grain, San Francisco

THE RELIANCE TRACTOR

A VERY sturdy and dependable industrial tractor has been developed with special reference to San Francisco's needs by the Reliance Trailer & Truck Company, Inc., 30 Eighth street, San Francisco.

This tractor uses the ordinary Ford power plant attached to a chassis and running gear of very compact and sturdy design. A number of these tractors are in service in local warehouses and those shown are used in connection with a number of trailers by the Haslett Warehouse Company. While the tractor is hauling a load, another trailer is being loaded. The tractor deposits its loaded trailer at the warehouse, hooks on to an empty, runs it back to the loading point, hooks on to the loaded trailer, delivers that and keeps continually at work without any waste of time. Often these tractors are worked through the tewnty-four hours with shifts of drivers, and under this tremendous service they show remarkable staying power.

This "little tractor with a big pull" has only a fifty-eight-inch wheel base, giving it a very short turning radius. Its wheel tread is only forty inches, which allows it to run in narrow aisles of warehouses, but it has sufficient power to handle nicely on the level a fifteen-ton load.

The only alteration to the Ford power plant is the installation of a centrifugal circulating water pump which insures proper cooling. There are two speeds ahead and one reverse. A heavy spring bumper and automatic coupler are installed in front of the tractor, so that it can spot railroad cars by pushing them along the track, or can be used in shifting material into corners by butting. It is said that one tractor and one driver will do the work of three teams and three men on five gallons of gasoline for eight hours' work.

Reliance tractor delivering flour at the warehouse

VULCAN MANUFACTURING COMPANY

The new, handsomely illustrated catalog just issued by the Vulcan Manufacturing Company of Seattle is something of a revelation to those who are unfamiliar with the extent and variety of products now turned out from the Vulcan plant. It is a book of something more than 100 pages, differing in marked degree from the usual catalog in that the greater part of it is devoted to photographs. Besides views of the plant and its various departments, it illustrates most of the different types of machinery now manufactured by the Vulcan. One division is devoted to marine equipment and ship fitting, including engines, winches, capstans, shafting, etc.; another to shipyard equipment, embracing various machines used in shipbuilding, and electric cranes; another to logging engines and equipment; another to miscellaneous machinery, one to mining machinery, one to transmission machinery, one to bridges and structural steel, and one to castings, heavy and light.

Upper: General view of the plant of the Apex Manufacturing Company. Left: A. Youngholm, Manager Apex Manufacturing Company. Right: Finishing life boats out-of-doors, Apex Manufacturing Company

SIX LIFE BOATS A DAY

THE Apex Manufacturing Company of Emeryville, California, has been building metallic life boats on Shipping Board contracts and by scientific management and systematized methods of construction has reached a capacity in a small plant of six twenty-six-foot metallic life boats a day. This speed in production is due to the system of working one man on one job, the boats progressing through various hands until they are finished. The steel keels are shaped and hung from the ceiling bottom up until one or two strakes of shell plating have been riveted on. The edge of the plate coming on the outside of the strake is punched by means of a gang punch and jig punching twenty holes at once. When the strake is put in place on the boat, these holes act as templates for punching the holes on the edge of the strake already in place to which they are to be riveted. The punching rig made at the plant and used in connection with Thor riveting hammers and a heavy soft metal dolly to hold on finishes the holes in the bottom strake at the rate of thirty holes a minute.

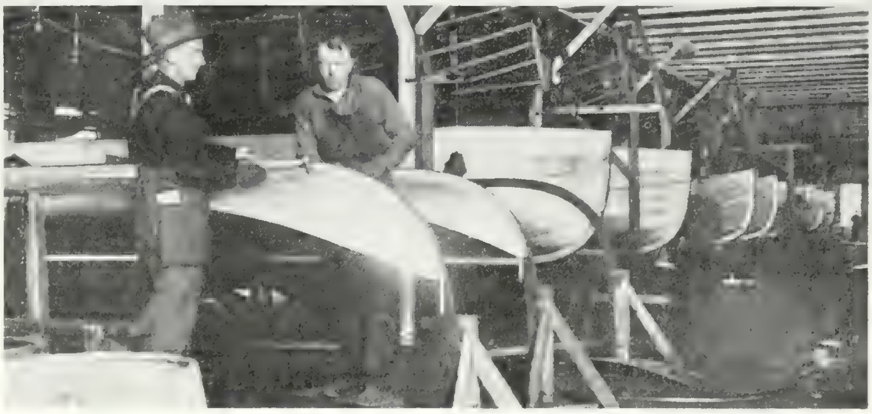
The sheet metal used in the boats is of twelve gauge and it has been found that this method of punching saves a tremendous amount of time in comparison with the use of electric drills. A specially designed rivet set made at this plant enables one mechanic with his air hammer to complete the operation of punching and riveting.

The plant of the Apex Manufacturing Company covers about an acre of land and is equipped with a complete machine shop, wood working plant, blacksmith shop, air compressor plant, and a stea mplant for wood bending.

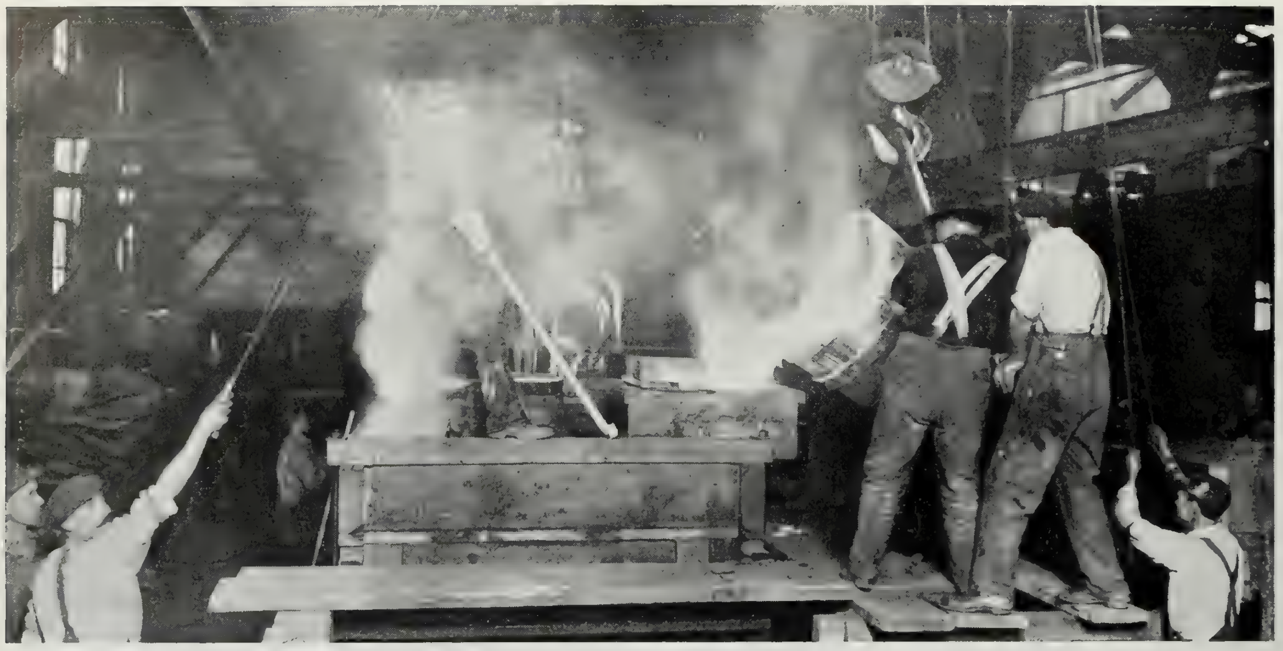
The favorable climatic conditions allow most of the finishing of the boats to be done on an out-of-door platform, so that all of the interior can be used in manufacturing processes. The painting of these boats is done with an air spraying machine.

SHIP BERTHS

The Chas. F. Braun Ship Berth Company of Oakland have developed a patented ship's berth which has attracted considerable attention from naval architects on account of the flexibility which it allows in the installation of berths in irregular spaces on shipboard. The berth in question is simply a sturdily constructed Standee bunk hung on two posts at the centers of the ends instead of being supported by four posts at the corners. It will readily be seen that this construction permits the placing of berths very much closer to bulkheads and to shipsides, at the same time having the post clear any projections of curvature. These ship berths have been officially approved by the United States Shipping Board and are being installed on many ships, notably at the Moore Shipbuilding Company, Oakland.



Starting the skin of a life boat on inverted frames, Apex Manufacturing Company



Pouring a propeller blade casting at the Standard Brass Casting Company

Finished propeller blade, Standard Brass Casting Company

A MODERN BRASS FOUNDRY

THE Standard Brass Casting Company goes to considerable expense and trouble to turn out sound propeller blades free from any hollow places, with perfect smoothness and finish.

This enterprising brass foundry has made it a standard practice to use two gates and two risers to each propeller blade. One of the risers measures 7 inches square by 36 inches in length. The removal of the risers and gates after the casting has come from the mould presents a difficult problem, and requires the labor of two men working steadily for eight hours with hack saws. The large riser weighs 430 pounds and the smaller 300 pounds. The two gates weigh 275 pounds.

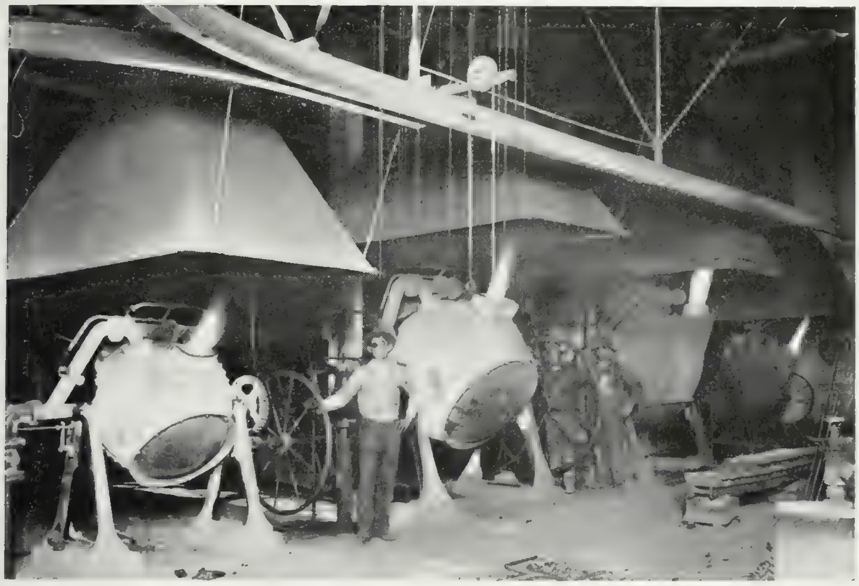
With two large ladles the mold is poured in fifty seconds, and this is followed by two men with tamping bars who then commence feeding additional metal through the two risers for a period of thirty-five minutes. Over 350 pounds of bronze is thus fed into the risers after the main body of the metal is poured through the gates.

One of our photographs shows the working surface of the propeller and it will be noted that this surface is very smooth and free from any pitting, buckles and scabs. This blade is just as it has left the sand, without polish or finish of any kind.

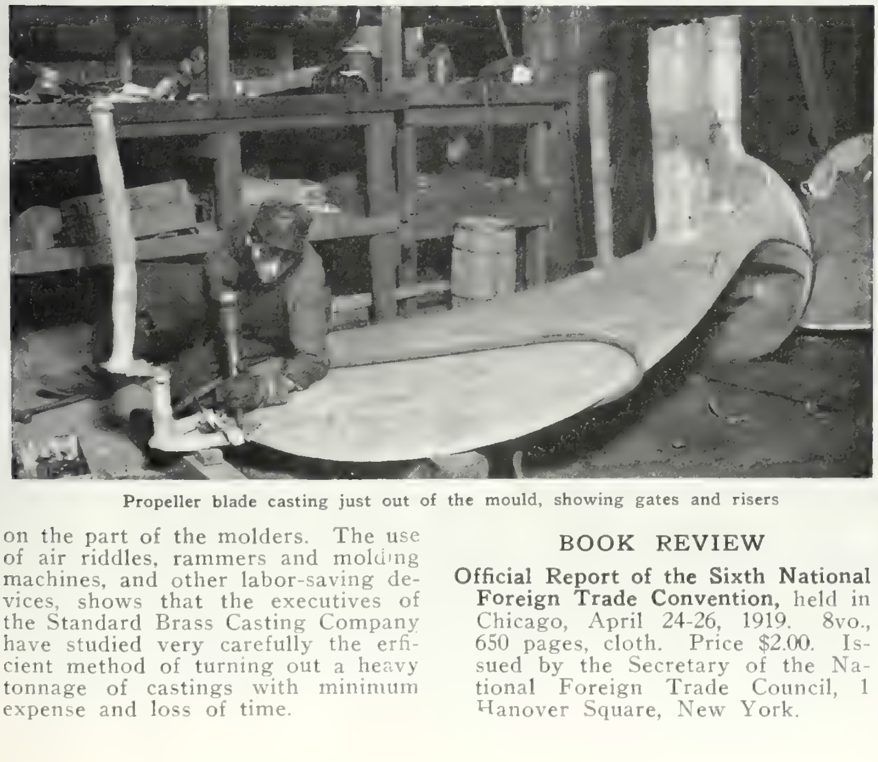
The modern equipment in this plant includes a battery of four large Schwartz furnaces. By the use of a complete overhead monorail system the molten metal, after being poured into the ladles, is conveyed to the molding department, and after the castings are taken from the sand this same monorail system is used for carrying the rough castings to the finishing department. For very heavy casting, two large traveling cranes are used to carry the large ladles. It would be hard to find a plant where the men work in greater unison and efficiency.

The modern handling equipment eliminates heavy lifting and tugging

Brass finishing shop, Standard Brass Casting Company



Battery of Schwartz Furnaces, Standard Brass Casting Company



Propeller blade casting just out of the mould, showing gates and risers

on the part of the molders. The use of air riddles, rammers and molding machines, and other labor-saving devices, shows that the executives of the Standard Brass Casting Company have studied very carefully the efficient method of turning out a heavy tonnage of castings with minimum expense and loss of time.

BOOK REVIEW

Official Report of the Sixth National Foreign Trade Convention, held in Chicago, April 24-26, 1919. 8vo., 650 pages, cloth. Price $2.00. Issued by the Secretary of the National Foreign Trade Council, 1 Hanover Square, New York.

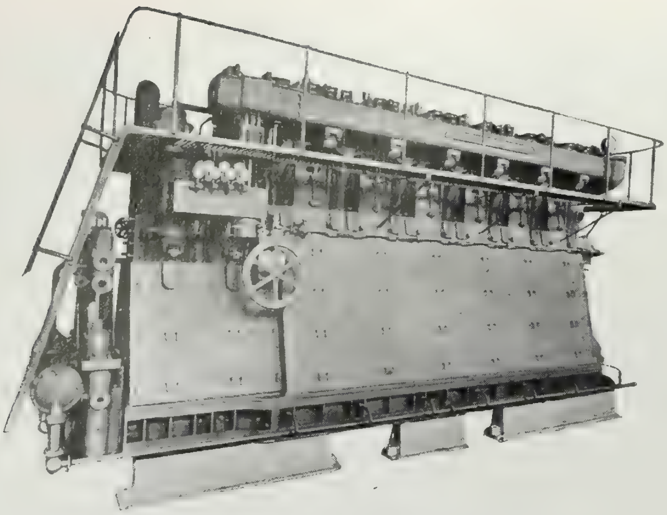
Under the title of "Official Proceedings of the Sixth National Foreign Trade Convention," the National Foreign Trade Council has issued a textbook on foreign trade replete with information, advice and suggestion. This volume is a stenographic report of the proceedings of the convention held in Chicago, April 24-26, 1919.

Included in the book are the speeches delivered at all the sessions, the banquet addresses, the discussions, and a list of the delegates present, together with the names of the organizations and companies represented. The convention was the largest and most instructive yet held. Nearly 2000 delegates were in attendance from thirty-eight States and seventeen foreign countries. Representing all parts of the world and all factors in foreign trade, from the production of raw material to the transportation of the finished product, the deliberations and conclusions of this gathering are entitled to the most serious consideration. Especially is this true of the Final Declaration of the convention, printed at the front of the volume, in which the conclusions of the convention are set forth in a comprehensive legislative program, the first of its kind definitely laid down by the business men of the country.

The opening chapter, dealing with America's Need for Foreign Trade, contains a valuable summary of our industrial and financial equipment for the development of our commerce on a new and larger scale. In the second chapter, the interest of special elements in foreign trade is considered, among them: agriculture, aviation, the tariff, and the Mississippi Valley. The subject of the American Merchant Marine is carefully treated from the standpoint of builder, operator, shipper and lawyer. The addresses delivered at the banquet by the Hon. Edward N. Hurley, James A. Farrell and Governor Frank O. Lowden of Illinois form a distinctive and significant chapter.

Other parts of the book deal with a great variety of foreign trade subjects, including education, merchandising, finance, advertising, credits, direct selling, the Webb law, and ocean service. Under each of these headings, the information contained in the set speeches is supplemented by discussion and explanations based on personal experience.

The conclusions of the convention on the future of our foreign trade, as recorded in the proceedings, were to this effect: Since the United States has become a creditor instead of a debtor nation, the course of our foreign trade will show an increasing tendency toward imports from our debtors; and that our American producers, in order to meet conditions resulting from the war and keener competition in foreign markets, must bestir themselves to new activities and determination to find new outlets for their own products.



View of Franco-Tosi full Diesel type marine engine

THE UNITED ENGINEERING COMPANY OF SAN FRANCISCO

TO those of our readers interested in the subject of the development of the motorship, it will prove a source of gratification to learn that this widely known engineering concern has acquired, through purchase from the designer and patentee, the Pacific Coast right to the manufacture of the notable and highly-efficient Franco Tosi full Diesel type marine engine, an illustration of which accompanies this brief reference to the company's operations in this special field of engineering. The subjoined particulars respecting the engine, embodying as they do several features of especial merit, will be found of topical interest.

The engine is of the well-tried four-cycle design and, due to the necessary control being exercised by means of the air compressor in lieu of the generally adopted method of utilizing the power cylinders for maneuvering, is manufactured in four, six and eight cylinder units, and in sizes ranging from four to eight hundred horsepower. Piston and rotative speeds are chosen in accordance with the best and most accepted practice for reliable and economical operation. The ratio of stroke to cylinder bore is such as to insure minimum engine height and to keep maximum loads within desirable limits. The crossheads and shoes (babbitt-lined) are of cast iron and readily adjustable to wear, with provision for their connecting rod removal bodily through the cylinder head, a unique feature that will at once appeal to owners.

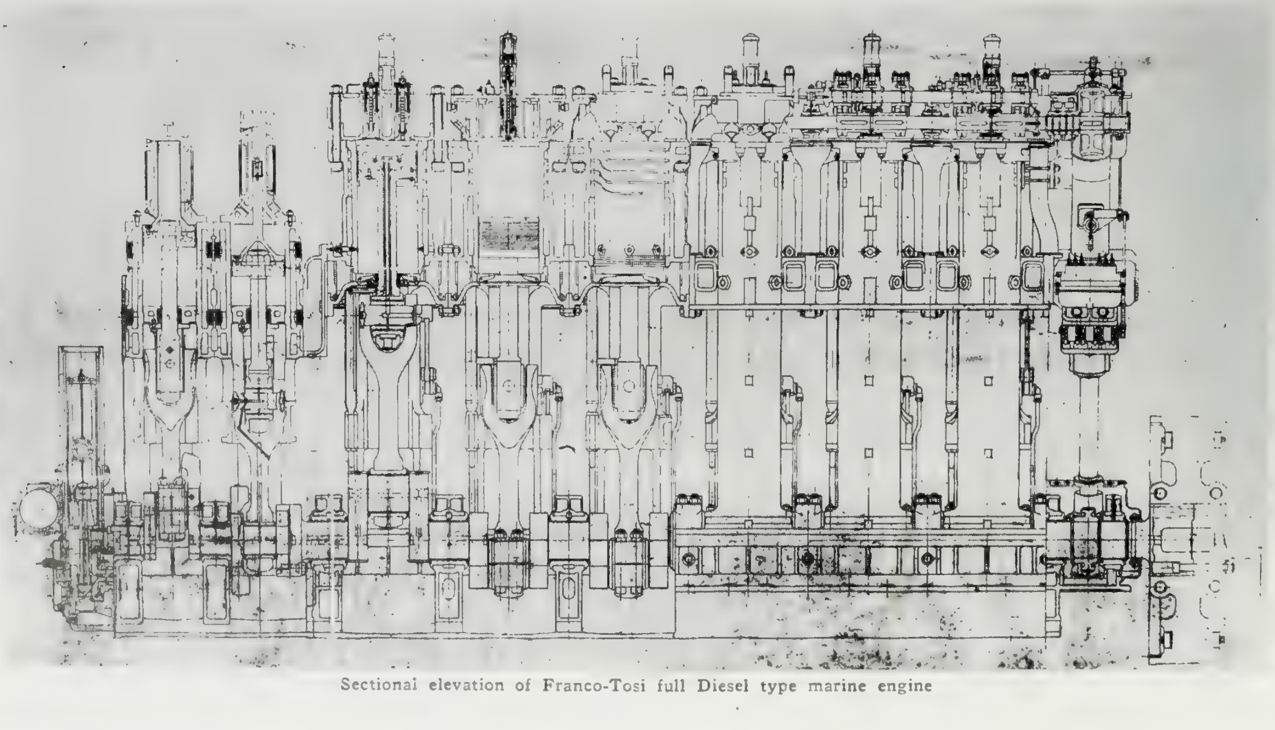
The admission and two exhaust valves have sufficient combined area to provide an unusually high volumetric efficiency, ensuring low maximum temperature and high over-load capacity, features of vital importance to marine engines. A special type of toggle-joint tubing is used for the admission of the cooling liquid to piston, the discharge being direct through a straight pipe to crank pit, all danger of lubricating oil being mixed with the cooling water being thereby obviated. The crankshaft rocker arms and reverse shaft are housed, by means of which a constant level oil bath can be maintained to ensure positive lubrication of the cams, rollers and fulcrums of rocker arms. Air compressor and maneuvering motor are combined at one end of engine, the compressor being of the three--stage design built into two cylinders, the crank of each being set at 90 degrees relative to the other. The lower end of these two cylinders is used as maneuvering motor in starting and reversing being supplied with high pressure air. Ordinarily the motor supplies compressed air at 100 pounds' pressure for such purposes as steering engine, hoists, whistle, etc. All Franco Tosi engines previde for complete forced lubrication of crankshaft bearings, crank and cross head pin boxes and cam shaft bearings, including coolers and strainers to thoroughly clean and cool oil before re-use.

While ever active in bringing to the notice of shipowners and prospective purchasers of marine motor power equipment, the inherent desirable features of the Diesel type of engine, and particularly of the Franco Tosi engine which this well-known local firm is prepared to manufacture in any size to meet every marine need, the United Engineering Company continues to devote much of its activities to the manufacture and repair of the standard types of marine steam engines and boilers to satisfy the continuous demand of its clientele for this efficient, if less economical, form of marine propulsion.

(Section continued on Page 190)

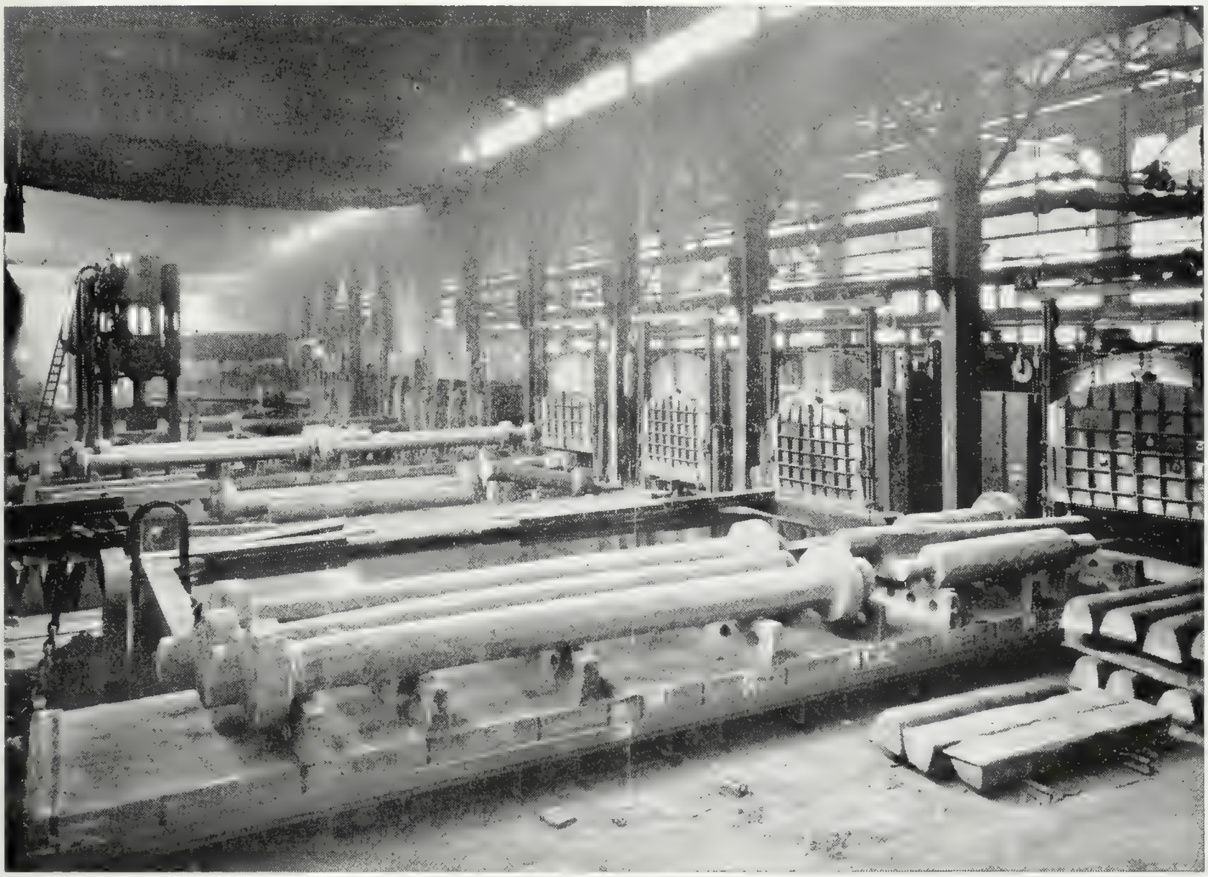
Machine Manufacturers:

Competent salesman with fourteen years' experience, besides apprenticeship as machinist and wood worker, desires position representing a responsible machinery house. Is at present representing a large national firm, but wishes to work locally. Big sales record. Bank and commercial references. Address Box 210, Pacific Marine Review.



Sectional elevation of Franco-Tosi full Diesel type marine engine

MESTA FORGINGS



Forge Department No. 2. Heat Treating Dept. in Foreground

¶ Every ingot used in the production of Mesta Marine forgings is poured from steel made in the Mesta open hearth department.

¶ The forging department is equipped with one 800 ton, two 1500 ton and one 2000 ton Mesta Steam-Hydraulic Presses.

¶ The department for the finishing of shafts has a larger capacity and is equipped with more modern machinery than that of any other producer of forgings.

¶ Finished ship shafting a specialty.

MESTA MACHINE COMPANY

PITTSBURGH **PENNSYLVANIA**

Manufacturers of

Gas and Steam Engines, Blowing Engines, Reversing Engines, Rolling Mill Machinery, Forging Presses, Gear Drives, Air Compressors, Condensers, Rolls, Pinions, Cut and Machine Moulded Gears, Iron and Steel Castings, Forgings, Forging Ingots, etc.

View of shop at the Sumner Iron Works, Everett, Washington, showing winches on erecting floor

SUMNER'S STRIKING RECORD

NOT a little of the speed and expedition with which the shipbuilding plants of the West carried out the program of the Emergency Fleet Corporation in the late strenuous days of the war was due to the consistent efforts of related and interdependent industries.

One of the most notable of these is the Sumner Iron Works, whose general offices and works are located in Everett, Washington, and whose activity and steady production of marine machinery during the war supplied many of the shipbuilding concerns of the Coast. This company manufactures a complete line of marine engines, winches of all types, hand and steam-steering gears, windlasses, capstans and marine machinery in general.

Their record of output during the war emergency is a striking evidence of plant efficiency, adaptability, public-spirited team-work and skillful management acquired through a long period of intimate association with the needs of mill, marine and mine men in the Pacific Northwest.

While it is true that in pre-war days the Sumner Iron Works produced mill machinery as well, during the war their entire energy was expended on producing marine engines, winches, hoists, etc., to propel and load the ships which were to carry Uncle Sam's boys and provisions to the struggle in France.

Here is a partial list of the orders filled by the Sumner works, a list, while incomplete, is remarkable in itself:

Eight 500-h. p. 3-cylinder triple expansion engines.

Six 750-h. p. 3-cylinder triple expansion engines.

One hundred and eighty-four cargo hoists of various types.

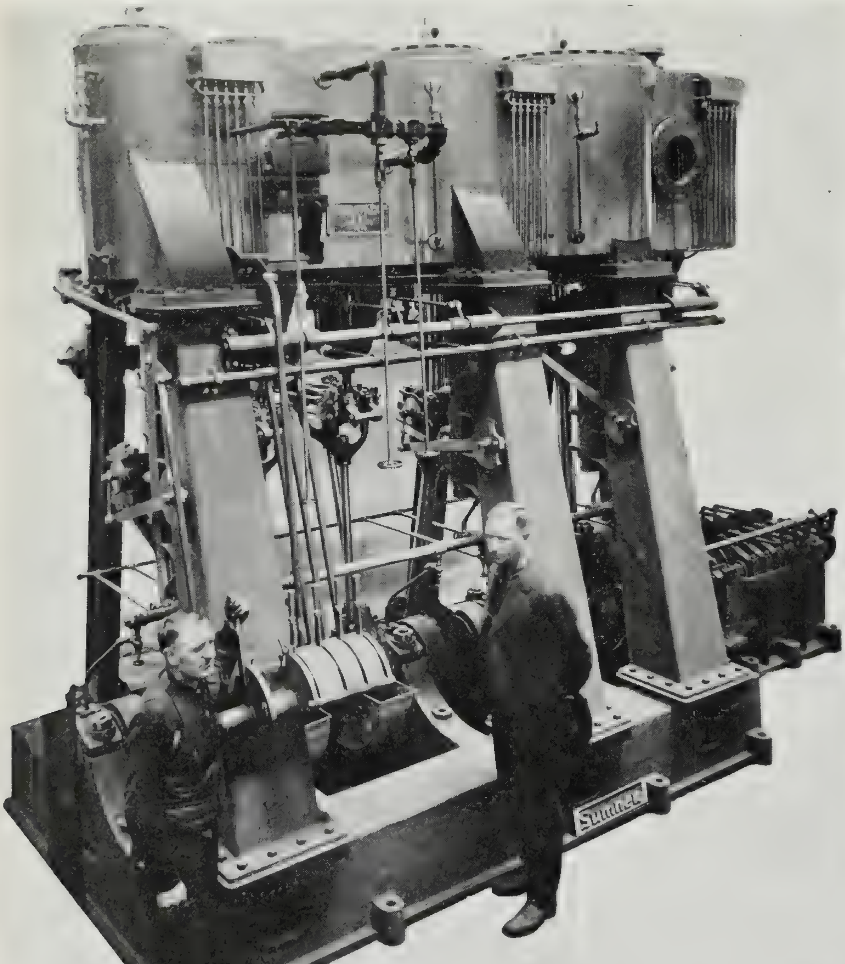
Two hundred and seventy-three winches of various types.

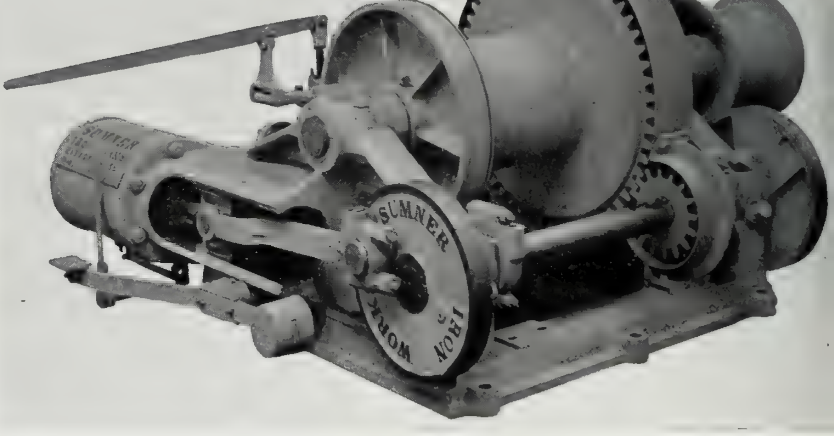
Fifty anchor windlasses.

Besides these, a large number of capstans, blocks, steering gears etc. These were supplied in part to the Emergency Fleet Corporation, the Todd Shipyard & Dry Dock Company, Seattle Construction & Dry Dock Company, and the various shipbuilding plants of Gray's Harbor.

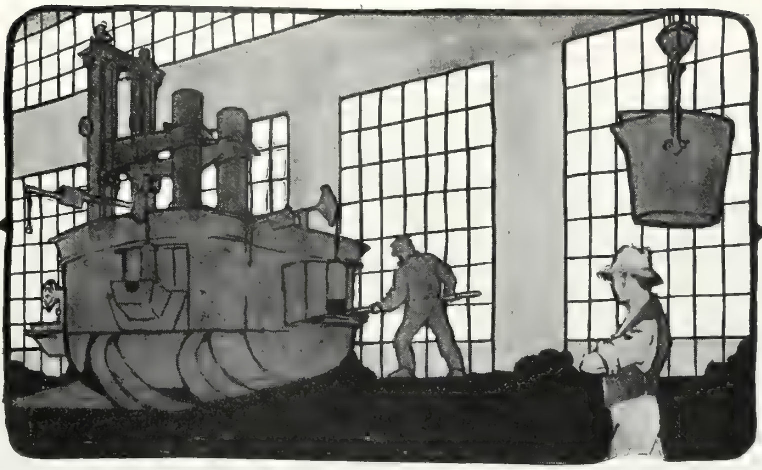
The Sumner Iron Works has kept up a consistent record of production and has been an invaluable friend to mill and marine men since its establishment in 1878. It now maintains offices in all the important Coast cities, including Seattle, Portland and Vancouver.

The officers of the company are:
F. W. Sumner, president.
J. H. Gillett, vice-president.
T. B. Sumner, general manager.
T. H. Bowden, treasurer.





Upper: Triple expansion steam engine. Lower: Cargo winch built by the Sumner Iron Work



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Most economical and efficient Electric Furnace in the World.

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Announcing the new
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MARINE WIRELESS EQUIPMENT
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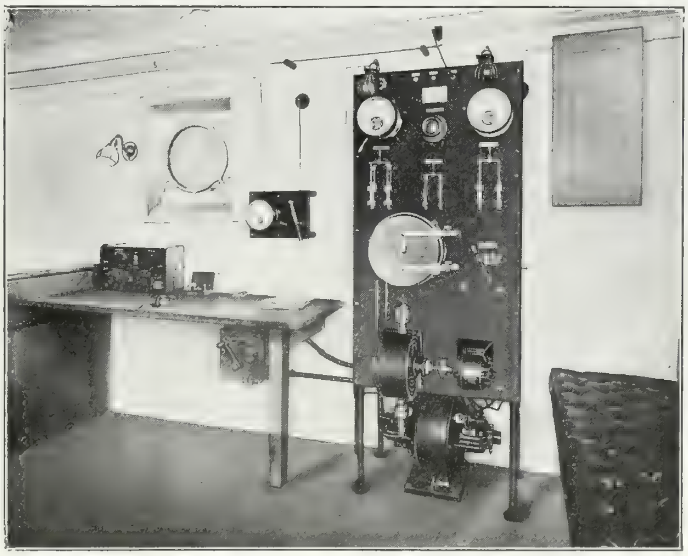

Ranges 150 to 1000 miles, depending on boat
Price—Sending and Receiving Set (ready to install), $1,000.00

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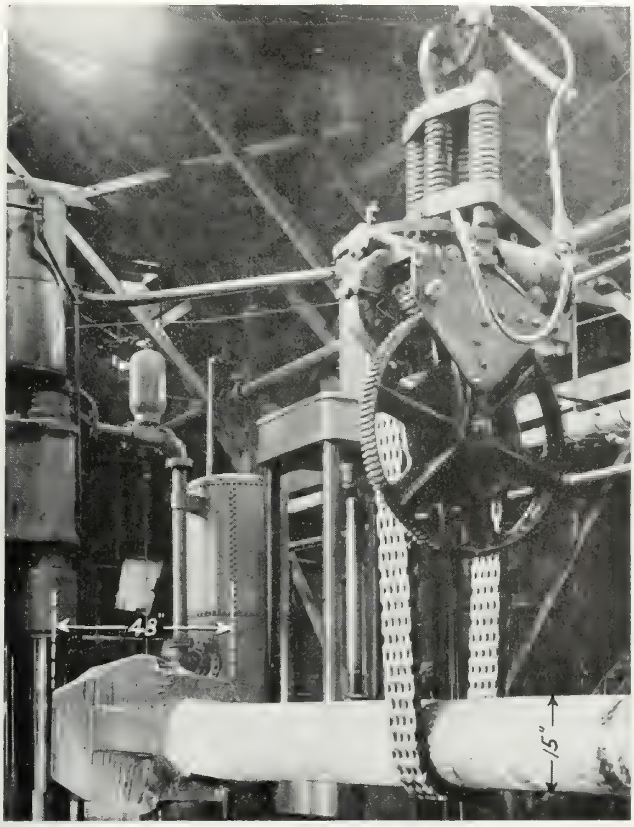

This is one of three Ingot Rotators used by Edwin Forrest Forge Co., San Francisco, Cal.

—for the Orient

We offer for sale the complete working-drawings for the manufacture of Ingot Rotators for Forge Shops—similar to illustration. Drawings are now available for 5 ton or 10, 15, 25, 30, 40, 50, 75 and 80 ton capacities. We manufacture more of these rotators than all other manufacturers combined. Every installation has been entirely satisfactory.

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for terms, etc.

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& ENGINEERING CO.
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10 Hammers
Ready for Delivery

These Board-Drop Blacksmith Hammers have a Capacity Ranging from 300 to 500 Pounds.

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Telephone Kearny 1696

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H. P. GRAY, President
WM. J. McDONALD, Vice-President

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SAN FRANCISCO

PARISH SUPPLY & MANUFACTURING COMPANY AWARDED MOORE CONTRACT

A matter of interest in shipbuilding trade on the Pacific Coast is the contract awarded last week by the Moore Shipbuilding Company to the Parish Supply & Manufacturing Company of Chicago for complete tackle block equipment for six hulls.

This is practically the introduction of the Parish equipment on this coast though their product is extensively used on the Eastern seaboard.

The order was placed through the San Francisco office of the Parish Company which is in charge of Anthony E. Boicelli in the Mills Building.

THE GREAT UNAPPRECIATED

(By one who has evidently made their acquaintance.)

We've loaded sand to Egypt,
  We've shipped coals up to Tyne,
We've sent Mauritius sugar,
  And meat to Argentine.

We've smothered Greece with currants
  South Africa with maize,
We've furnished Spain with olives,
  Marseilles with bouillabaisse.

We've sent Australia rabbits,
  We've shipped nuts to Brazil,
Sent oranges to Jaffa
  And ore to Broken Hill.

We've sent New York fresh water
  (Niagara to supply),
We've sent ice to Archangel,
  And opium to Shanghai.

We've sent Tasmania apples,
  We've stocked Bordeaux with wine,
And Aberdeen with granite,
  The Great Salt Lake with brine.

We've swamped Madras with curry,
  We've sent Arabia dates,
We've shipped out raw tobacco
  (Virginian) to the States.

We think, to be quite candid,
  We've done extremely well,
Yet there are folks who tell us
  To consign ourselves to * * * *

JUST KEEP FISHING

Hi Somers was the durnest cuss
  For ketchin' fish; he sure was great!
He never used to make no fuss
  About the kind of pole or bait,
Er weather, neither; he'd just say,
  "I got to ketch a mess today."
    An' towards the creek you'd see him slide,
      A-whistlin' soft an' walkin' wide.
I says one day to Hi, says I,
  "How do you always ketch 'em, Hi?
    He gave his bait another swish in
    An' chucklin' says, "I just keep fishin'."
Hi took to readin' law at night
  An' pretty soon the first we knowed
He had a lawsuit, won his fight,
  An' was a lawyer! I'll be blowed!
He knowed more law than Squire McKnab!
An' though he had no "gift of gab"
To brag about, somehow he made
  A sober sort of talk that played
The mischief with the other side.
  One day when someone asked if Hi'd
Explain how he got in condishin'
  He laughed an' said, "I jest kept fishin'."
Well, Hi is Guv'nor Somers now,
  A big man 'round the State, you bet!
To me the same old Hi, somehow,
  The same old champeen fisher yet.
It wasn't so much the bait or pole,
  It wan't so much the fishin' hole,
That won for Hi his big success;
  'Twas jest his fishin' on, I guess,
A cheerful, stiddy, hopeful kind
  Of keepin' at it—don't you mind?
An' that is why I can't help wishin'
  That more of us would jest keep fishin!—Ray Clark Rose in "The Vagabond."

MARINE OIL ENGINES

3-100 H. P. new Fairbanks-Morse oil engines complete.
4-350 H. P. Diesel engines.
2-550 H. P. Diesel engines.
1-25 H. P. Fairbanks-Morse type "Y" crude oil engines.
2-3 inch 2-4 inch centrifugal pumps, motor connected.
1-½ ton refrigerating machine.
1-4 ton refrigerating machine.

INLAND NAVIGATION CO.,
St. Louis, Mo.

Ransome Compasses and Binnacles

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Request a Sample of Your Nautical Optician, or for Smaller Sizes Ask Your Jobber

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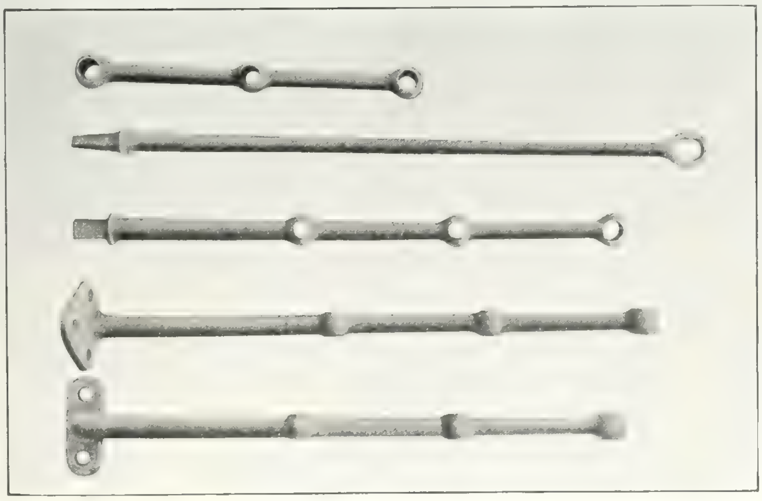

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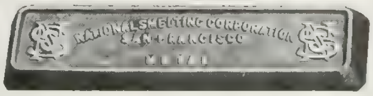
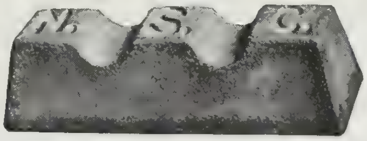
METALS



Babbitt Metal
Type Metal Solder
Ingot Copper Ingot Brass Pig Tin
Pig Lead Zinc Aluminum
Antimony, Etc.



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FOR SALE—NEW

Triple Expansion Marine Engine

12¾", 21½", 35" by 24" stroke.
500 H. P. at 180 lbs. pressure.
Surface Condenser.
Located at Vancouver, B. C.

Address inquiry to

Edward P. Farley & Co.
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DOWNEY SHIPBUILDING CORPORATION

STEEL SHIP and ENGINE BUILDERS

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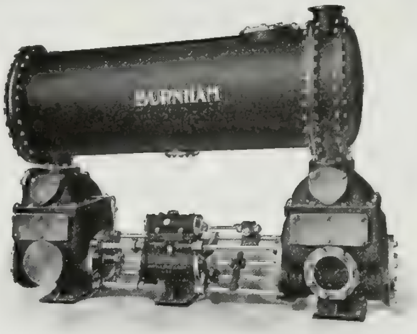
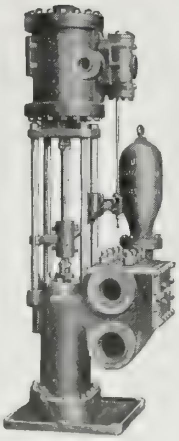
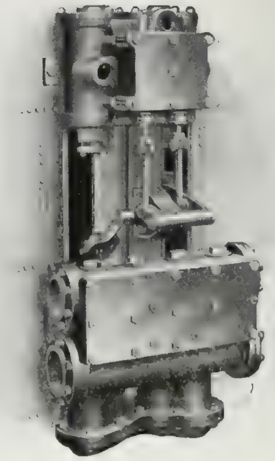
MARINE PUMPS



MARINE CONDENSERS





We manufacture Vertical Simplex Boiler Feed Pumps, Horizontal and Vertical Duplex Ballast, Fire and Bilge, Sanitary, Fresh Water, Engine Room Bilge, Oil Supply, Oil Circulating Pumps. Horizontal and Vertical Simplex Evaporator Feed Pumps, Combined Air and Circulating Pumps, Engine Driven Circulating Pumps, and Surface Condensers.

UNION STEAM PUMP COMPANY

BATTLE CREEK, MICHIGAN
U. S. A.

NEW YORK CITY SHIPBUILDING CONCERN CHANGES NAME

THE Gas Engine & Power Company and Charles L. Seabury & Company, Consolidated, of Morris Heights, is now known as the "Consolidated Shipbuilding Corporation." This well-known company has operated for over thirty-five years and has built more than 3000 craft. It won its original reputation as builders of "the only naphtha launch" and later as builders of the finest and fastest steam yachts and motor boats. It has for many years devoted its facilities to a considerable extent in building government vessels. It has built and delivered during the war mine sweepers, flying boat hulls, water-tube boilers, and converted a great many yachts and motor boats for war service.

The officers of the Consolidated Company, who have been connected with the industry for many years, are: President, John J. Amory; vice-president, William J. Perslow; secretary and general manager, Bruce Scrimgeour; treasurer, Clement G. Amory.

Why the Name is Changed

At the formation of the original company in 1885, it was proposed to build a gas engine lighting apparatus in addition to naphtha launches. For this reason the name Gas Engine & Power Company was chosen. When the Seabury Company joined the Gas Engine & Power Company in 1896, the two companies consolidated under a combination of the two names, the Gas Engine & Power Company and Charles L. Seabury & Company, Consolidated.

The company has, since that time, operated under this long and cumbersome name. It has been abbreviated in either of two forms—"Gas Engine & Power Company" or "Charles L. Seabury & Company." When the company started building gasoline engines, they selected the trade name of "Speedway." Gradually the name was used to cover boats and other products manufactured. The name "Speedway Products" was also used extensively. A year or so ago, when the employes' buttons were adopted, it became necessary to use a shorter name than the full corporation title. Accordingly, the factory was called the "Speedway Shipyard." This name proved very satisfactory, although it did not exactly fill all the requirements and was just another addition to the many titles under which this company was known. For instance, in the beginning of 1919, the company had the following abbreviations:

Gas Engine & Power Company.
Charles L. Seabury & Company.
Seabury's.
Speedway Shipyard.
Seabury Shipyard.
Morris Heights Shipyard.
Speedway Company.

To avoid these many abbreviations and to shorten the corporation title, it was decided to change the entire name of the company. The name "Consolidated Shipbuilding Corporation" was chosen as best typifying the characteristics of the present company. It has been the consolidation of two companies and has been known as such for many years. The word "Consolidated" denotes the true condition—that is, a firm union of two companies to form one system.

The trade name "Speedway" will still be retained to cover the gasoline engines which have made a world-wide reputation.

LARGE EXPANSION OF THE POLLAK STEEL COMPANY

TENTATIVE plans for an enormous increase in the capacity of the Pollak Steel Company, both at the Cincinnati and Chicago works, have been laid and are rapidly being worked out. The organization and plants have grown in such large proportion during the war both in buildings and equipment, together with the ever-increasing demands for American steel products, that the company has found it necessary to increase the capacity of both the Cincinnati and Chicago works.

The products of the company now consist of hammered, pressed and drawn forgings of every description, ranging from one to one hundred thousand pounds. The most modern equipment for the manufacture of heavy and small forgings is now in operation at both plants for the manufacture of steam and electric car and locomotive axles, heavy marine forgings and industrial forgings of every description, and both plants are now equipped with steam hammers, presses and a machine shop complete in every detail. Also the most modern heat-treating plants in the country which take care of everything in the forging line.

The new improvements will be along the lines of rolling mills, known as merchant mills, which will turn out rolled products which are in great demand and cannot be forged. This will consist of material for farm implements, railroad work and kindred lines. In addition to this, plans are being drawn up for a large drop forge plant for the Chicago works. With the present equipment and the proposed improvements the Pollak Steel Company will have a scope far reaching in the manufacture of steel products. The Pollak Steel Company has been one of the first to come forward and express its faith in the future.

WANTED
Experienced Marine Engine Draftsmen
Fabricated Ship Corporation
Foot of Twelfth St.
Milwaukee, Wis.

The company also announces the appointment of Mr. D. E. Sawyer as the domestic and foreign general sales manager of the company, effective July 1. Mr. Sawyer will be located in the Equitable Building, 120 Broadway, New York City, handling the sales problems of both the Cincinnati and Chicago works, in foreign countries as well as the United States. Mr. Sawyer has been for many years connected with the Illinois Steel Company, and during the recent war served on the War Industries Board at Washington. With the new improvements and the ever-increasing foreign and domestic business, the company has found it necessary to increase the sales department, thereby relieving other officials of the company. Friends of Mr. Sawyer are pleased to learn of his appointment.

The Reilly Distiller Bulletin No. 228 of the Griscom-Russell Company, 90 West street, New York.

Contains descriptions and dimensions of the various types of this well known apparatus for condensing a supply of fresh water on board ship, together with explicit directions for installation.

The Cleveland Steel Tool Co.
Largest Exclusive Manufacturers of
PUNCHES, DIES, CHISEL BLANKS, and RIVET SETS
660 East 82d Street, Cleveland, Ohio
Standard sizes carried in stock by
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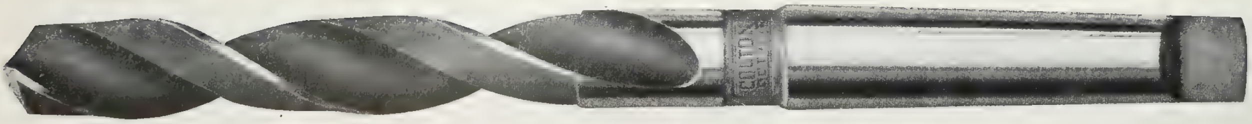


"Colton Detroit" High Speed Twist Drill

OF INTEREST TO HIGH-SPEED TWIST DRILL USERS

One of the largest manufacturing concerns in the world advises that it has made a remarkable record in drilling operations with two 1-3/16-inch "Colton Detroit" high speed drills. The work was on 1-3/8-inch boiler plate. Two thousand holes were drilled by each drill. The drills were sharpened three times and at the end of the job were measured carefully and found to be 3/32 of an inch shorter. This remarkable performance is better realized when we consider that each of these tools had drilled the equivalent of a hole seventy-six feet in depth through boiler plate before being sharpened.

These drills are sold by Louis G. Henes, who carries a large stock in all sizes both at San Francisco and Los Angeles.

Colby "Sampson" Crane Installation at a Portland Shipyard

BIG SEATTLE CONCERNS COORDINATE EFFORTS

HOW that the Pacific Coast manufacturers have had a respite from the rush of war orders, there is an opportunity for retrospection and planning for permanent growth and development along lines that will make for industrial progress of an enduring character. There will undoubtedly be other cooperative measures adopted for the promotion of mutual business relations such as the arrangement recently consummated between R. J. Church, general manager of the Vulcan Manufacturing Company of Seattle, and M. R. Colby, president and general manager of the Colby Steel & Engineering Company, Seattle, representing the principals of the two concerns, whereby the Vulcan Manufacturing Company will build, in conjunction with the Colby Steel & Engineering Company's own plants, the Colby "Samson" cranes, hoists and different kinds of heavy lumber and handling equipment.

Each of these concerns helped to make history during the war period. The Colby "Samson" crane and the hoists and other labor-saving equipment of the Colby Steel & Engineering Company are well known in all the shipyards on the Pacific Coast, as well as in the lumber mills, where they were used with great success. The Vulcan Manufacturing Company also made a noteworthy record in turning out immense quantities of ship cargo-handling equipment, fabricated steel and heavy machinery of various kinds.

In speaking of the arrangements entered into between the two concerns, Mr. Colby is quoted as follows: "We feel that in completing our negotiations with Mr. Church and the Vulcan Manufacturing Company, we have taken a distinct step forward. The Vulcan plant is undoubtedly one of the best equipped and best managed shops on the Pacific Coast. This company made a wonderful record for efficiency and speed in turning out heavy equipment for the steel ships for the Emergency Fleet Corporation and for Skinner & Eddy and other big Pacific Coast yards, as well as developing a number of special machines for expediting work in the yards. The company has a splendid structural steel and forge shop and one of the largest rod and bolt shops on the Pacific Coast. The work they are doing in their foundry and machine shop speaks for itself.

"It is the intention of our company to proceed with the manufacture of our cranes, maintaining a stock for prompt delivery. We have already started work manufacturing a number of the Colby 'Samson' cranes of the latest type, such as we have recently completed and installed for the Duthie Shipbuilding Company, Seattle; North End Lumber Company, Tacoma; Defiance Lumber Company, Tacoma, and the Harbor Marine Company, Victoria, British Columbia. This type of crane has been used with great success by lumber mills, ship yards, docks and warehouses. We shall also make up a number of cranes of the overhead traveling type, enabling us to make prompt delivery also on this type of crane."

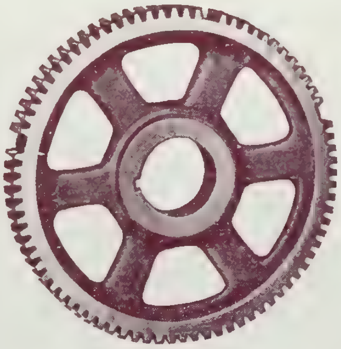
Colby "Sampson" Crane Installation in a Northwest Lumber Yard

Pacific Marine Review

Pacific Fleet Arrives
(Page 82)

September
1919

Pacific Marine Review, Vol. 16, No. 9. Published monthly at San Francisco. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. $3.00 a year.



PAINLESS DENTISTRY *for* GEARS

YOU wouldn't discharge the foreman if he lost a molar. Why scrap a gear just because of a few broken teeth? Why not fill in with new metal—as shown here—and recut? This is only one of a thousand ways to oxweld and reduce costs. Ask us to send you the Bulletin that tells about the advantages of oxwelding in your industry.

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NEWARK, N. J. CHICAGO LOS ANGELES
World's Largest Maker of Equipment for
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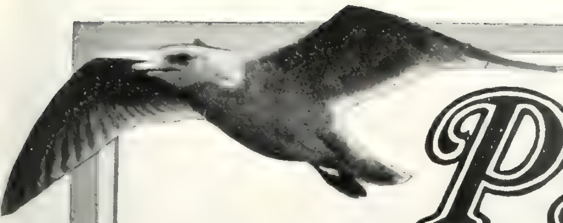

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South American Line—S. S. Anyo Maru sails for Valparaiso and West Coast Ports Oct. 21st

San Francisco Passenger and Freight Office, 625 Market St.

Pacific Marine Review

The National Magazine of Shipping

September, 1919

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Italian Geared Turbine Cargo Steamers

By C. E. Spinnler

ITALY until a short time ago completely depended on foreign countries, and particularly on England, for the construction of the propelling and auxiliary machinery for the few hulls which have been launched in its very antiquated shipyards. Why should Italy undergo the trouble and the heavy expenses to create its own shipbuilding industry at a time when good neighbors supplied her with all the necessary machinery, obtaining thereby the profitable complete dependency of Italy to their will.

Just before the war Germany was beginning to place her foot strongly in that field and to make very strong competition to English manufacturers, supplying Italy with some of her best and fastest boats.

But the war taught Italy many lessons, and in the shipbuilding industry she emancipated herself almost completely. From barely a dozen shipyards before the war, today the number is more than three times as great. All of these are modern, well equipped yards, able to turn out ships of every kind and description; seeing to it also that quality goes before quantity. The foreign shipbuilders, as well as the foreign engine builders, can already see modern Italian ships plying the seas, equal in all respects to the best cargo ships of other nations. Capable Italian firms of very high standing have developed ship and engine types of their own, which have proved most satisfactory in service.

The Franco Tosi Company of Legnano, Italy, has designed and built very successful marine steam turbines, both for direct connection and for use with reduction gears.

In designing and building such propelling machinery the Franco Tosi Company took advantage of all their extensive experience gained during the last fifteen years as builders of more than 1,500,000 h. p. in steam turbines for stationary purposes.

It may be recalled that since 1912 more than twenty-four destroyers have been fitted out with Tosi turbines ranging in capacities from 7500 s. h. p. to 25,000 s. h. p. per unit. During the war a scoutboat of the Italian Navy was supplied with two 25,000 horsepower direct connected turbines running at 500 RPM; a shipspeed of nearly 41 knots was obtained.

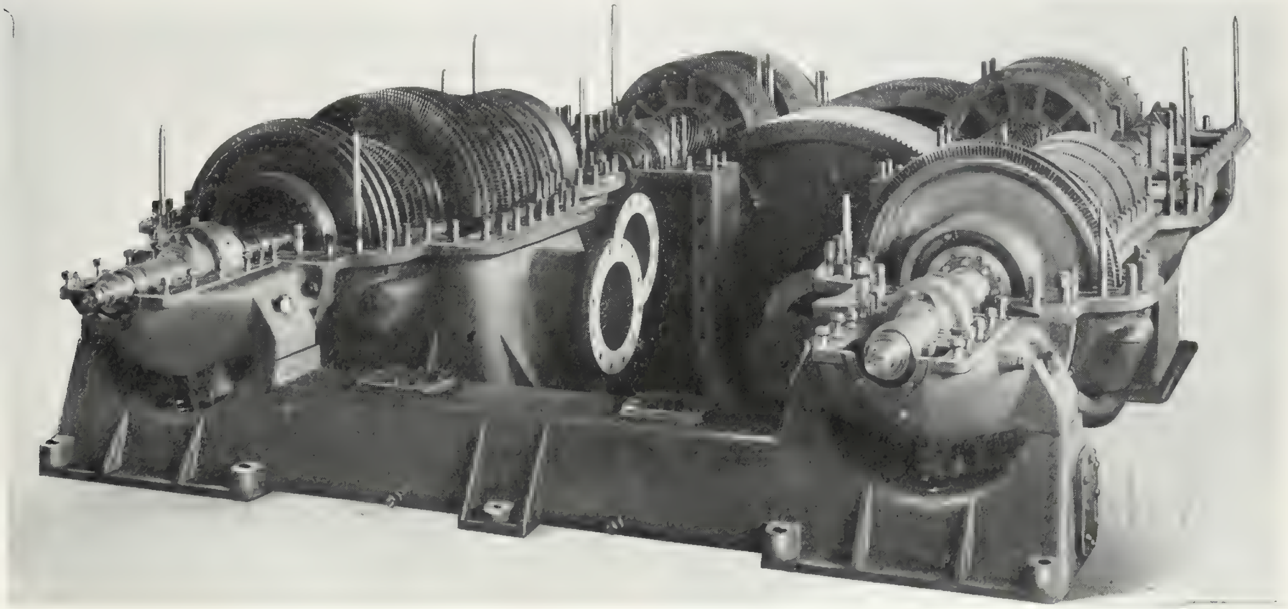
Recently geared turbine sets have also been provided for the Navy and they have given very satisfactory results.

The geared turbines for propelling purposes on cargo boats are coming more and more in use as they incorporate many advantages over the reciprocating marine steam engines.

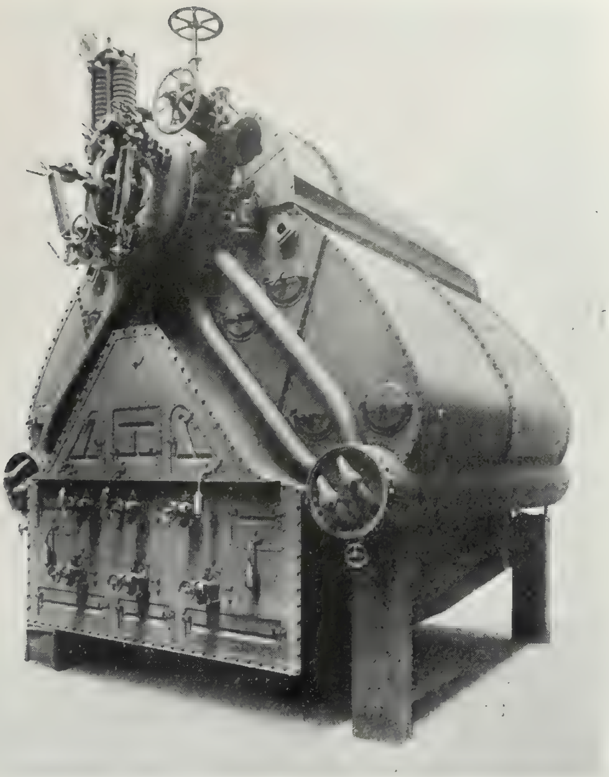
The following description gives the details of the Franco Tosi turbine installation on 8000-ton cargo steamers:

Boiler Plant

In all the newer ships, water tube boilers instead of Scotch boilers are used, these having for the same steam production as generally obtained in Scotch boilers a greater heating surface, with the



Franco Tosi compound steam turbine and reduction gears with covers removed

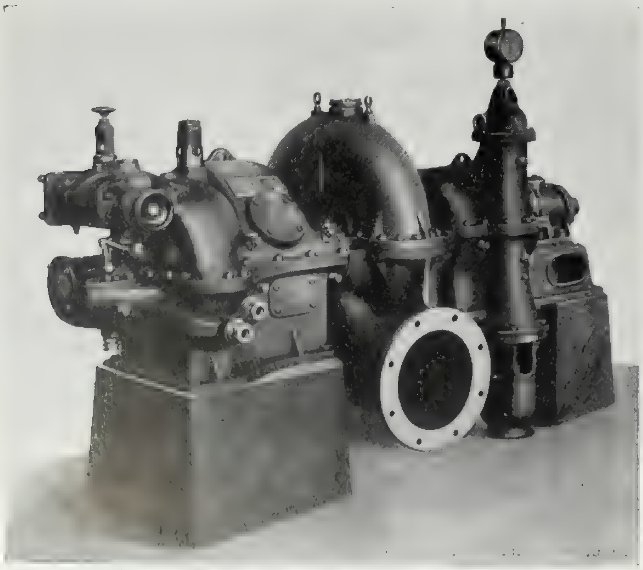


Franco Tosi water-tube boiler arranged for oil firing

advantage of a considerable reduction in weight of the boiler itself as well as of water carried.

These water tube boilers are provided with a relatively large water volume, so that if by disattention of the stokers the feeding should be interrupted, it requires about fourteen minutes time before the water level reaches the danger limit. (About the same time as in the ordinary Scotch boilers.) In addition an automatic feeder is provided for each boiler, which eliminates the above mentioned danger completely.

The boilers are enclosed in a double sheet wall, in which wall space the feeding air, before reaching the grates, is circulating so as to reduce as much as possible heat radiation from the boilers. To improve still more the condition for the firemen an air pressure of a few millimeters water column is maintained by means of turbo blowers (45 m/m). This air pressure is so low that it will not cause any trouble during the stoking of the furnaces with coal.



Franco Tosi turbine-driven circulating water pump

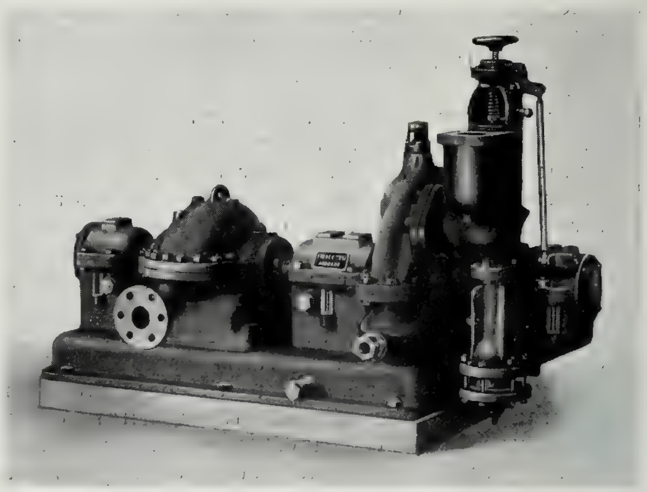
For the feeding of the boilers two centrifugal pumps are provided, one of them is sufficient to supply the whole amount of feeding water, the other remains as a reserve. These pumps are driven by a 20-horsepower steam turbine at a speed of 5000 RPM and has a capacity of 24 tons an hour at a pressure of 250-280 lbs. a square inch. The centrifugal pumps have all their rotating parts built in bronze and are provided with automatic pressure regulators.

Main Steam Turbines

The main steam turbines consist of one high pressure and one low pressure turbine with an astern turbine incorporated in the low pressure casing. If required a second astern turbine could be easily incorporated also in the high pressure casing.

The high pressure turbine is of the mixed action and reaction type, the action wheel having a double rim with blades arranged in velocity series; a great number of reaction blades are mounted on the drum.

The low pressure turbine is built as a full reaction turbine. The astern turbine is mounted on the same shaft, but is of the mixed type.



Franco Tosi turbine-driven feed water pump

The stuffing boxes of the high pressure turbine are composed of carbon rings, those of the low pressure turbine are of the labyrinth type.

Reduction Gear

The reduction gear is of the rigid double reduction type. Each turbine shaft is coupled to a pinion shaft which carries a pair of small pinions. These shafts are supported rigidly by three bearings each, and are running at turbine speed of 2500-3000 RPM.

These pinions drive an intermediate gear pair, also journaled each in three bearings. The intermediate gear shaft carries the pinions for the second reduction, which are driving the low speed gear wheels mounted on a drum and direct connected to the propeller shaft by means of a flange coupling.

All the gears are enclosed in a very strong casing, strong enough to take care of all the deformation of the hull and ensuring so a perfect tooth contact under all circumstances. The gear is provided with forced lubrication. A hand turning gear is provided at the end of the high pressure turbine pinionshaft.

Main Condenser

The condenser is of the triangular type with very abundant cooling surface, with tubes so arranged to reduce to a practically possible minimum the passage resistance of the steam between the tube-bundles, and to provide for an efficient cooling of the remaining non-condensible gaseous products.

The condenser is provided with two steam ejectors for the extraction of the air from the condensing chamber and with two hot water pumps for the extraction of the condensate, eliminating so the cumbersome and troublesome piston air pumps.

Main Auxiliary Groups

With the elimination of the separate air pumps all the other auxiliaries necessary for the condensing plant, to save space and simplify operation, have been incorporated in one unit group, which is driven by one turbine of 50-60 horsepower running at a speed of 5500 RPM. By means of a reduction gear this speed is reduced to 500 RPM, the operating speed of the different pumps of the unit, as:

> A centrifugal water circulating pump of a capacity of 90 tons an hour and maximum pressure of 8 pounds a square inch.
>
> A lubricating oil circulating pump which supplies the whole lubricating system of the main propelling machinery.

In addition to these pumps there is a vertical centrifugal pump driven by means of a helical gear from the pump shaft, for the extraction of the condensed steam. If this pump is built as a separate unit it consists of a steam turbine running at a speed of 6000 RPM, a reduction gear to slow down the speed to 2000 RPM for driving a centrifugal pump.

As reserves, a separate hot water extraction pump and a lubricating oil pump are provided, whereas, as a reserve to the main circulating pump the main bilge pump is used.

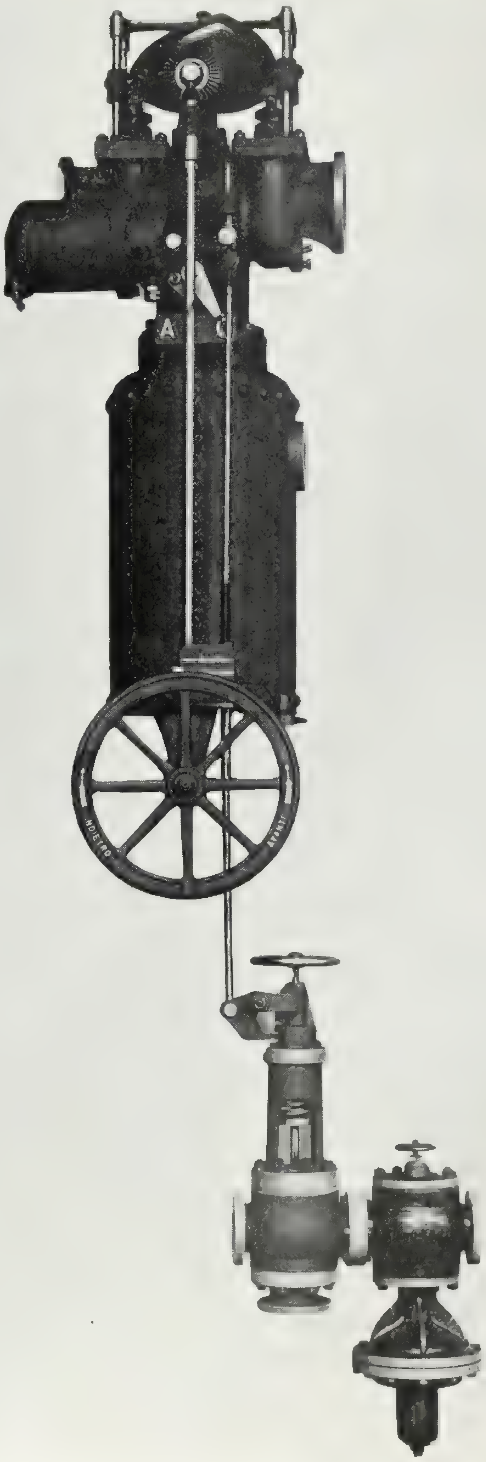
Steam Admission to the Turbine

For the steam distribution to the turbine nozzles a double slide valve is used which assures perfect tightness and ease of operation, as only one hand wheel is necessary for the operation of both the ahead steam-valve as well as the astern steam-valve.

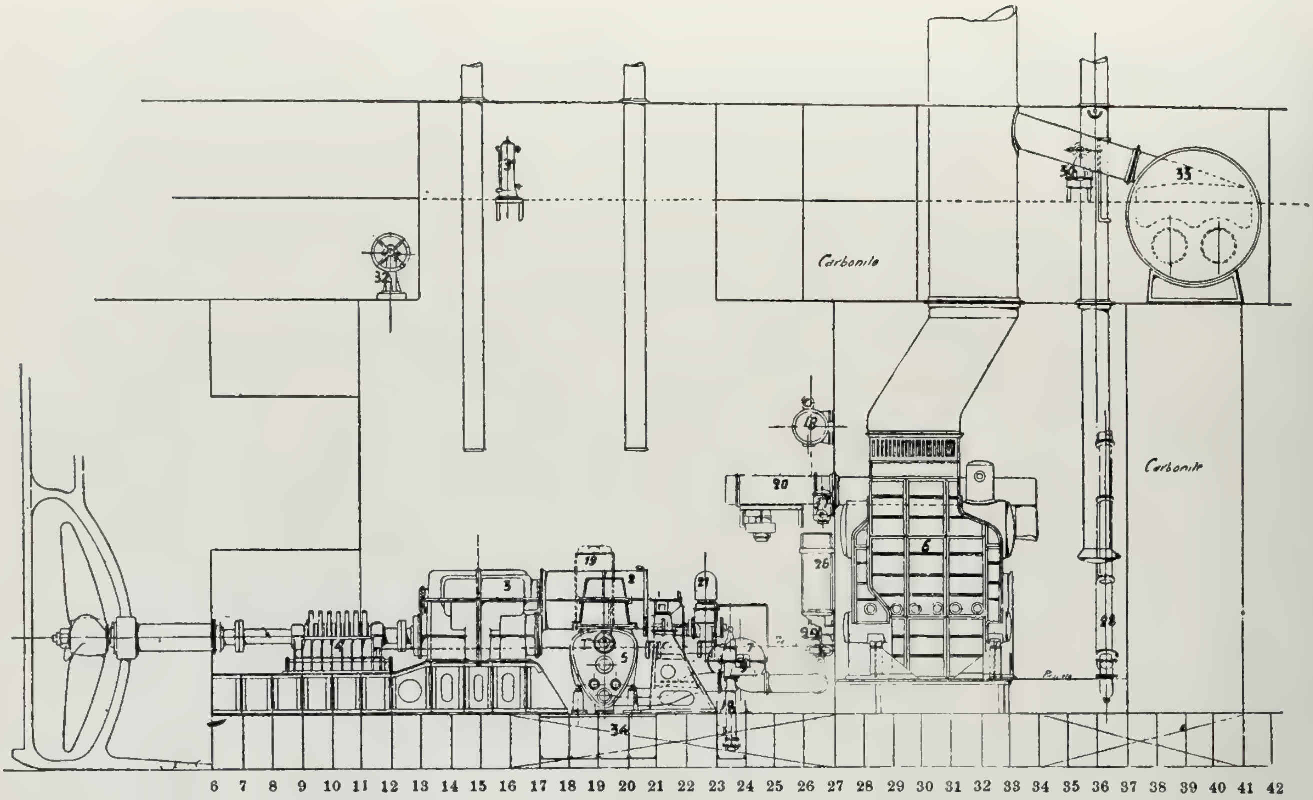
Just before the operating valve a butterfly valve is provided in the steam main, which is under the control of an oil servo-motor. The oil pressure for this servo-motor is under the control of a centrifugal governor mounted on the free turbine shaft's end. This governor acts so, that, if for any reason, the turbine speed increase over a certain limit, the steam supply is automatically shut off.

Recovery of the Exhaust Steam from the Auxiliaries

As the auxiliaries consist of centrifugal pumps driven by small steam turbines at high speed it thus brings the advantages of having the exhaust steam completely free of lubricating oil and air in addition to a very low steam consumption. At normal speed of the vessel this exhaust steam can be completely utilized to preheat the boiler feeding water in the preheaters, thus obtaining a very high thermal efficiency. In case that the ship should run for a considerable time at a reduced speed naturally not all the exhaust steam of the auxiliaries can be utilized for preheating purposes, and in such case provisions are made that the surplus of exhaust steam is conducted direct in the main low pressure turbine. For this purpose the exhaust collector of all the auxiliaries is connected with one end to the preheaters and the other end is provided with a pressure release valve which prevents the raising of the steam pressure in the collector above five pounds.



Franco Tosi arrangement of control valves for main turbine set



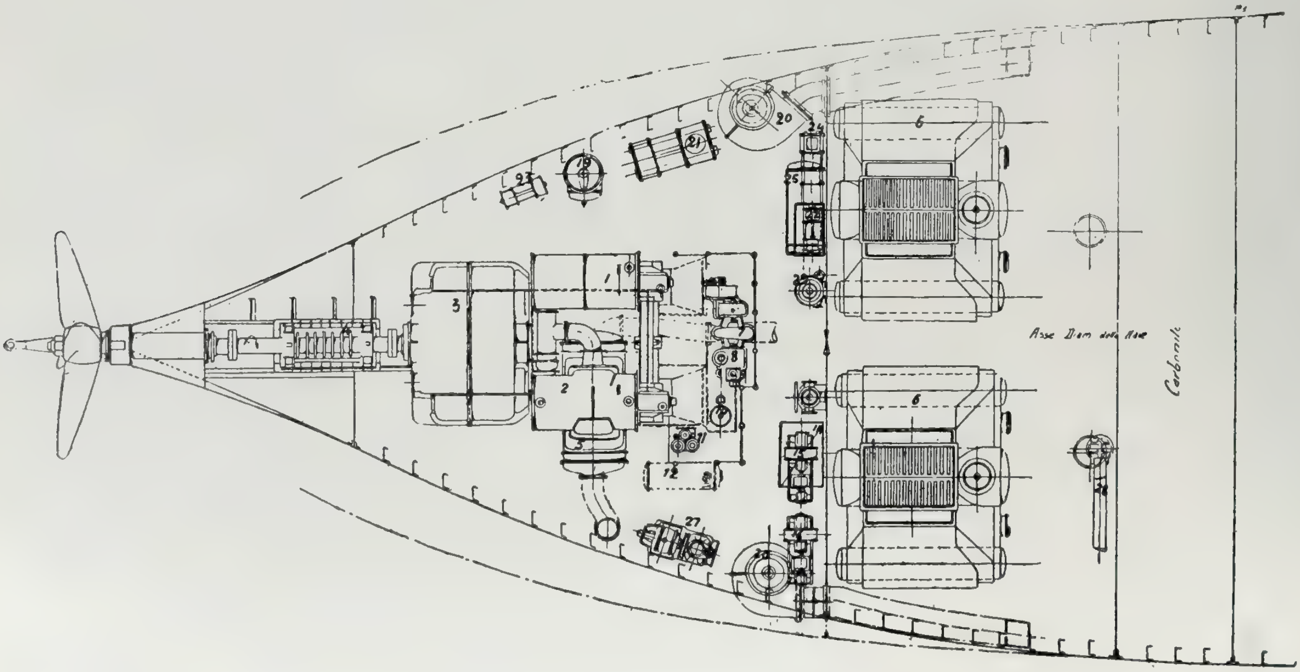
Longitudinal section showing arrangement of power plant on single screw cargo steamer

In case less water should pass through the heater than that which would correspond to the quantity of exhaust steam from the auxiliaries in operation, the collector pressure tends to raise and the release valve automatically releases the excess steam to the low pressure turbine by means of a three-way valve. The adoption of this three-way valve is warranted in view of the fact that for quickest possible reversing of the main turbine this exhaust steam should no longer go to the low pressure, where it would act as a break, but must be immediately transferred to the condenser. This process of switching is made automatically by means of the same hand wheel which controls the main maneuvering valve.

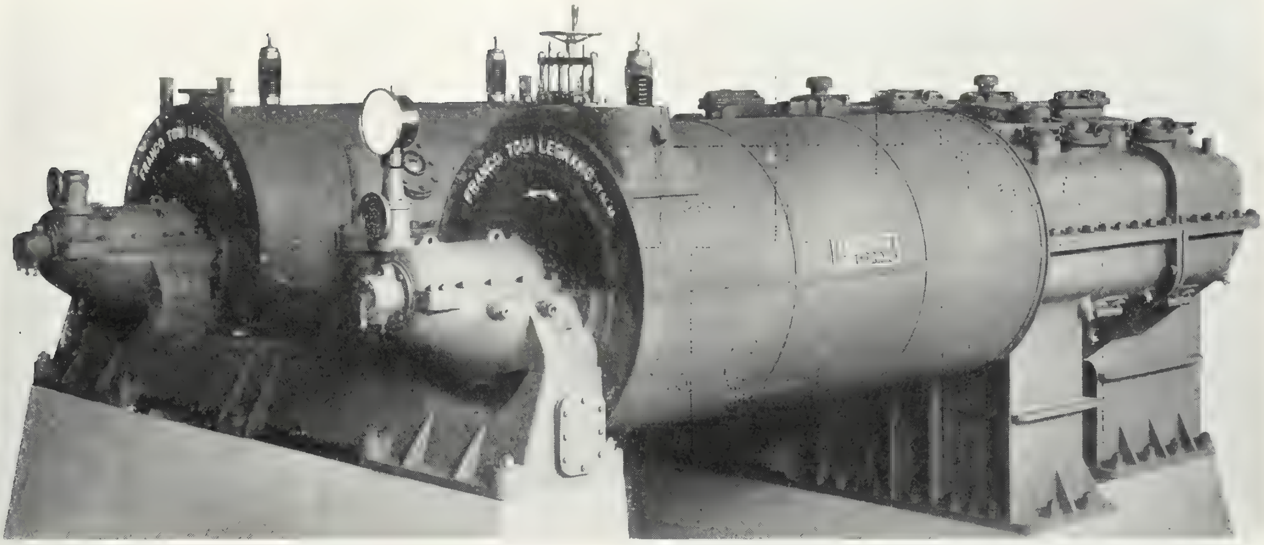
Other Auxiliaries

The other auxiliaries which are provided are:

1 feed water heater,
1 evaporator of 15 tons capacity in 24 hours,
1 feed water filter,
1 SEO type ejector with relative turbo pumps,
1 steam ash ejector,
1 donkey boiler,
1 auxiliary condenser,
1 principal and one auxiliary hot water pump and one 5-ton distillator,

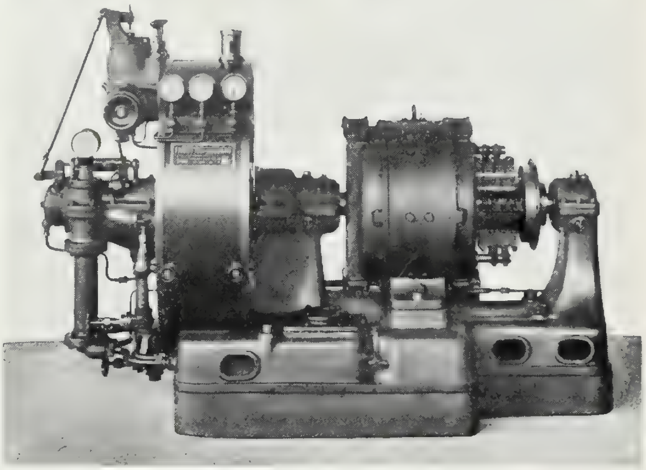


Plan showing arrangement of power plant on single screw steamer



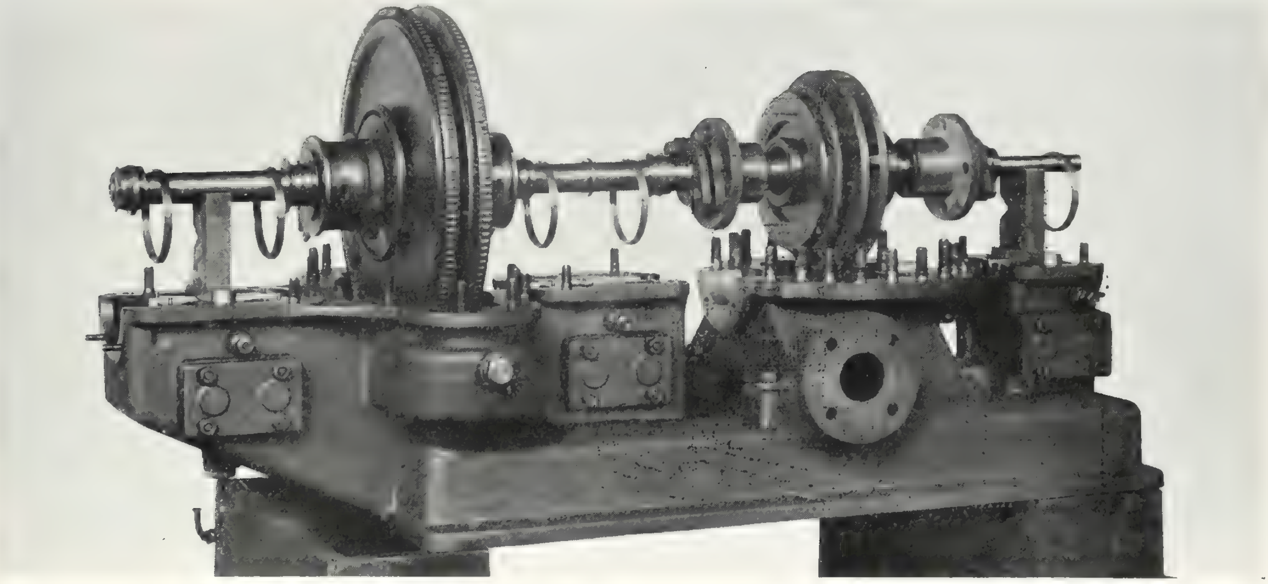
A Franco Tosi geared compound turbine set on test block

Franco Tosi turbine-driven ventilating blower

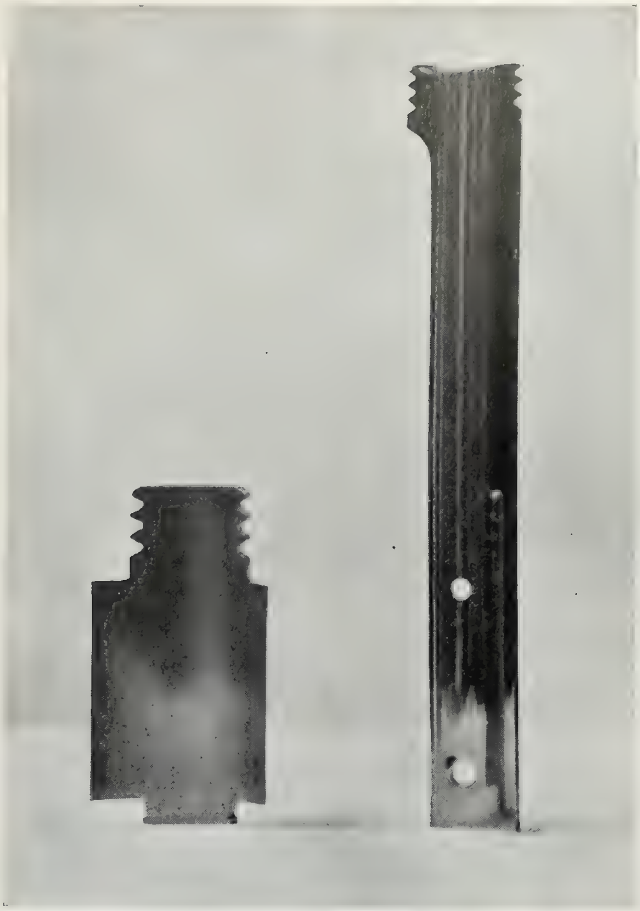


Franco Tosi turbo-generator set, 30 k.w. capacity, 3000 r.p.m.

1 bilge duplex pump of 200 tons capacity an hour,
1 duplex feed pump, capacity 11 tons an hour,
1 general service duplex pump, capacity 18 tons an hour,
1 duplex circulating pump for the auxiliary condensers, 30 tons an hour,
1 electric generating set of 10 KW.



Franco Tosi turbo-driven feed pump, showing runner lifted from bearings. Note rigid construction



Franco Tosi turbine blades

The first ship fitted out with such a propelling machinery as above described is the Marino O, built by N. Odero & Company at the Setri Ponente Shipyard near Genoa, Italy. She is of 5495 gross tons and has been in service since July, 1918. The boat has the following dimensions:

Length between P. P.	378 feet
Beam	51 feet
Depth	30 feet 2 inches
Loaded speed	10½ knots an hour

The boat is a coal burning steamer and has been provided with two Scotch boilers, which have been built to utilize material supplied from England for that purpose. However, all the other similar ten steamers, for which the Franco Tosi Company is supplying the turbine propelling machinery, will receive water tube boilers adapted for liquid fuel; thus rendering this type of vessel as economical as can be possibly obtained with such turbine propelling apparatus.

The chief engineer, Mr. Raffaele Pittaluga, whom the writer had the pleasure of meeting in an Atlantic Coast port, states the following about the operation and endurance of the propelling machinery of the Marino O:

"I take pleasure to confirm the good behavior of the whole machinery and of the very fine condition of the turbines and reduction gears. We covered a distance of 5401 nautical miles in 514 hours and twenty minutes, which corresponds to a medium speed of 10.5 knots an hour. The turbines and gear have been working perfectly and without the slightest disturbance.

"Since the 7th of July, 1918, to June 22, 1919, we have covered 37,529 nautical miles with a total of 4137 service hours. Here is an extract from my logbook for this trip:

Distance covered	5401 nautical miles
Time of navigation	514 hours, 20 minutes
Hull cleaned	March 3, 1919
Loaded draft medium	7.75 meters—26 ft.
Boiler pressure	185 lbs. a square inch
Nozzle pressure	172 lbs. a square inch
Cond. vacuum	95.2 per cent
Feed water temp.	98 degrees centigrade
Turbine speed	2180 R.P.M.
Propeller speed	70 R.P.M.
Shaft horsepower	2360 H.P.
Vessel speed med.	10.5 knots an hour
Fuel consumption per 24 hours (including auxiliaries)	33 tons
Ashes	10.5 per cent
Fuel used	Pocahontas Smokeless
Fuel consumption per SHP hour	1.283 lbs.

This shows clearly what an Italian built steamer equipped with Italian manufactured machinery can do, and we only hope that the same results will be obtained with the ships now under construction. We understand also that a great fleet of twin screw motorships of eight to ten thousand tons deadweight capacity are being built, and the first of these fitted out with Diesel engines, has proved to be a complete success.

AT HOME–SAN FRANCISCO

September 1, 1919

"California in unstinting measure extends its greetings to the great fleet entering San Francisco harbor. To its entire personnel, from the admiral commanding to the enlisted men in the depths of the fireroom, we offer the fullness of our love and admiration. May the placid waters of our coast and bay, under the genial rays of our California sun, dissipate all unpleasant recollections of the nerve-racking days and nights of vigil through which they have so recently and gloriously passed. After much anxiety we have our heroes home again, and our joy on their safe return is accentuated by pride and gratitude. Welcome! Thrice welcome to our shores!"—Governor Stephens.

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A Few Snaps of the Pacific Fleet in its Home Waters

San Diego	*August 6, 1919*
Los Angeles	*August 9, 1919*
Monterey Bay	*August 25, 1919*
San Francisco	*September 1, 1919*

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The Future of Japan's Shipbuilding Industry

By Ryozo Asano,
Managing Director, Asano Shipbuilding Company.

AMONG the great industries which promise to mark the economic development of Japan in future, the shipping and shipbuilding industries seem to claim a position of special importance. Situated as she is geographically, it is quite natural and inevitable that Japan should seek for expansion of her overseas trade and commerce; and the peculiar characteristics of her people are specially suited to make her a great factor in the world's ocean transportation. It is but to be expected, then, that the future of Japan's shipbuilding industry should be a subject of such absorbing interest at this time.

Japan's Position in the World's Shipbuilding

In discussing this subject, it would be well at the outset to consider the position of Japan's shipbuilding industry as compared with that of the other countries. Looking over the world's shipbuilding results since the last decade of the nineteenth century, the most striking fact is the overwhelming preponderance of the British achievements, and this is especially true in respect to the early nineties when Great Britain turned out 80 per cent of the total output of the world's new tonnage. From the beginning of the present century, the remarkable development of the industry in Germany and Holland and the activities in the United States, France, Japan, Canada, and elsewhere, tended to lower the British position but even then Great Britain was launching annually 60 per cent of the world's total. Since the outbreak of the Great War, however, the shipbuilding activities in the United States and Japan have been pushed and developed with such leaps and bounds that the British preponderance was considerably lowered, her percentage being reduced to 30 per cent. The following statistics taken from a recent publication will show the British position against the rest of the world and the progress made by the other countries in shipbuilding achievements since 1905 (Decimal=thousand tons):

	World	British	U. S. A.	Japan	Germany	Austria	Holland	Italy	Norway	Sweden
1905	2515	1636	303	32	255	16	44	62	53	5
1906	2920	1854	441	32	318	19	67	31	61	11
1907	2778	1654	475	66	275	9	67	45	58	12
1908	1833	964	305	60	208	26	59	27	53	9
1909	1602	999	210	52	129	25	59	31	29	6
1910	1958	1161	198	30	159	14	71	23	37	9
1911	2550	1824	198	44	256	38	93	17	35	9
1912	2902	1773	241	58	275	39	99	25	50	14
1913	3333	1980	276	65	465	62	104	50	51	19
1914	2853	1715	201	78	387	34	118	43	54	15
1915	1202	673	177	40	...	...	113	22	62	20
1916	1688	640	404	142	...		180	57	42	27
1917	2938	1257	998	346			149	39	46	27
1918	5447	1628	3033	501			74	61	48	40

From the above statistics it will be seen that Japan's pre-war and early war-time shipbuilding was quite inconsiderable, and this makes all the more significant the fact that in 1916 she rose to the fourth position and a year later to the third position in the rank of world's shipbuilding nations. It is expected that during 1919 Japan will complete about 600,000 tons of ships, of which 200,000 tons are being constructed for the United States Emergency Fleet Corporation.

Ryozo Asano

This rapid and most extraordinary development of the industry was due to equally extraordinary conditions brought about by the war. Before the war, the shipbuilding industry in Japan was considered almost hopeless owing to innumerable handicaps, chief among them being the high cost of materials and the lack of technical skill. But the abnormal requirements of the war created abnormal demands for tonnages and the struggling

Soichiro Asano, president Asano Shipbuilding Company

infant industry was given the opportunity of developing into a strong and powerful factor. The victory seemed to depend on ships, cost was a matter of no consideration, and fabulous prices were paid for ships of all kinds. The following table showing the average prices paid for new ships in Japan tells its own tale:

			Average price per ton deadweight	
1914			110	(Yen)
1915			120	"
1916	First half		170	"
	Second "		240	"
1917	First "		400	"
	Second "	Small Types	700	"
		Large "	740	"
1918	First "	Small "	700	"
		Large "	810	"
	Second "	Small "	700	"
		Large "	800	"

These were the average prices, but as high as yen 1000 per ton deadweight was paid for a 1600-ton steamer in August, 1917, which marks the record.

Confronted by such unexpected opportunities and working under the pressure of war demands, the Japanese shipbuilders directed every energy and all the forces available to develop the industry. The old shipyards extended their plant facilities and new yards were started on great scale. Mechanics and workmen were gathered from all sources, the new industry offering them most substantial inducements, and were trained to execute this most important work. The suspension of the government shipbuilding bounties affected the industry very little in those days; and although the embargo on exportation of steel materials from the United States at one time threatened to put a complete stop to the building operations, this obstacle, too, was finally overcome and the work was pushed with renewed vigor. In 1911 there were only eight yards capable of building ships of more than 1000 tons gross, equipped with seventeen ways, employing 26,000 workmen and capitalized at yen 23,000,000. But in November, 1918, prior to the armistice, there were fifty-seven yards with 157 ways and 97,000 workmen, representing the capital investment of yen 110,000,000.

Effect of the Armistice

Any industry abnormally developed and expanded under the stimulus of the extraordinary war conditions could not hope to escape altogether the shock of the sudden cessation of hostilities, and the shipbuilding industry in Japan was no exception in this respect. When the news of the armistice was received, the operators were found quite unprepared. The steel market was heavily stocked with high priced materials but nothing could be done to forestall the radical fall in prices. The shipbuilders and operators had made their calculations and building plans on the basis of the war prices and all their efforts to retard the slump in charterages and tonnage values were made in vain. Although there were no new orders placed with the builders nor any sale transactions effected, the prices of ships fell within a month to yen 400 a ton deadweight and there seemed to be no end to the downward tendency. The great uncertainty and gloomy aspect of the situation gave rise to most discouraging sentiments and pessimistic views regarding the future.

Looking back over the events, however, I am inclined to believe that this very sudden and radical depression had at least two distinctly salutary effects. In the first place, the decline coming as it did almost in a night, the bottom was reached in a very short time and this fact tended to accelerate the return to a more normal and firmer condition. In the second place, the sudden depression, which appeared to transform the situation into a hopeless chaos for the time being made it impossible for many wooden-ship yards and also the small mushroom shipyards operated on shaky bases to continue without undergoing thorough reorganization and wiped out of existence all speculative enterprises. Already the shipping market is growing stronger and firmer every day and the shipbuilding industry of Japan which has thus been freed from the undesirable element has turned face about from the rush of war activities to make its way in the thorough and careful work of peace.

Need of a Great Merchant Marine

It is hardly necessary now to speak of the important part which the merchant marine must play in the future economic development of Japan. Among the many lessons which have been taught by the war, none has been emphasized more forcefully than the need of a great merchant marine. The ships contributed more perhaps than any other single factor in winning the victory for the Allies, but it is now universally recognized that in the years of Peace to come, they are to be found even more essential than during the war. The United States, Great Britain, France, and other powers of any importance are all laying out ambitious plans and are striving to develop their merchant marine; but no country is more dependent on ships than Japan.

During the war the Japanese shipbuilders rose to the occasion in a splendid manner and added to registry more than 600,000 tons of modern carriers besides furnishing substantial tonnages to the allied nations. But in the years to come they have even a greater task before them. Living in a country not particularly rich in natural resources, the Japanese people must necessarily seek for expansion in manufacturing and commerce and the ships must carry their products to the markets beyond the seas. Moreover, a great fleet of merchantmen will furnish to the overflowing population a most lucrative occupation. As to how successful Japan will be in becoming a great maritime power will depend on her shipbuilding industry. Already many of the Japanese shipbuilders have started out with this larger vision, but they are faced with innumerable handicaps and difficulties, the chief among them being the steel problem, the insufficient development of related industries, and the lack of technical experience and skilled labor. To cope with the highly advanced state of the industry in Great Britain and other countries, the Japanese builders must work with greater energy and earnestness to overcome these disadvantages.

The Steel Problem

Remarkable as has been the shipbuilding achievements of Japan during the war, the very large majority of the ships constructed have been built with imported materials. To what extent the Japanese yards during the past few years have been dependent upon foreign materials may be seen from the fact that the embargo on exportation of steel from the United States compelled practically all of the yards to curtail their operations, and some of the yards had even to discontinue their work altogether. It is true that in the recent years considerable tonnages of iron and steel have been produced in Japan, and the ship plates and other materials turned out at the mills under government operation have been found most satisfactory. The greatest portion of these materials, however, is required by the Navy and the remainder available for private shipyards is far from being adequate to meet their requirements. The bitter experiences encountered during the war have led to the realization that if the Japanese shipbuilding industry is to become really an accountable factor, it must be supported by abundant domestic production of steel materials.

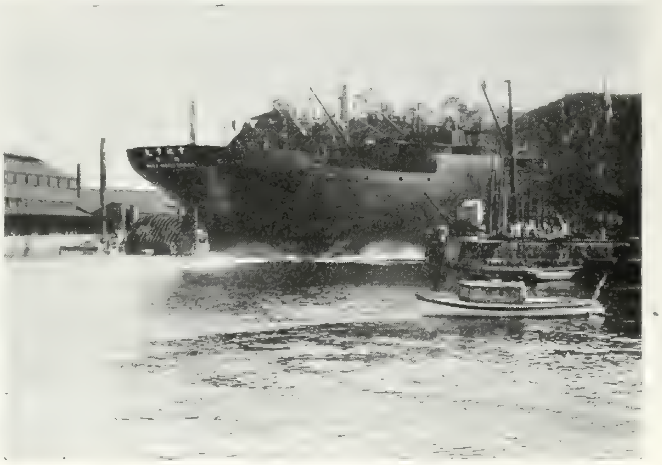
Before the war, the development of the iron and steel industries in Japan was considered hopeless on account of the high cost of production. The only undertakings of the character, therefore, were conducted by the government for the purpose mainly of supplying military and naval requirements. For ordinary commercial and industrial uses, iron and steel could be imported more cheaply and quite readily from foreign countries, and there was no special inducement for private capital to undertake such an enterprise. But under the stimulus of the war, many foundries, rolling mills and other works of like nature were started. With the restoration of peace and the return of normal conditions, these enterprises will be forced to meet in an unequal competition the steel and iron industries of America and England. Under the present conditions, iron and steel products could be imported much more cheaply than they could be produced in Japan. To determine such measures, however, it is of utmost importance that a thorough consideration should be given to their indirect effects on other industries. To raise a customs barrier, for instance, would only tend to raise prices of steel and would result in placing Japanese shipbuilding industry out of the running in the world competition. The protection and encouragement must be so applied as to afford sufficient financial aid without raising the prices of steel.

Labor Problem

Another great handicap is the lack of technical experience and skilled labor. This condition, however, is quite inevitable for any nation endeavoring to develop a new industry. Although Japanese engineers have mastered well the science of shipbuilding, it is most desirable that their knowledge be supplemented and enriched with the years of practical experience. As to labor, there are now nearly 100,000 men employed in the Japanese yards, but the great majority of these men are new recruits and more than two-thirds must be numbered among the unskilled. It is most striking, however, that the Japanese laborers have proved themselves quite ambitious and energetic to learn and to improve. In comparatively short time, new men have been trained to execute their work quite satisfactorily, and it has been said by many foreign experts visiting Japanese yards that the Japanese riveters, for instance, do superior work than similar workmen in other countries. It is inevitable, of course, that many years of experience and training will be necessary to bring them to the high standard of British workmen, but already a splendid progress has been made and, for the present, any lack of efficiency on the part of Japanese workmen is more than offset by their lower wages.

Solution of Difficulties

Viewing the situation at large and considering the geographic position of the country and maritime characteristic of the people, it seems but natural that the best genius of the nation should be directed to the development of shipbuilding industry. The difficulties and handicaps in the way are not of such nature as to work hardships permanently, but they are only such as are common to any nation making a start in a comparatively new industry. Furthermore, there are possibilities and potentialities, which, when properly developed, cannot help but make Japan a great shipbuilding nation. Our immediate concern, there-


Launch at a Japanese shipyard

fore, is to foster the young industry, which has been started so vigorously, so that it may be strengthened to cope successfully with the older and more firmly established industry of Great Britain and other shipbuilding countries. To this end capital and labor must be joined together in harmonious co-operation and must work for permanent results even at the cost of sacrificing immediate gain; also government protection must be afforded to assist the industry during the critical period of development.

It is unnecessary to argue that an industry of this nature must be developed by private capital, but it is also beyond question that the capitalization of each individual enterprise must be large enough to withstand the financial pressure due to world competition. During the war, many small yards were brought into existence but were found unequal to survive the shock of the armistice. In the period of competition to come, such small yards will be quite unable to hold their own. Already the necessity of shipping combination has resulted recently in the formation of Kokusai Kisen Kaisha, capitalized at yen 100,000,000, embracing many private shipowners and builders and bringing together 500,000 tons deadweight of new ships into a single operative unit, furthermore, the said total tonnage planned to be increased to 1,000,000 tons deadweight next year. Similar combination is necessary also in the shipbuilding industry. It will enable the yards to turn out superior ships, because they will have the benefit of best engineering experts and experience; also the cost of construction will be reduced to minimum by the large scale building operations. Furthermore, it will do away with the useless scrambling after workmen which has not been in the least productive of any benefit and has tended only to demoralize the morale of the working class.

As for the labor—wise guidance is needed now more than at any other time. Japanese laborers have proved themselves quite intelligent and through their contact with the outsiders have not been slow to catch the new idea and to realize the importance of their position. They are now in the process of organization as one of the controlling factors in the economic life of the country, and at this critical period the lessons must be learned from the bitter experience of foreign countries. Already both capitalists and laborers have come to realize the gravity of the situation and efforts are being made by the leaders to create an ideal condition by adjusting the traditional idea of loyalty and personal relationship between the employer and the employee to modern conditions of life.

Government Protection

But to hasten the firm establishment of the industry, it is necessary that a wise policy of government protection be adopted. The Japanese government early realized this great responsibility and in 1900, the Shipbuilding Bounty Law was promulgated and the bounties paid during that year amounted to slightly over yen 10,000. No better evidence of the wisdom of this law could be gained than from the fact that during the subsequent years the Japanese merchant marine enjoyed a most healthy development and building activities so increased that in the years 1917 and 1918 the amount of the bounties paid rose to yen 7,700,000. When the high war prices came, government considered the bounty unnecessary and the law was suspended in 1917. With the return of competitive conditions on conclusion of the war, the bounty law must again be brought into force. The Japanese builders are prepared to make every sacrifice to secure a firm position for themselves, but in order that they may be enabled to expand their operations against odds and inseparable risk, it is important to instill within them the confidence that comes from the assurances of support given by a wisely administered policy of government protection. The subject is doubtless being considered by the government and a favorable decision will be reached in the near future, now that peace has finally been concluded.

The shipbuilding industry of Japan indeed has a most promising future and is destined to play an important part in the building up of the economic strength of the nation. The accomplishments of the past few years may be considered as an earnest of what is to come and those who are engaged in this industry are uniting their forces to bring about the result.

Group of Japanese shipbuilders just after a keel-laying ceremony

Ships at the outfitting dock, Alameda works of the Union plant of the Bethlehem Shipbuilding Corporation

Seventy-five-ton electric hammerhead shipyard crane installed by Wellman-Seaver-Morgan for the William Cramp & Son Shipbuilding & Engineering Company, Philadelphia, Pennsylvania

Pacific Marine Review
The National Magazine of Shipping

576 Sacramento Street
SAN FRANCISCO, CALIFORNIA U. S. A.

Official Organ of the Shipowners Association of the Pacific Coast

Subscription Price, per year (Domestic) $3.00
(Foreign) $3.50
Single Copies . . . . 25 cts

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NEW YORK OFFICE
339 Hudson Terminal Bldg.
30 Church Street
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NORTHWESTERN OFFICE
560-561 Empire Building
Seattle, Wash.
J. A. KENNEDY, Mgr.

Pacific Marine Review is sold at all leading News Stands
Entered as second class mail matter at Postoffice
San Francisco, California

Published on the First of Each Month. Copyright
1919 in the United States by J. S. HINES

DEVELOPING A MERCHANT MARINE

THIS editorial is copied from the issue of Pacific Marine Review for September, 1904. Its views on the Merchant Marine situation are as applicable today as they were then, and we re-print it as showing the consistent editorial policy followed by Pacific Marine Review since its first appearance in journalistic fields.

"The following argument recently advanced by Robert B. Armstrong, assistant secretary of the Treasury Department, in course of a speech delivered at St. Louis is worthy of reproduction:

"'Much has been said recently about stimulating the merchant marine. It is a question worthy of the most profound and patriotic thought. But a merchant marine without freight is not worth the time it takes to tell about it. The two things go hand in hand. One is the complement of the other. Just why the American people, or some of them, object to government assistance in supplying American rolling stock for a highway of commerce that has been in existence since creation, I am unable to comprehend. No one objected seriously or successfully when the government aided the transcontinental railroads which linked to the empire of the Eastern States the virgin wealth and grand resources of that greater empire on the Pacific Slope. No one objected when the government helped lay the rails through the great unknown Middle West. No one objected when the government put the magician's wand of Federal aid into the hands of the people and by building the great transcontinental railroads transformed the desert into a garden of prosperity and the plain into an orchard of plenty. Why, then, should these same patriotic, progressive people protest when it is suggested that the government help place upon the bosom of the sea ships that fly the American flag and carry the products of American ingenuity and American industry to natural markets which are ours for the fighting for?

"'How would you regard a financial proposition that would take every year three hundred million dollars out of the communities you represent? Would you recommend the continuance of a condition whereby the railroads of your communities were owned by foreigners? Would you advocate the continuance of a situation by which all of the freight charges, amounting to one-third of a billion of dollars, went outside of the communities of production and into the vaults of individuals and corporations of alien nations? I know you are too patriotic and too thrifty to permit that condition to continue, yet that sum the United States pays yearly in ocean freights to foreign vessel owners. You wonder why it is that our trade balances look well on paper, but show no corresponding importations of gold. Subtract three hundred millions from the nominal trade balance and you have the situation!'

"As saith the preacher: 'Let us hear the conclusion of the whole matter.' Rightly or wrongly every other productive industry has been born, reared and has grown into vigorous manhood under the beneficent motherhood of protection, while the American ship has been a foundling spurned from every door and denied all shelter.

"Withdraw our high tariffs upon steel rails, and the fierce competition of Germany, Belgium and Great Britain would close many of our steel works in a few years."

PACIFIC COAST SHIPBUILDERS' TRAFFIC ASSOCIATION

PRACTICALLY all the steel shipyards on the Pacific Coast have banded together under the above name to carry on a campaign for a reduction in the freight rates on shipbuilding steel from the steel producing centers to the Pacific Coast.

The present freight rate on steel from Pittsburgh to the Pacific Coast is $1.25 per hundred pounds, from the Atlantic Seaboard to the Pacific Coast $1.37½ per hundred pounds. In contrast to this the transcontinental rate from the Atlantic Coast to the Pacific Coast on export steel is 60c. The present freight rate additional across the Pacific makes the total rate from the Atlantic Coast to Shanghai or Kobe $1.20. Inasmuch as Japanese shipbuilders are actively competing for contracts, it would seem no more than right that the rate on steel for shipbuilding purposes from the Atlantic to the Pacific Coast shuold be put on a fairer basis.

It is well to look over the history of transcontinental rates a little and see the cause of this high rate. From May 1, 1916, to December 30, 1916, the rates on shipbuilding steel were 75c from the Atlantic Coast, 65c from Pittsburgh, and 55c from Chicago. On March 15, 1918, the so-called inter-mountain cities such as Spokane and Salt Lake City protested against the Coast enjoying a lower rate than themselves. Inasmuch as this low rate was based on a supposed water competition to the railroads, these cities entered a plea before the Interstate Commerce Commission to have the rates equalized on the claim that there was no real water competition to Pacific Coast cities. This so-called inter-mountain rate case was contested very bitterly, but the Coast could not prove that there was water competition, so it lost out. The decision of the Interstate Commerce Commission at that time forced upon the Coast shipbuilder a rate of $1.10 from the Atlantic Coast, $1.00 from Pittsburgh and 90c from Chicago. Then by general order of the Railroad Administration on June 25, 1918, all rates were raised 25 per cent. The Coast shipbuilders are now, through the Pacific Coast Shipbuilders' Traffic Association, asking that the rate be based on the figures of December, 1916, plus a 25 per cent raise which would make the rates 93¾c from the Atlantic Coast, 81¼c from Pittsburgh and 68¾c from Chicago. It would certainly seem that the fairness of this case would appeal to the Interstate Commerce Commission and that rates would be speedily rectified.

LEGISLATION AFFECTING SHIPPING

THE present Congress seems to be no exception to the rule so far as maritime legislation is concerned, for there is appearing on the docket a flood of the usual "burdensome regulatory legislation" to hamper the operation of the American ship. As a sample, one bill requires that hereafter all ships of American registry of certain classes shall carry as part of their regular complement a duly qualified embalmer, the object of the bill being apparently to do away with burials at sea.

This bill is here quoted in full because study of its text will show how little our legislators appreciate the difficulties and problems of the ship operators:

"A Bill prescribing prohibition of burials of the human dead at sea, and providing for the proper care and disposal of same.

"Be it enacted, etc., That from and after the passage of this act common carriers by water in foreign commerce and common carriers by water in interstate commerce shall, under the direction and supervision of the United States Shipping Board, provide for the proper and permanent embalming of the bodies of all passengers or employes who shall die while in transit, provided port within the United States may not be made within twenty-four hours after the death of said passengers or employes. In no case shall the owners, officers, or employes of any common carrier in foreign commerce or common carrier in interstate commerce perform or permit burial at sea, but the remains of all passengers or employes who die on board while en route, if citizens of the United States, shall be embalmed and returned to the United States on board the ship in which the death occurs if bound toward the United States, or if bound from the United States transferred, if practicable, to another vessel which may be bound for the United States with a view of immediate return to this country, and upon arrival at a port of the United States immediate notice to the next of kin shall be given, and the remains placed at the disposal of the said next of kin.

"Sec. 2. That for the purpose of carrying out the provisions of this act, common carriers by water in foreign commerce and common carriers by water in interstate commerce shall be provided with an embalmer duly licensed by legal authority of one of the States or Territories of the United States, or one who has successfully passed the examination by the Federal Embalmer's Examining Board, and the necessary equipment and material to carry out the requirements of this act.

"Sec. 3. That for the services provided for in this act, to be performed by common carriers by water in foreign commerce and common carriers in interstate commerce, a just and reasonable charge may be made against the estate of any person who shall have died on board while en route.

"Sec. 4. That any person violating the provisions in this act contained shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not more than $500 or imprisonment for not more than two years, or both, in the discretion of the court."

The passage of this bill might possibly induce a few more "mother's boys" to enroll in the recruiting service of the Shipping Board but just why the ship should be required to carry an embalmer when practically all ships of the class affected have ample cold storage facilities seems one of the problems only soluble in the minds of our politicians.

Perhaps it will be necessary in the future to work all of our overseas freight service in some sort of a convoy system and provide along with the convoy a floating palace wherein the A. B.'s of the ships forming the convoy may find in their leisure moments all the comforts of life on shore. Possibly shipping companies would be able to make several profits off the wages of crews on long voyages, by the efficient management of such a system.

But seriously, if our American legislators are ever to be imbued with the right idea on maritime affairs, it will be first necessary for the American people to become "ship minded," and possibly the only way this will ever be brought about will be through the formation of shipping companies whose stock is popularly subscribed in such a way that the majority of the voters in the United States will become actual shipowners and so be induced to put enough thought and study into the subject that they will compel their lawmakers to also be "ship minded."

We as a people and our representatives in Washington must realize that when we go after the business of carrying the maritime freight of the world, we are coming into competition with peoples who have for some centuries been "ship minded." It would be difficult to find in Sweden, Norway, Holland, Denmark or the United Kingdom citizens who were not more or less familiar with seafaring matters, and in every little town throughout these countries, it would be easy to find many citizens who were actual share holders in some maritime enterprise. This condition in the lives of their citizens gives to these nations a tremendous advantage in considering legislation affecting the welfare of their overseas commerce and makes it necessary for America in competing with them and maintaining a merchant marine service of any very great capacity to be willing to put up part of the price of operating an overseas fleet of merchantmen.

LABOR AND PACIFIC COAST SHIPPING

At the present time all the unions representing the labor which handles cargo and the labor which handles ships are in a state of ferment and there is a constant cry for an increase of wages to meet the high cost of living. The situation is fast assuming the outlines of a vicious circle. Increases of 10 to 25 per cent in wages mean to large shipping companies a tremendous increase in the aggregate of their annual operating expenses. This increase must be absorbed by corresponding increases in the traffic on freight and the rates for passenger traffic which again is almost immediately reflected in an increase of the cost of living which then brings about, through a very natural sequence of events, a demand for still further increase in wages and so it continues ad infinitum.

The Admiral Line during the month of August has granted increases in wages to the members of ships' crews and to the longshoremen and other shore forces ranging from 20 to 25 per cent, which will add, in round figures, $1,000,000 a year to the already burdensome costs of operation.

The stevedores at San Francisco, who were paid 80 cents an hour for straight time and $1.20 for overtime, have been raised to $1.00 and $1.50, respectively. Proportionate increases have been made to the longshore forces at British Columbia, Puget Sound, Columbia River, Humboldt Bay and Southern California ports.

As an example of the manner in which the ship's crews are profiting by the new scale, the following comparative table on the steamship Governor, plying in the freight and passenger trade between British Columbia and Puget Sound and California ports, is interesting:

Deck Department No.	Under Old Scale Per Mo.	Under New Scale Per Mo.
Captain	$ 325.00	$ 371.25
First officer	170.00	235.00
Second officer	145.00	206.25
Third officer	127.50	182.50
Fourth officer	117.50	158.75
Boatswain	80.00	95.00
Carpenter	90.00	105.00
Watchman	75.00	90.00
Twelve seamen	75.00	90.00
Two deck boys	40.00	55.00
Five ordinaries	55.00	70.00
27 Total,	$2385.00	$2983.75

Engineer's Department		
Chief engineer	$ 250.00	$ 346.25
First assistant	175.00	235.00
Second assistant senior	150.00	206.25
Second assistant junior	140.00	206.25
Third assistant	130.00	182.50
Deck engineer	90.00	105.00
Three water tenders	75.00	90.00
Six oilers	75.00	90.00
Nine firemen	75.00	90.00
24 Total,	$2285.00	$2901.25

Clerical Department		
Purser	$ 150.00	$165.00
Freight clerk	110.00	125.00
Baggage agent	100.00	115.00
Senior operator and clerk	90.00	115.00
Junior operator	60.00	85.00
5 Total,	$ 510.00	$ 605.00

Steward's Department No.	Under Old Scale Per Mo.	Under New Scale Per Mo.
Chief steward	$ 140.00	$ 155.00
Second steward	85.00	90.00
Third steward	70.00	85.00
Strg. steward	75.00	90.00
Two stewardesses	50.00	60.00
Storekeeper	70.00	85.00
Barkeeper	60.00	75.00
Chief cook	110.00	125.00
Second cook	92.50	107.50
Third cook	75.00	90.00
Fourth cook	65.00	80.00
Baker	110.00	125.00
Second baker	75.00	90.00
Third baker	60.00	75.00
Butcher	85.00	100.00
Second butcher	65.00	80.00
Four scullerymen	60.00	75.00
Messman	65.00	80.00
P. P. messman	60.00	75.00
Two messboys	55.00	70.00
Pantryman	70.00	85.00
Second pantryman	60.00	75.00
Third pantryman	60.00	75.00
Twenty-seven waiters	55.00	70.00
Six bell boys	30.00	45.00
Chair boy	30.00	45.00
Lineman	65.00	90.00
Two janitors	55.00	70.00
News agent	60.00	75.00
Watchman	60.00	75.00
67 Total,	$3992.50	$4992.50

The foregoing represents, however, only the increases to these men in salaries. It must be borne in mind that a considerable additional compensation is paid them in the shape of overtime and so-called "meal allowances" which have been increased as follows:

Meal Allowances

Officers from $1.50 and $3.00 per day to $2.50 $3.00 and $3.50

Remainder of crew from $1.50 to $2.00 per day

Overtime

Deck department, from 60 cents to 75 cents and $1.00 per hour.

Engineer's department, from 60 cents to 75 cents per hour.

Steward's department, from 40 cents to 60 cents per hour.

In addition to the above, the crews are now given larger allowances for room money when for any reason it is not practicable to berth them on the ship.

All of these increased costs can of course be paid for from but one source and that is the ship's earnings. Were the margin between expenses and earnings sufficiently broad, the coastwise steamship companies would prefer to absorb the extra expense from profits, because their freight and passenger rates are now about on a parity with the railroads, and any further increases by the water route incurs the serious danger of diverting the steamer business to the rail lines. But the proposition the steamer lines have to meet is that even before these tremendous increases had been awarded, the rapidly rising costs of supplies, equipment and other items that enter into general steamship operation had already caused expenses to overhaul earnings. Therefore now they are faced with the stern reality of either increasing revenue or operating at a stupendous loss.

CONTINUATION OF GOVERNMENT OWNERSHIP

By C. E. Grunsky, Eng. D.,

Consulting Civil Engineer, San Francisco, Cal.,

FOR consideration of the Council of the National Merchant Marine Association of the United States:

1. The United States to retain the ships now in government ownership.

2. Operation to be by private corporations whose subscribed capital stock is to be not less than the cost of acquiring tonnage equivalent to that which each proposes to operate at current prices per ton in the world's market. (Cost new only to be considered.) The paid-in capital stock of any operating concern is to be at least 25 per cent of what it would cost to acquire the equivalent tonnage.

3. The government-owned ships to be subject to recall or withdrawal by the United States upon two years' notice, or, in case of war, without notice.

4. The operating concern to pay to the United States an annual amount, representing current depreciation, wherewith to amortize the legitimate investment, thereby providing a fund out of which to replace the ships which are discarded from time to time. The current depreciation will be charged by the operating concern to operating expense and is to be computed as follows:

Determine the legitimate investment of capital which any ship represents, by deducting accrued depreciation (straight line method), if the vessel is no longer new, from the cost of acquiring an equivalent tonnage in the world's market. Estimate the expectancy of each ship at the time the lease is entered into. Then amortize the investment in uniform annual amounts obtained by dividing the investment as above computed by the expectancy expressed in years.

The amount thus fixed as current depreciation should be paid annually during the period of each ship's usefulness, even though the ship serves beyond its expected term of usefulness. The payment thereof should be out of any excess of earnings over operating expenses other than interest on invested capital and depreciation, and should become due annually out of the accumulation of any such excess. The expectancy of each ship at the time it is turned over to an operating concern should be fixed by competent experts.

5. When United States ships are operated by a concern which also operates other ships, the concern's entire shipping business to be pooled and the United States tonnage to be credited with that proportion of net earnings which this tonnage bears to the total tonnage operated by the concern.

6. Not more than twenty ships to be allotted to any one concern within any two-year period after a plan of procedure is adopted.

7. The salaries of the principal officers of the operating concern, chargeable to operating expense, to be made subject to the approval of the United States.

8. The net profits (after payment to the United States of current depreciation) to be divided between the United States and the operating concern on the basis of two-fifths to the United States and three-fifths to the operating concern.

9. The United States would, under this plan, recover as depreciation or as amortization of investment somewhat more than the cost of replacing the ships as they go out of use. (The assumption is made that the ships which will come under consideration may be all regarded as practically new.) It would require no increase of original investment to replace those which shall have served their time, consequently the United States would be placed in a position to maintain ownership of the present amount of tonnage for all time, without recourse to funds from other sources.

10. An unequal division of profits in favor of the operating concern is suggested because a somewhat larger risk of loss will be assumed by it than by the United States. The United States, in case of business failure, will be out the current depreciation and will get no return on its invested capital, but, by retaining ownership of the ship, the United States does not risk the loss of any capital other than the unpaid amortization increments.

11. The establishment of regular lines of transportation to foreign countries and to our dependencies may require government subsidies. To any extent found desirable, the profits resulting from the proposed plan of operation can be held available for such subsidies. The balance should be used in caring for ships not in active use and for such other purposes as Congress may determine.

AMERICA MUST BUY FOREIGN SECURITIES

IT is felt in England that the combined effect of the recent prohibition of gold exports from that country and of the unpegging of sterling exchange will bring about American investment in foreign securities, according to advices received from London by the National Foreign Trade Council.

British purchases in the United States cannot be paid for in gold and it will be a long time before British exports will rise to the point necessary to pay for imports. A way out is through private credits from the United States in the form of purchase of British securities.

Both the gold embargo and the depreciation of British exchange tend automatically to stimulate sales of English goods in foreign markets and to cut down her import purchases. She must still, however, depend on the United States for many commodities. It will probably be necessary for her to sell many of her securities in America, if American goods are to move to any extent to Great Britain.

It is also suggested that America might help herself and support British industries at the same time, by establishing plants in the United Kingdom, the construction, machinery and total equipment for which should be purchased over there.

In this way a market would be created for British goods and the gold would be kept within the kingdom. It is reported that large American businesses are already considering some such plan for establishing their product in the English and European market.

AMERICAN CHAMBER ACTIVE IN BRAZIL

THE great value of American chambers of commerce in foreign countries to the growth of American foreign trade is becoming increasingly evident. Recent advices received by the National Foreign Trade Council from London, Shanghai, Rio de Janeiro and Buenos Aires all indicate great activity in obtaining the removal of unnecessary trade restrictions and in settling by arbitration any disputes that may have arisen from the termination of the war.

As an instance of this, the budget law of Brazil for 1919 prohibited the presentation of consular invoices for certification after the departure of the ship on which the merchandise is carried—shipping conditions made such a requirement practically impossible to meet. Another article of the same law required the inclusion in the consular invoices of a statement specifying the materials entering into the preparation or composition of each article shipped—the impossibility of which is apparent. Energetic protest by the American Chamber of Commerce for Brazil recently resulted in the extension of the time limit on consular invoices until the arrival of the steamer in Brazil; in the second case, the operation of the law was postponed until November 1, by which time it is hoped that the law will be repealed.

The benefits arising from the efforts of these American chambers abroad should be apparent to all foreign traders. The chambers are supported by their membership dues, and are all carrying on active campaigns for new American members. If such are obtained, it is believed that the work of the chambers can be expanded to the great advantage of American trade.

Sumner Iron Works—Engine Builders

Foundation Company's ships outfitting at the Sumner Iron Works, Everett, Washington

THIS firm designed the main engines and the steering gear arangements for the twenty twin screw steam ships building at Victoria, B. C., by the Foundation Company, Ltd., for the French government.

They were awarded the contract and have completed eight of these triple expansion main engines; ten windlasses; ten steering engines with all fittings including the rudder quadrant, and forty-two cargo winches for these vessels.

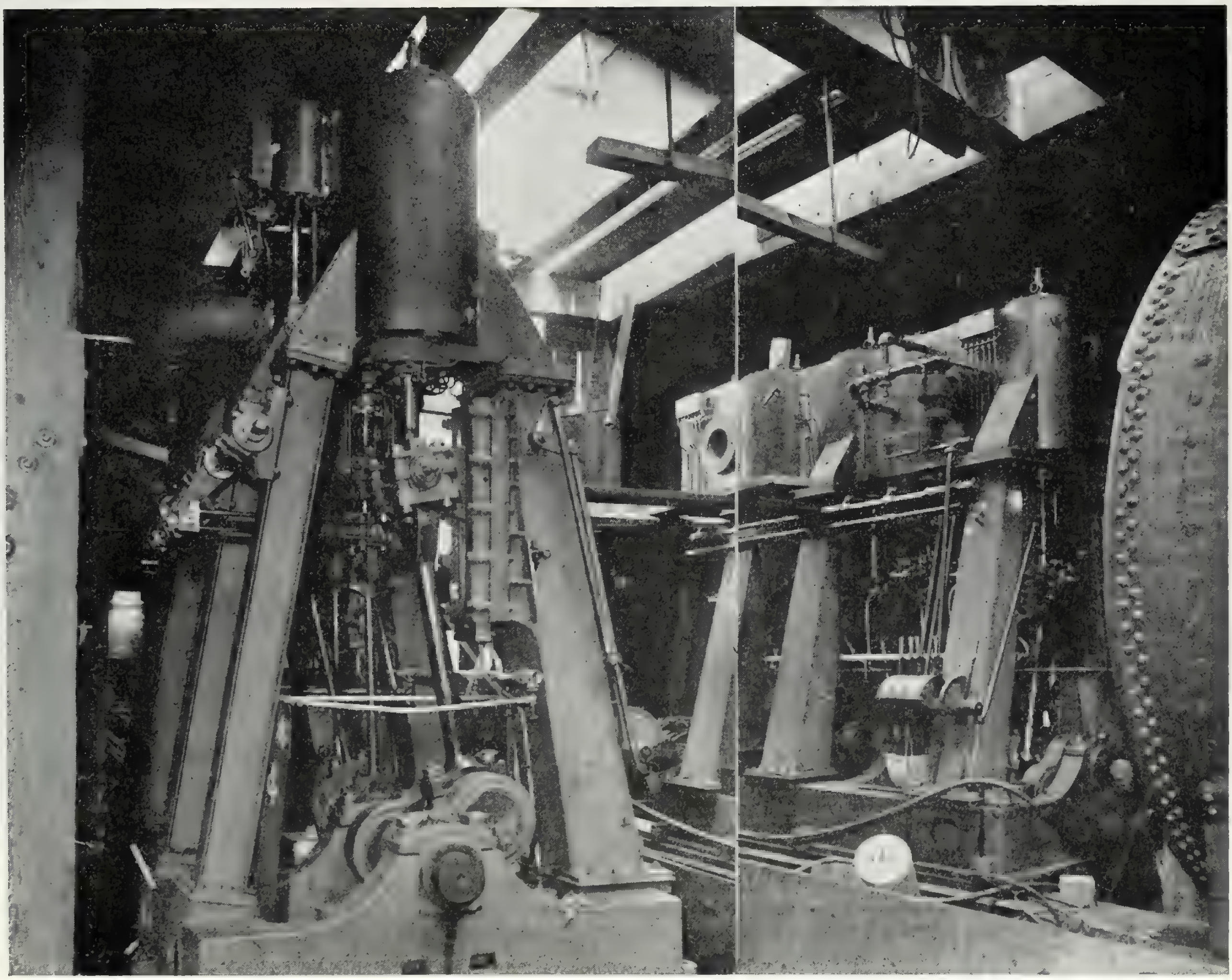
The remainder of these engines have been built from these same designs by the following firms:

Hutcheson Brothers, Ltd., Victoria, B. C.
Vulcan Iron Works, Denver, Colorado.
Foundation Company Machine Shops, Scranton, Pennsylvania.

The main engines are of the inverted direct acting triple expansion type, designed for 550 i.h.p. at 120 r.p.m. One the trial trips of these vessels the engines have exceeded 600 i.h.p. at 125 r.p.m. and have been very successful in all respects.

They have been designed without unnecessary finish but with exceptionally liberal bearing surfaces on all parts. All the machinery has been built to the requirements and inspection of the Bureau Veritas, Mr. Frank Walker, of Seattle, being this society's chief representative for the Pacific Coast.

The cylinders are lagged with planished steel, and the polished brass oil piping and indicator fittings give these engines an exceptionally fine appearance, which is being very favorably commented upon by marine experts of Puget Sound and British Columbia.



Sumner Iron Works' triple expansion marine steam engines as installed in wooden steamers of the Foundation Company

Why Has America No Motorships

K. P. Radovanovitch, M. E.,
Consulting Engineer, New York.

HOW often do we hear the question: Why is it that America has no fleet of motorships? Why is it that if larger motorships are constructed America has to turn to Europe for the engines? Why is it that people in America look in general, not only askance at the Diesel motor, but also entertain a certain awe (as if for something out of their reach, something unearthly) toward the high pressure oil engine for ship propulsion at a time when Europe has demonstrated for almost a decade that the motorship is just as reliable as the steamer.

At a time when hundreds of motorships of foreign origin are crossing the world seas in forty to fifty day non-stop-runs, there is only a surprising and alarmingly small number of diminutive tonnage flying the American flag. At a time when Europe has fully realized, in order to partake efficiently in the world trade, that the carrying space of the ship has to be increased, the speed augmented, the earning capacity raised, the fuel bill reduced and the ship to be made independent of foreign or expensive fueling stations—at such a moment, when Europe is unfolding her utmost endeavor to control the world traffic, America still finds time to wait and to prorogue the earnest and decisive resolution to enter the world contest for the building of large motorships.

People imagine perhaps that the change from the steam engine, with its hundred years of ascendency, to the more progressive and economic oil engine is somewhat of an aberration. But the unlimited opportunities and the great fields which open themselves to the high pressure oil engine, begin to interest our business men, and it is gratifying to see that this highly developed and most economic prime mover receives now the proper and adequate consideration which it deserves.

And since the high pressure oil engine has taken up the fight for its existence and is on the right way to conquer and defeat her hundred-year-old sister, the steam engine, it will be of interest to know the history, the development and the builders of the so-called "Diesel engine."

Before proceeding in this matter, however, I want to come back to the array of questions which I put forth in the beginning. Of course, the answer cannot be expected to be given in one unity. It is an intrinsic concatenation of facts which have worked together against the general adoption of marine oil engines. Through long studies, intensive investigations and profound reflections, I have been able to form several opinions in regard to the dilatory progress of larger marine motors in this country, which I am trying to explain in the following.

Technical circles are readily inclined to look at the shipowner as being imbued with prejudice and rather adverse to the introduction and acceptance of new mechanical devices on boats, especially to the adoption of a new prime mover for ship propulsion. This reproach, however, is quite unjust in the majority of cases, because we cannot expect the shipowner to give his ship for experimenting purposes or to place an order for machinery which has not proved its value. He wants a successful and reliable oil engine which has not to be tried out in his boat, because he knows that the engine has to endure long non-stop-runs under the severest conditions, and that defects, either in design or construction, can lead to serious accidents at sea, and in order to receive satisfaction from large oil engines, there is only one choice left to him; namely, to buy on the European market.

Unfortunately the majority of manufacturers in this country want orders, big orders, before considering the construction of something new—before the enthusiasm and energy can be aroused. We can readily see this from numerous advertisements which announce: "Marine Oil Engines built in sizes up to 2000 b.h.p."—or even higher. This is harmful as orders for large oil engines placed with an inexperienced manufacturer generally lead to mistakes, blunders and failures.

Unless the manufacturer is able to show the prospective marine engine buyer facts, cogent and incontrovertible facts, in regard to marine oil engines, we cannot blame the purchaser for becoming irresolute. If he is aware of the unquestionable superiority of the oil engine and insists on its installation, he has to turn to Europe to satisfy his requirements. But the war had almost separated Europe from America for five years. For fully five years the war has kept the whole world away from peaceful work, such as undertaking scientific research to economize the operation of merchant ships. And shipowners who realized the great saving and earning capacity of the motorship have not been able to obtain European oil engines.

No large marine oil engine units have so far been built in this country. Two 2000 b.h.p. two-stroke cycle motors constructed by the Brooklyn Navy Yard, after the design of the Maschinenfabrik Augsburg-Nurnberg, are the only exceptions to this assertion.

Another encumbrance in the development of the high-pressure oil engine is the business man and the purchaser, to whom economy in the first cost and ostensible saving when buying are the main factors. The Great Creator has endowed America so profusely with natural richness, prosperity, power and latent energies, that the word efficiency, especially in operating prime movers is very little known. Coal is cheap, the steam engine is cheap and the oil motor had small prospects, the more so as the field for it had first to be created.

But with the realization of such sinful and prohibitive waste of natural treasures and raw materials as has prevailed in this country, and with a mastering sense for enterprise and industry came also an understanding of efficiency and the demand for an economic prime mover. Consideration of efficiency and economy have even greater strength and influence for a ship's powerplant, where the fuel has to be carried along.

To the satisfaction of shipowners who are contemplating the installation of a successful oil engine, I can say that the cost for maintenance and repair of such a motor is lower than that of a steam engine, including the boilers and all auxiliaries. This naturally mitigates the fact that in an oil engine the best of material and workmanship has to be employed in order to make it successful.

In the third place I am adducing the favorite expression that we have always been in the habit of profiting by other people's experience, and the principle is perfectly applicable in the case of the Diesel engine.

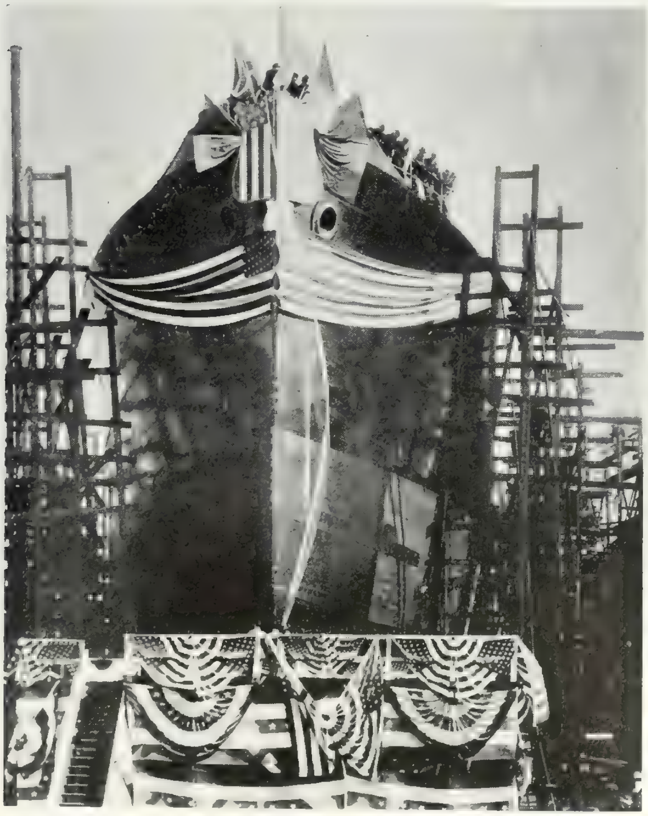
The trouble with this is, that the profiting is done by the other people, and that to a very considerable degree. It is furthermore a plenary acquiesence of our inability to perform original and creative work; it is an implicit admission that American talent and creative genius are not competent and have no patience, skill and wisdom to act independently of Europe. I have seen cases where men relied so much on the "profiting by others" that they had no confidence in themselves and were sending new designs which they had attempted to Europe for approval.

Capital is to blame in the majority of these cases, because of its avidity for immediate profit. Firms who seek immediate success with high-pressure oil engines pay high prices to become licenses of already successful builders. But by the time the design has been Americanized, brought into fit shape for our manufacturing conditions, and experience gained, valuable time has been wasted and additional capital spent. This time and money would probably have sufficed in many cases to practically develop an original design, and the development of American designs in this and other engineering fields would naturally incite the minds of American engineers to research work and constructive thinking so that we would soon be in the lead instead of following behind.

The knowledge gained in meeting and overcoming mistakes and obstacles is doubtless of greater value than the mere knowledge that such difficulties exist, without the practical experience of overcoming them. I instance the comparison between the practical training of a mechanical engineer, which he acquires by actually going through the shops, and the training which he receives at the college alone.

Before closing my disquisition upon this subject I would like to mention one of the most serious and critical causes which delayed the progress and development of the high-pressure oil engine. It was the perverted conduct of experiments by Diesel during the development period of the first engines. This, however, I am going to show later. Here I want to recall the tremendous expenditure in money and time, as an inevitable conclusion of erroneous fallacies, which are still in remembrance and which still keep a large number of prospective manufacturers irresolute.

But all these difficulties and all these obstacles have been overcome. Scientific lore and practical experience of vital importance for the successful manufacture of high-pressure oil engines have been garnered abundantly and are common property. The opportunities are unlimited, the more so as the oil engine is by no means a finished product. Avenues are open in all directions for improvements for research work and for the development of large units.



The 9400-ton steel cargo steamer Orani, recently launched by the Seattle North Pacific Shipbuilding Company

Mrs. John D. Twohy, sponsor of the S. S. Orani

H. G. Seaborn, new general manager, Skinner & Eddy Corporation

Skinner & Eddy's 10,400 Ton Freighters

THE four vessels building by the Skinner & Eddy Corporation for their own account have been designed with a view to their utility as general freight carriers rather than for any special service. The principal dimensions of these vessels are:

Length overall, 439 feet 9½ inches.
Length between perpendiculars, 425 feet.
Breadth molded, 55 feet.
Depth molded to shelter deck, 36 feet.
Designed load draft, 26 feet 6 inches.
Cubic capacity grain, 545,000 cubic feet.

The vessels are designed to carry 10,000 tons deadweight on a draft of 26 feet 6 inches, but are capable of carrying a maximum of 10,400 tons on 27 feet 4 inches, this being the draft allowed by the Classification Society.

These vessels are of the shelter deck type, with three complete steel decks, five cargo holds, and in addition a deep water ballast tank will be built aft of the machinery space for use when running in ballast. This deep tank will also be available for cargo. Fuel oil will be carried in the double bottom, which will have sufficient capacity for a steaming radius of about 10,000 miles. The fore and aft peak tanks will also be fitted so that fuel oil may be carried in emergency, thus increasing the steaming radius to about 13,000 miles.

The general arrangement of the vessels is shown on the accompanying plans. The captain and deck officers are berthed in the forward deck houses and the engineers on the port side of the midship deck house. On the starboard side of this house are berthed the steward and petty officers. A special feature of these accommodations is the arrangement of galley and mess rooms. An exceedingly large galley is provided at the after end of this house, at both sides of which are arranged the mess rooms, one for the engineers on port side and separate rooms for firemen and seamen on starboard side. This arrangement will ensure the crew getting their food in the best of condition and will eliminate to a large extent the waste that would be occasioned if the crew's mess rooms were at some distance from the galley, as is usual in a great many vessels. Immediately under the galley on upper deck are placed the refrigerating rooms, with access directly to the galley. The crew's living quarters are placed aft under the shelter deck and another special feature of this vessel is the large three berth rooms provided for the firemen and seamen. A large steering gear house is fitted aft on the shelter deck and this house contains the entrance stairways to the crew's space and also the lavatories and wash rooms.

For handling cargo, four 5-ton booms are provided at each mast, two to each hatch and derrick post, with one 3-ton boom at No. 3 hatch. A 30-ton boom is provided for heavy lifts at No. 2 hatch, and the winches provided for working this boom are compound geared.

The vessels will be propelled by geared turbines of 3000 shaft horsepower, manufactured by the General Electric Company, which will give the vessels a speed of twelve knots on loaded trial. The turbines will be of the very latest type, embodying the results of the past five years' experience in the operation of this type of machinery. Forced lubrication will be used on all bearings of turbine and gears. Every precaution will be taken to make the turbine equipment absolutely reliable in operation, and capable of continued service with a minimum of upkeep.

The engine and boiler room auxiliaries will include main and auxiliary feed, air and circulating pumps, ballast pump, fire and bilge pump, sanitary pump, fresh water pump, engine room bilge pump, cooler pump, main and auxiliary condensers, feed heater, evaporating and distilling plant, and fuel oil burning plant.

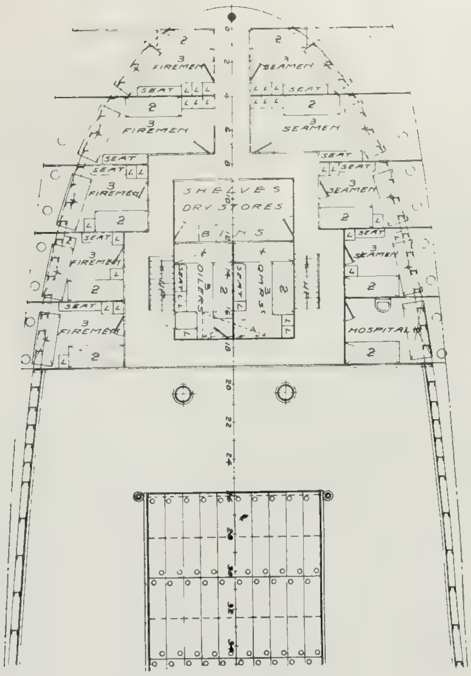
All pumps will be of the highest grade marine type, manufactured by the Worthington Pump & Machinery Corporation, with the exception of the centrifugal circulating pump, which will be built by the Morris Machine Works.

The propeller will be of manganese bronze. Shafting is to be of a quality meeting the requirements of both Lloyds and American Bureau of Shipping, and will be larger in diameter than required by either society.

There will be three Scotch marine boilers, 14 feet 9 inches in diameter and 11 feet 9 inches long, built for 210 pounds' working pressure. Each boiler will contain 3000 square feet of heating surface. Three Morison furnaces will be fitted in each boiler and a separate combustion chamber for each furnace. Boilers will be arranged for operation with either oil or coal. A complete Howden forced draft system will be fitted, with latest type of furnace fronts; also patented cast-iron bridge walls.

Boilers will be equipped with locomotive type superheaters, delivering steam at the throttle at a temperature of 500 degrees, or a superheat of 110

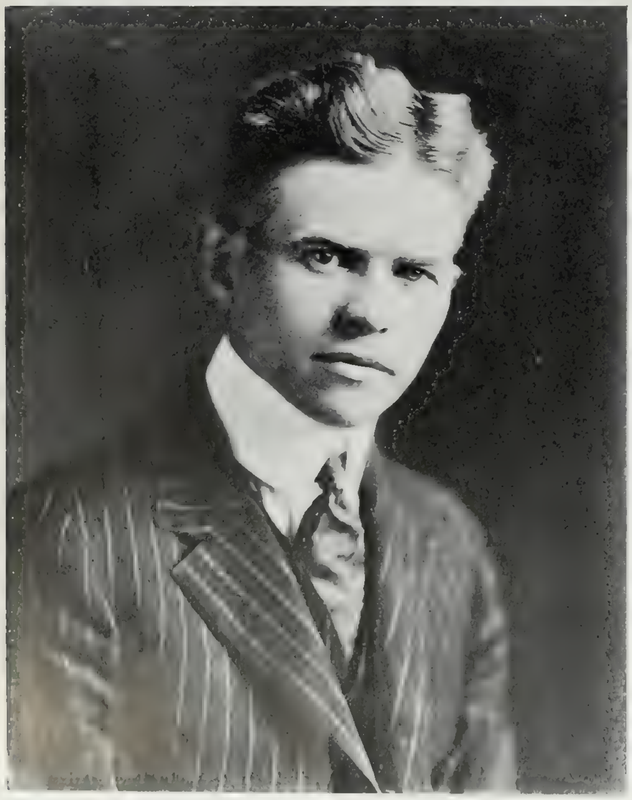
William Edris, assistant vice-president, Skinner & Eddy Corporation



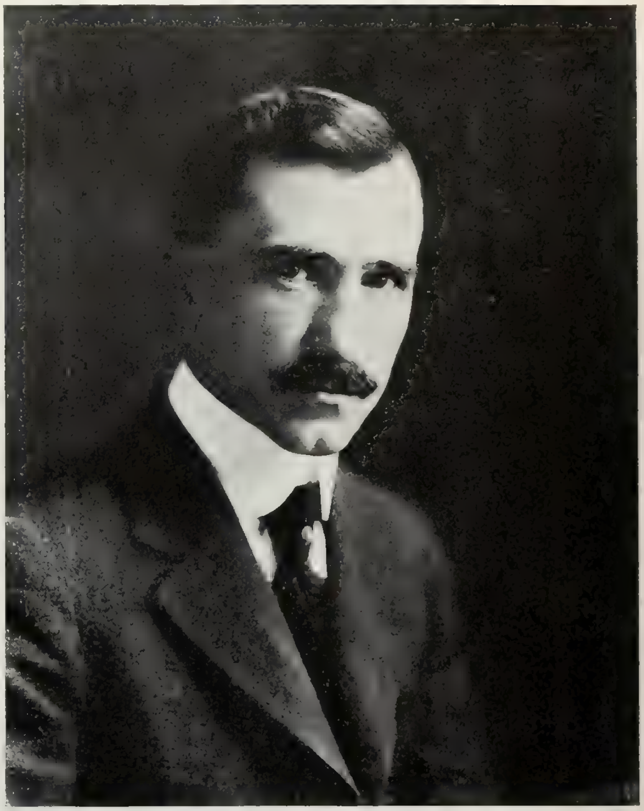
Plan of crew's quarters, Skinner & Eddy 10,400-ton cargo steamer

degrees Fahrenheit. The steam consumption of the main unit will not exceed 11 pounds per shaft horsepower an hour.

All salt water and feed pipes, as well as deck steam and exhaust pipes, will be of copper. All other steam pipes will be of steel, with forged steel flanges. Cast steel valves will be used on superheated steam lines.



C. N. McCallum, chief engineer, Skinner & Eddy Corporation



James Barclay, naval architect, Skinner & Eddy Corporation

The steering engine will be of the Wilson-Pirrie spring quadrant type, with hand gear attached. Control from pilot house will be by means of hydraulic telemotor.

Winches will all be 8 inch by 10 inch double cylinder horizontal type, with link motion reversing gear, thus dispensing with the wasteful reverse valve usually fitted on deck machinery.

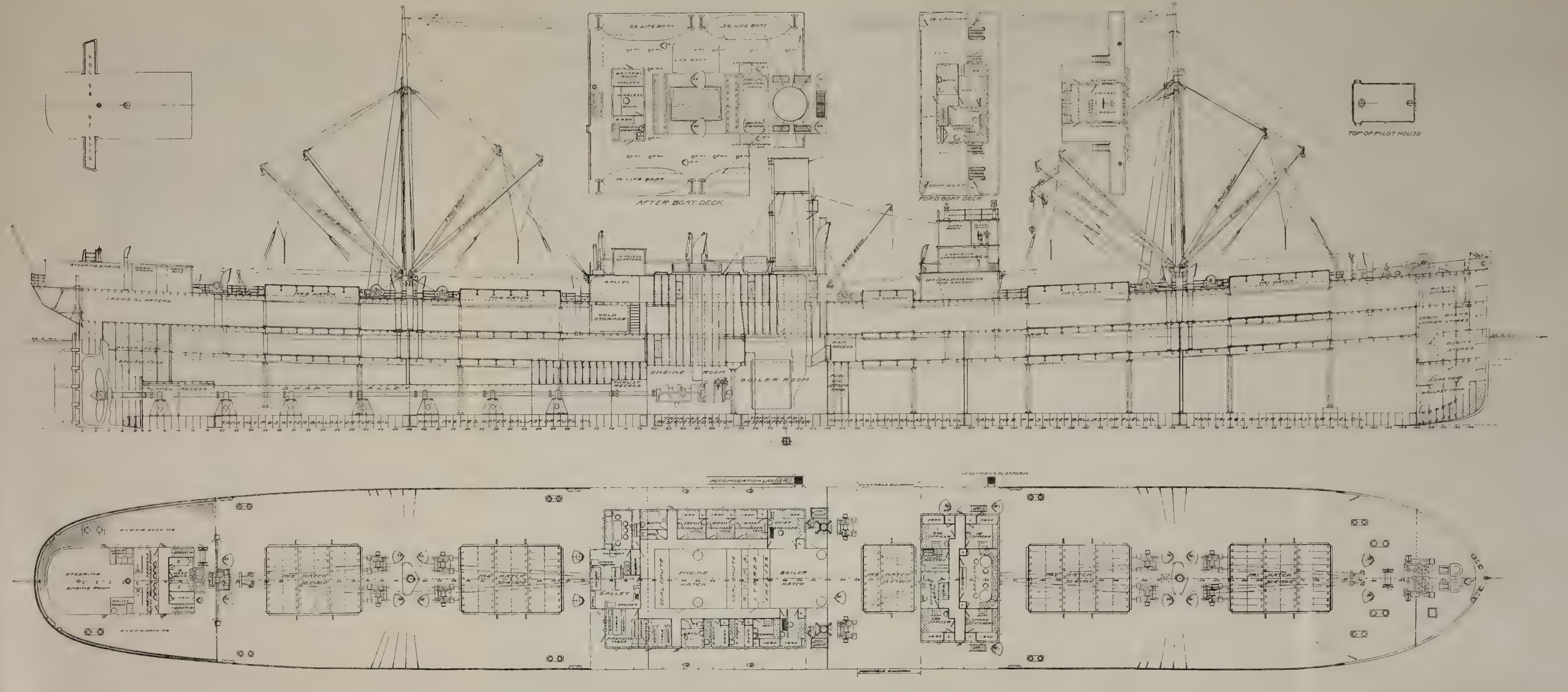
The windlass will be 10 inch by 10 inch double cylinder spur geared. Main pinion will be of forged steel, and main gear of cast steel. The windlass will be of heavy construction throughout.

Both hull and machinery will be built to the requirements of American Bureau and Lloyds' Register of Shipping, and will be classified with the highest rating of both societies.

These vessels have been designed by Naval Architect James Barclay, Chief Engineer C. N. McCallum, and Technical Expert M. H. Kiel of the Skinner & Eddy Corporation, and the details of construction will be carried out under their supervision.

The Winnisimmet Shipyard, Inc., Chelsea, Massachusetts, has begun the construction of its 3500-ton railway dry dock together with the retaining walls and wharves to be used in conjunction with it. This will make the eighth railway dry dock of the Crandall type to be constructed in Boston Harbor. The Crandall Engineering Company, dry dock engineers of East Boston, Massachusetts, are the designers and are superintending the construction.

Type of Freighter Built by Skinner & Eddy, Seattle, for Their Own Account



Perspective—A Glance at the Future of American Business

By Charles G. DuBois
President, Western Electric Company

Charles D. Du Bois, President, Western Electric Company

THE Great War is ended and the day of reckoning has come. The victorious Allies rightfully hold the criminal German rulers to account for their crimes and the German nation to make reparation up to the limit of its ability. But even while we continue to rejoice in this victory, we should be seeking to see as clearly as we can, and in its true perspective, the economic situation that is immediately before us. It is not a problem to be worked out only by a few statesmen, assisted by experts. We all need to understand it because we shall all have a part in it and its solution is fraught with incalculable importance to ourselves and the generations that are to follow us.

At the risk of attempting too much, let us consider in their relations to each other the main features of the present economic and social situation as they bear on our own material prosperity.

By reason of the much longer and greater strain on the European nations during the war, they are in a far more disorganized condition now than America and they are thus unable to proceed as rapidly with the conversion of war activities into normal peace activities. Europe needs our products and, until its own industries are completely re-established, we must take our pay, not in money or goods, but in securities—that is, promises to pay at some future date. From a purely selfish standpoint, America as a creditor nation wants other nations to prosper so that they can buy our goods, can pay the interest on their debts to us, and can eventually liquidate the principal.

And as to our domestic situation, we have to remember that our war activities created employment for everyone, and to that extent made for generally prosperous conditions. It remains to be seen to what extent such prosperity was merely temporary. Even while it lasted, some of it was more apparent than real. Wages increased as the cost of living went up and the cost of living in turn increased as the wages that constitute most of the cost of every article went up. This process, as everyone knows, can create no prosperity for us as a whole, for though it has affected many individuals favorably, many others have been compelled to seriously curtail.

During the war there undoubtedly was a greater prosperity than normal, but it had another cause. This was that everybody worked, and everybody, whether voluntarily or by compulsion, saved. Since we worked harder, we produced more than ever before, while at the same time we consumed less and wasted much less. This greater net production aided considerably toward paying our war cost, but still it left an enormous amount—judged by pre-war standards—to be paid in the future.

We are only now really facing this future. The great joy and relief we all felt when the armistice was signed last November, and we knew that at least all fear of German world domination was over, has been followed in the succeeding months, as was only natural, by a letting down of effort which, though it may be small in each individual, has been, and is in the aggregate, stupendous.

That part of the war production which was at the cost of undue strain and fatigue is of course no longer necessary or justifiable, but, making full allowance for this, the present let down of effort from the war standard represents a serious loss in production.

Moreover, this material loss is accompanied by a mental unrest that threatens even more serious consequences. The relief from the emotional strain of war affects us all. Some realize soberly the difficulties that must be surmounted and appreciate that the only practical course of action is to work steadily ahead under the existing conditions. Others, who are less practical or whose minds have been inflamed by visionary ideas, or strained perhaps by personal misfortune, think they see the dawn of a millennium and demand swift and radical economic changes in the unreasoning hope that somehow a great betterment will result.

The desperate conditions in Eastern Europe have produced the most violent reactions. Where society has become so disorganized that the ordinary methods of production, distribution and trade have broken down, idleness results from the disorganization, and hunger inevitably follows idleness. To starving men, anything seems better than starvation, so Bolshevism, which promises everything and by criminality gets something for a while, seizes its opportunity.

All this is like jumping off the precipice because the road is rough. Civilization itself depends on the maintenance of law and order. Without them the world would quickly fall into chaos, so that governments only fulfill their primary function by dealing swiftly and sternly with all attempts to overthrow by force this fundamental principle. This must be so, whatever sympathy may be felt for those whose misfortunes or weak judgment have made them the dupes or tools of criminal fanatics.

The conditions in America are so much better than in any of the war-stricken countries—are indeed so prosperous—that we need not really fear any large movement here toward any form of anarchy. But the great safeguard against it is to preserve our present prosperity till the strain in Europe has passed.

It is idle to suppose that material prosperity can be maintained except by continuous production—in fact, the extent by which we can intelligently increase production measures the increasing volume of prosperity.

The modern organization of industry by which goods are designed, produced, sold and transported has undoubtedly been the foundation of a material prosperity, such as was never before conceived. It has its imperfections, as have all human affairs, but it has, in a democracy at least, the means of self-correction; it has greatly stimulated invention and scientific research; and, above all, it does operate the machinery of production and distribution so that men have food, clothing and shelter and a chance to improve their condition. This machinery has just successfully stood the unprecedented strain of war demand for production. The real problem before us is to keep it in adjustment under the less spectacular conditions of peace. And yet perhaps these conditions rightly considered are no less inspiring.

For we look not only to helping Europe and so safeguarding ourselves, but, by the means of material prosperity, we think of a better America than we knew before the war. And that better America to deserve the name must mean better working and living conditions, so that all who are willing to work may have continuous opportunity to do so and may participate fully and fairly in the product of their labor. We want better cities, better homes, better schools, better rural conditions. But we know such betterments can only come by greater efforts than we have yet made. We must, in short, earn them.

The achievement of all these objects seems clearly possible if we can get a clear perspective of the situation so that we see all its parts in their true relations to each other and as together making one complete picture. If we can get that perspective, we shall see what our course of action ought to be.

Does it not point directly toward increasing just so far as we can the total production of the country? Rather than a lessening of effort, is it not the time to increase our effort, both for quantity and quality? Shall not such effort be toward wresting from Nature more of her secrets, and by applying to them the work of our brains and our hands get a future yield which will make that of the past look meagre? Or shall we be content with the total of what we have had and spend the rest of our strength in quarreling over its division? The one way is full of inspiration and promise, not only for a better America, but for a better world. The other is both toilsome and unfruitful and only seems easy because we are used to it.

Can there be any doubt that America, in this hour of her opportunity for economic leadership, as well as moral leadership of the world, will choose what seems the harder, but, viewed in the whole perspective, is both the easier and the greater course?

CAPTAIN A. E. JACKSON

Captain A. E. Jackson has left the service of the Pacific Mail Steamship Company, by which he had been employed since 1912, and has joined the Shanghai Pilots' Association, the members of which do the Yangtze bar piloting. Captain Jackson is well known in San Francisco and elsewhere on the Pacific. He served on the Nile, Siberia, Persia, Peru; as first officer of the Pennsylvania, City of Para, Santa Cruz and Colombia, and as master of the San Jose.

CHICAGO PNEUMATIC TOOL COMPANY

Announcement is made of the removal of the Minneapolis office of the Chicago Pneumatic Tool Company from the Metropolitan Bank Building to Fifth Avenue and Fifth Street South, Minneapolis, Minnesota, where a complete stock of Pneumatic and Electric Tools, Air Compressors, Oil Engines and Rock Drills and parts therefor will be maintained.

AMERICAN BOYS FOR AMERICAN SHIPS

Permanent Relief Work

By Ralph E. Cropley

In this article Ralph E. Cropley has struck at a solution for at least one of the difficulties which will have to be met by the American people in maintaining an efficient Merchant Marine.

The sailor ashore in a strange port without friends always needs looking after, and if we are to multiply the personnel of the Merchant Marine as fast as we have been of late multiplying the units of that Merchant Marine, it will certainly be necessary for us to establish in every seaport on our coasts club houses, hospitals and institutions of many kinds to supervise the welfare of the men on shore leave and between jobs. It will also be necessary probably to establish branches of these institutions in many foreign ports and to extend our financial assistance much more liberally than we have been in the habit of doing to those institutions such as the Seamen's Church Institute, The Mariners' Church, and others which have long been a haven for the sailor in times of trouble.

ONE by one the war clubs and canteens are rapidly disappearing from our cities. With a navy to number 250,000 as a peace basis; an army which we hope will have at least 500,000 men permanently, and the merchant marine enrolling 250,000 recruited from the best of our manhood, one wonders what sort of men these million boys of ours are going to become if we all quit our Red Cross and other relief work simply because the war is over.

Analysis will show that these million men are absolutely essential to the prosperity of the United States. Therefore, have they not every right to expect the same sort of welfare consideration which has been so lavishly given to our soldiers, sailors and fighting marines in times of war? The boys apparently think so, for on Decoration Day, when the War Camp Community Unit of the Harvard Club of New York City endeavored to close its doors, such a howl of protest was raised that in the name of humanity the Harvard Unit has been forced to continue indefinitely.

To many a boy this unit is the only home he knows. In its two years of service the tiny canteen—and it is only one of many in New York City—has ministered to 248,000 men and on some Sundays has fed as many as 1400. The boys like the place because they can be regular fellows, do as they please, and there is no religious element to annoy them. They get good home-cooking at prices they can afford to pay, and all their worries, which to them seem as mountains, are untangled. They also get clean beds at moderate prices and therefore do not have to seek cheap boarding houses of questionable character. But, above all, it is some place to go to regularly instead of having to hang aimlessly around the streets. Furthermore, the canteen department of the unit is run by women of the world who can talk to a fellow in his own talk and jolly him a bit—women who are not sympathetic with a fellow (a fellow does not want that kind). They are just the kind of women a fellow can talk to when he has things to get off his chest, and you know a fellow quite frequently needs to just "talk."

The New York County Chapter of the Red Cross also is finding that its problems still continue. During the visit of the fleet to New York a short time ago the chapter had to extend financial relief to nearly 5000 sailors. The number assisted, outside of the hospitals has been so large that count has been lost. At the present time, especially on Saturdays, there are over a hundred naval, army and merchant marine boys coming into the office daily, and men and women labor until 9 p. m., and Sundays as well, keeping up the morale of the well boy who is sadly out of luck in pay, has family worries, and what not. Looking ahead it would seem as if the job were to be continuous.

The big new problem is the merchant marine boy. In order to keep our new ships from rotting at their anchors because of the lack of men to man them, on June 2, 1919, Mr. Hurley, chairman of the Shipping Board, issued an appeal to the country, saying:

> "The backbone of a merchant marine are the men who are in it. We must have the best obtainable crews for our new merchant ships.

> The need is pressing. American vessels in American ports today are calling for crews—for mates, engineers, seamen, firemen, cooks and stewards who are American citizens.
>
> "It is as vital to the nation's prosperity that we have efficient crews on the ships of the new merchant marine as it is for the railroads to have skilled and large train crews. Every American farmer, business man and manufacturer is directly interested in a business way in seeing that this is done.
>
> "It is his duty to help us secure efficient management at sea of the great fleet on which so much of the nation's money has been spent. It is the patriotic duty of every citizen not to forget the needs of the merchant marine, our third arm of service in peace or war. We have the ships; it depends on the people whether we have the men to run them as they should be run for the best interests of American business, first, last and all the time."

That we have merchant ships in times of peace is as vital as our having them in times of war. For in eight months the United States is producing in manufactured articles, raw material and food supplies, enough to care for her home demand. In order to keep labor employed and prosperity in the land, it is absolutely essential that we reach overseas markets, or otherwise we will be living off ourselves and not only marking time as to the net worth of the nation, but deteriorating as well. To get these needed markets we must have American ships, for foreign maritime nations are not going to carry American goods to any extent in their ships to our customers who are likewise theirs.

We have the ships now. How are we going to man them when, as things are at present, the American boy is not attracted to a seafaring career as proportionately as he should be? We certainly have failed to give proper attention to forming plans as to how to keep the boys at sea once they have been enticed away from the pleasures of life ashore. We seem to have lost sight of the fact that the welfare of a seaman in port is just as important as his welfare afloat. For hell, I recommend anybody to live on a ship alongside a dock while she discharges her cargo and ships another. I have spent many a night on vessels along the New York waterfront and know how lonely officers and men get whose homes are inland or abroad. Having no club to go to—nothing but the overcrowded Seamen's Church Institute, mainly patronized by unclean foreigners—the temptation is great to drown one's sorrow at the corner saloon or seek the companionship of the woman of the streets, because there is nothing else to do. Certainly such a condition doesn't make for the efficient crews Mr. Hurley desires for American ships.

For many years the Seamen's Church Institute in New York City has served well to supply merchant sailors of the world with the club—the home they have lacked. Unfortunately, even now, before the new American merchant marine is half manned, the institute, large as it is, cannot begin to care for the situation—a situation which in the matter of night lodgings alone is going to be somewhat as follows, when the war organizations are closed up. The figures are on a yearly basis for New York City alone:

U. S. naval man	150,000
American merchant sailors	200,000
Foreign merchant sailors	150,000
	500,000

The institute in its dormitories and rooms can comfortably care for 189,000 men a year. During 1918, by giving up lounging and recreation rooms and turning them into dormitories, the institute slept 219,872 men under its roof, and over 100 men were turned away every night.

Who in New York is going to care for the other 281,000?

Coming up from New Orleans recently on a Southern Pacific liner, I noticed that the type of seaman on American ships had changed decidedly. No longer did I see the usual unshaven, bleary-eyed individual washing paint, etc., during watches. His place had been taken by a clean-cut youth whose working clothes showed that he had been in either the army or navy and was putting in his time as an able seaman while studying to become an officer. Asking the boys what they did with themselves after work hours, when in port, I learned that in New Orleans they were sadly out of luck, and as for New York—well, as one boy put it:

> "We put on our ex-service uniforms and go to a War Camp Community house. God help us when they are closed up. Lots of us won't stick by the sea, I'll tell the world. You see, we're human like the rest of you land-people. We're regular fellows. When ashore we want to do the things we used to do every night at home—see a show, talk to a decent girl, shoot a game of pool—do everything else a fellow has a chance to do when he works ashore."
>
> "You'll still have the Seamen's Church Institute to go to," I ventured.
>
> "Have you ever been there?" I was asked by a dozen voices.
>
> "No," I replied, very curious. "What's the answer?"
>
> "Foreigners. Then, besides, the place is too crowded. Why, you can't get a place to sit down, and sometimes the lobby is so crowded you can't move. As for sleeping there—well, who th' hell wants to sleep in a bed which some buggy, venereal foreigner may have occupied the night before? 'Taint the fault of the institute—they treat fellows fine—it's just circumstance, and unless the Red Cross or somebody else does something for American seamen to take us away from having to live with foreigners when ashore, the merchant marine can go to the devil as far as I'm concerned, as I'll be after going back and driving a truck as I did before the war."

What this boy said is the crux of the whole problem of whether the United States will be able to man its merchant ships. I took the boy's advice and visited the Seamen's Church Institute. I found it just as he had said. It was 4 p. m. at the time of my visit and so crowded was the lobby I could hardly move. Outside, around the park before the institute's thirteen-story building, the curbing was occupied by the bummest lot of dirty foreigners I have ever seen. The crowd within the building was a mixture of naval boys learning to be officers at the institute's school—clean-cut American merchant ship boys and foreigners of all kinds. Everybody, because of the crowd and the heat, seemed to be dejected. I learned that the situation was becoming more chaotic every day.

The remedy for the whole situation is for the Red Cross or War Camp Community to carry on in peace as in war and establish American seamen's homes in all big ports. Furthermore, there must be Seamen's Church Institutes established in all ports to care solely for the foreigners. This organization always has done so and therefore is best adapted for the work. In New York foreigners alone will test its capacity, and the religious element in the institute is needed by the uneducated foreigner, whereas the American boy wants to be left alone in this respect or he'll not come around.

From the head of the Seamen's Church Institute in New York—a man who has made a wonderful success of the work for years—I have ascertained that on the Pacific Coast the situation for merchant seamen is indeed sad. As I understand it, outside of a few small missions in San Francisco, there is no place for a seaman to go other than the saloons and cheap waterfront boarding houses. In Seattle an effort is being made to create a Seamen's Church Institute on lines similar to the one in New York. In Philadelphia, through the efforts of some people connected with the Navy League, something is to be done for the sailor, and it has received the endorsement of the Episcopal laity and the Society of Friends. As for Norfolk and Newport News, a merchant ship officer has told me the situation was so bad that when discharged from a ship there merchant sailors actually paid their way up to New York in order to have a roof over their heads. Quite frequently the next ship they would be assigned to was at Norfolk and back they would have to go.

The problem in each port will be different. For instance, in New York there would have to be at least ten Seamen's Clubs along the miles of water front. In general each club would be like that of the Harvard Unit of the War Camp Community—affording sleeping accommodations as well. It would not be charity, for the boys wouldn't stand for that. They want to pay for what they get, yet having little money, can't afford prices which would put these clubhouses on a paying basis. The Harvard Unit alone, I believe, goes into debt $15,000 a year. Yet that yearly debt has kept many a boy clean and efficient for Uncle Sam.

During 1918 the Seamen's Church Institute in New York served 503,720 meals. The Harvard Unit, twenty times smaller, served 124,000 in a year. The Savings Department of the Institute cared for $727,356.47 belonging to seamen, thereby protecting them from losing it. American boys will need the same accommodation, for what to do with their money is in most cases a very serious problem for all types of sailors. At times they are paid off with several hundred dollars, and ignorance of how to get it to their families, as well as the facilities for doing so, quite frequently means that thieves and the women of the streets profit materially. If the opportunity is not given the American sailor to save I am very much afraid Home Service Chapters of the Red Cross will be called upon to care for mothers and wives who will be as destitute as many were during the war from the failure of the government to come through with allotment checks.

The baggage of a seaman when in port while waiting for a ship, is a source of great annoyance and concern to him. Red Cross rest rooms at railroad stations—War Camp Community houses—can relate tales of the tons of sea-bags and suit cases they have cared for, while the Seamen's Church Institute checked 51,679 pieces of baggage during 1918. As for the Institute's Mail Department, it received 60,229 letters for sailors who were still at sea, yet who wanted to be sure of their mail on arrival in port. Letters play an important part in the efficiency of a man away from home. Ask the man who has been overseas during the war. The War Camp Community houses solved this problem for naval boys, who but had to write to have their mail forwarded to such and such a place. In my hospital work I know where a letter gave a boy the gumption to fight for his life! You should be able to imagine readily what letters mean to the men of the sea—what it means to have a comfortable clubhouse where they can be sure of getting their letters and sitting down in comfort and answering them.

The main problem for each of these community houses for merchant marine, army and naval boys, can be grouped as follows:

1. Meals and bed.
2. Banking.
3. Baggage.
4. Mail.
5. Recreation.
6. Temporary financial relief.
7. Temporary financial relief to families.
8. Hospital service.

This last has more to do with the Merchant Marine than any branch of the service as the Army and Naval boys are taken care of by the government and are still paid while sick. The merchant ship man has his hospital expenses cared for but his pay ceases the moment he is put ashore from his ship. This works greater hardship on his family than on him.

Surgeon General Blue has recently asked the Red Cross to "carry on" in United States public hospitals, as it did in military hospitals, so a beginning has been made to care for this needed assistance. In 1918 Seamen's Church Institute visitors called on 8217 merchant seamen in New York hospitals, and that number was but a small part of the total.

Such is the general outline of the problem facing the American nation if it wishes to have a merchant marine and be prosperous. If our boys know that in all ports they can be made comfortable when ashore—that they need not starve while waiting for a ship—need not mix with the foreigners at Seamen's Church Institutes, then Mr. Hurley will have no difficulty in finding recruits for the merchant marine from the best types of American manhood; Franklin Roosevelt need not worry about his Naval Reserve or the getting of enough men for the regular Navy. The same applies to filling the quota of the Army. In self-preservation it is plainly up to the American people to do something and do it quickly. The war organizations must not be allowed to quit cold. The example of what took place at the Harvard Unit of the War Camp Community on Decoration Day should be constantly kept in mind.

European Marine Notes

Exclusive Correspondence of Pacific Marine Review

IF anyone wants to start a brisk discussion in British shipowning or shipbuilding circles at the present time the mention of the possible and growing American competition is sufficient. It must be said that the matter is being argued out on very clear and reasonable lines and considerable admiration is being expressed for American methods. At the present moment, no matter how pessimistically a shipbuilder may talk here, he always winds up in an altogether different vein and ends on the note, "There's life in the old dog yet."

Amongst contributors to the discussion we have had H. E. Yarrow, C. B. E., managing director of Yarrow & Company, the famous British shipbuilding firm. He has been away for a five months' tour of the United States and Canada and being a man who therefore knows both sides of the Atlantic, his views are interesting and to an extent valuable. Your correspondent had not an opportunity of always keeping him to the line of question that was especially intended, but Mr. Yarrow's remarks, while being naturally colored by his Britishness, may be very well summed up as follows.

He began by saying that he did not want to appear pessimistic, but at the same time we had to look after ourselves. He was asked when he arrived if he had brought any orders from America, and he said: "If you don't take care they will get orders from us. There is no business to be obtained from them now, I fear." While things were said of American performances which were a bit of humbug, they had done some very remarkable work. For instance, he went round a shipbuilding yard in Boston which had been built since the Americans came into the war. It was a yard of exactly the same size as Yarrow's, and the whole of it was covered over with a glass roof. It was built for constructing torpedo boat destroyers only, and had, roughtly speaking, sixty or seventy overhead electric cranes. It had a very wonderful plant, and they could turn out destroyers very quickly and economically with their very complete installation. In another yard near New York they had an order for 150 merchant ships each 320 feet long. The yard was supplied by a large number of steel works which produced much already fabricated material. One very striking thing might be said of all the yards he saw—that nearly all the foremen or men in charge had come from the Clyde or the Tyne. In a sense that was satisfactory, but on the other hand it was very sad to find them over there building ships in competition with us.

In the Union Iron Works, one of the biggest shipbuilding yards in the States, he continued, they were building sixty-six torpedo boat destroyers in one yard, and they had thirty-eight launched. It was found, however, that there was some delay in fitting out those which had been launched. While walking through the works he saw a Yarrow boiler shop. Inside there were any number of Yarrow boilers. Unfortunately, the patent had expired, and it meant nothing to the firm, but it was a satisfactory thing to see Yarrow boilers tucked away on the Californian Coast. He was quite sure of one thing, and that was that Americans had made up their minds definitely to have a very much larger merchant marine than they had before the war. Whether they would be able to build ships as cheaply as they could be built in Europe would not affect the question at all. If it cost more the government would subsidize, or they would build their own ships. They had made up their minds to have a merchant marine of their own built in America and manned by Americans. That of course would have an effect in this country. A lot of the British-owned and British-built ships for carrying American goods would not be wanted. That to a very appreciable extent would affect shipbuilding and shipping owned here. The cost of living was still higher in America than it was here, but the wages were higher.

There was no doubt, continued Mr. Yarrow, that the output was not restricted in America to the extent it was here, and that appeared to him a very serious point so far as the industry of this country was concerned. He felt that the British working man was just as good as the American working man. He impressed on all who had control of the interests of their firm in its working to do all they could to try to point out the failure of the principle of the limitation of output. The first question asked by the various managers and presidents of the American shipbuilding companies was regarding the limitation of output in Great Britain. They felt that this was their chance to get an innings in shipbuilding in competition with European shipyards. He did not think America could build ships at least a year ago as cheaply as we could on the Clyde, but they had very up-to-date works and they had gained a good deal of experience. If we did not take care they would be very serious competitors for foreign work, and that would be very unfortunate for this country. What applied to shipbuilding applied to other industries. There was no doubt their steel works were better equipped and had better plants than ours. He was sure they could supply steel quite as cheaply at their steel works, if not more cheaply, than we could at our steel works. Of course, they were handicapped by freight, but one could buy certain types of steel here more cheaply than British steel. He did not take the pessimistic view of things that was sometimes taken by people in this country. On the other hand, we must realize, he said, that we were faced with a very serious time of competition on the part of America and other countries. He felt confident that we would manage to hold our own, but that we had a very tough fight before us.

What the Baltic Thinks

On the Baltic Exchange in London also the men are very busily engaged in watching the changing conditions confronting the shipping interests. A writer in the Times Trade Supplement, speaking of views there, declares that the revival of the American mercantile marine, which means in effect the creation of new competition, will, no doubt, bring a certain amount of business to British shipbrokers, but it can scarcely be a favorable point for British ownerships. Many new

American services have been inaugurated during the past few months, of which two have been announced this month. One is a new weekly cargo service between New York and Glasgow, to be maintained by the International Mercantile Marine; the other is a service, at first, at any rate, monthly, between New York and Constantinople and the Black Sea, inaugurated by the United States Shipping Board. American cargo ships are appearing in all routes. Japanese companies have inaugurated many new services during the war and have built many cargo ships, and, like the Scandinavian ownerships, they have enormously strengthened their finances. The keenest competition is to be expected from all quarters, and British shipping companies who begin the new era with fleets depleted and depreciated, will need to employ all the business skill of which they are capable to enable them to hold their own in the coming strenuous times.

In this connection there is ground for satisfaction that the business world is being reinforced by a number of men who in the fighting departments or in the Civil Service especially impressed the leaders of industry with whom they came into contact with extreme efficiency. There are many instances of men now leaving government departments for business offices. One of the most notable cases is that of Commander Thomas Fisher, R. N., who distinguished himself in the trade division of the Admiralty, through serving on various government committees concerned with commercial problems in war, and later, as a representative in the United States of the British Shipping Ministry. He has now been appointed general manager of the Atlantic Lines of the Canadian Pacific Ocean Services.

Shipbuilding Contract in the Law Courts

An interesting question of repudiation of a shipping contract has just been heard in the courts here and it might be briefly alluded to. The defendant company was laying out a large shipbuilding yard on the Tees. The plaintiff ordered the first six steamers to be built in the yard at a cost of $1,150,000 apiece. Two of the steamers had not been built, and the plaintiff brought an action for alleged wrongful repudiation. The defendants said that the delay in building the ships was due to failure of the plaintiff to supply such information as would enable them to obtain permission from the government to build. The plaintiff, on the other hand, said that the defendants had not exerted themselves to get permission, but had, in breach of their duty, suggested to the government that it should order them to occupy the yard with the assembling of fabricated ships. Mr. Justice Bailhache, in entering judgment for the defendants, reviewed the evidence, and said that unless they had obtained permission to construct fabricated ships they would not have received permission to build any ships at all, and would not have been able to lay out the yard.

London and the Large Liner

Judging from the dock works which are in progress or definitely projected here, the intention of the Port Authority is eventually to make London capable of accommodating the biggest of the world's merchant ships. Soon there will be docks and dry docks sufficiently large to take even greater ships than the Australian and other liners which not long ago taxed the resources of the port, and eventually Mauretanias and Olympics will be able to come and go as easily as they do at Southampton. Whether the British-New York express services will ever have the capital for bases on this side of the Atlantic is difficult to foretell. They do not appear, however, to be downhearted about it, either at the dock or in the Port of London Authority offices for, looking at a large model of the dock extensions the other day, I observed with interest that amongst the tiny ships shown alongside the quays were miniature four-funnelled Cunarders and White Star liners.

British Shipbuilders and Coal

The question of coal has suddenly become, since July 10, a very critical one for British industry generally. As is perhaps known, the British coal mines are under a kind of temporary war control and the government has a very large hand in the ordering of the enterprise. It has been suggested in certain quarters that this should be exchanged for complete nationalization. That matter does not come into the sphere of practical politics just yet. In the meantime, however, the miners have had their hours reduced from eight to seven a day and they are having a further increase in wages. It was perceived that this would tend to an increase in the price of coal, but when the government announced on July 10 that the increase would be $1.50 per ton, industries everywhere in this country received a severe shock. Shipbuilders as well as shipowners foresee very serious times ahead for them if this extra charge becomes actual law. As I write the matter is being debated, but the chance of the $1.50 not being added is remote. The general industry in this country has not wakened up properly since the armistice and the change over from war conditions to peace conditions of industry has not made any special progress. Gradually, however, the government, assisted by the big banking and financial interests in the country, were certainly helping business to recover and more animation was beginning to be perceived. Capital was being launched out into fresh enterprises and some of the closed factories were being reopened. Still, however, there remained over a million workers unemployed, so that the progress had not made much headway. The new $1.50 a ton upon coal looks like putting a stop order upon all this advance, anyway for the time being. The extra cost of coal will add appreciably to the cost of iron, steel and everything else in the country because coal, either for manufacture or transport, stands at the bottom of all these things. When fuel costs more everything else goes up. This is the awkward factor of the moment, and as I write our shipbuilders, who will be faced with heavier costs at home and keener competition elsewhere, have not had their spirits raised.

The famous old Cutty Sark is once again in the Thames. She has been the Portuguese Ferreira since 1895. It will probably surprise quite a lot of people to learn that the gross tonnage of the packet which is generally regarded as the fastest of the clipper ships is only 968. She was built in 1869.

L. D. Lovekin, American Marine Engineer and Naval Architect

WE believe that it is fitting and proper for us to print herewith a short review of the remarkable attainments and a few facts regarding the history of a man whose perseverance, foresight and ability have placed him in a position as one of the foremost authorities on marine engineering.

Mr. Lovekin started to work when twelve years of age as a rivet passer in the William Cramp & Sons shipyard. From this humble start he passed through the various stages of ship construction and when seventeen years old entered as an apprentice at pattern and model making. When twenty-one years old he was made foreman of the pattern shop of Charles Hillman Co., Philadelphia, Pa. During the period of his foremanship he studied diligently with a view to becoming a designer and in 1892 he entered the employ of Cramp's shipyard as a draughtsman, filling various positions until, in 1899, he became chief draughtsman of the engineering department of the Cramps concern.

In October, 1900, he was selected by Mr. Henry G. Morse, the designer, builder and president of the newly organized New York Shipbuilding Company of Camden, N. J., as his chief engineer, in which capacity he served for almost seventeen years. During that time he was responsible for the engineering work on all the naval and merchant ships built by that concern.

In May, 1917, he was selected by the American International Shipbuilding Corporation of New York to study the problem of mass production of fabricated cargo ships, which seemed necessary if we were to keep pace with the sinking by German submarines.

In September, 1917, he became connected with the American International Shipbuilding Corporation as consulting engineer, and continued in that capacity with the American International Shipbuilding Corporation, which was formed to build fabricated cargo ships at Hog Island. In 1918 he became a vice president of this concern and has lately been made a director of said company.

We might also mention in passing that there is probably no man in the United States who enjoys the confidence of the marine draughtsmen as much as does Mr. Lovekin, and this is solely due to his untiring interest in them as a body and as individuals. An idea of their esteem for him is possibly best cited by the fact that he is the only living honorary member of the American Society of Marine Draughtsmen.

In 1910 the American Society of Naval Architects and Marine Engineers selected Mr. Lovekin as a delegate to the fiftieth anniversary of the Insitution of Naval Architects held in London, England.

In addition to his extensive work in the ship building line he has been an untiring worker at home, having devoted years of study to problems of various kinds; the results of which have placed him in the rank of successful inventors.

Mr. Lovekin has the honor of being a member of the following clubs and societies: The Franklin Institute, Philadelphia, Pa.; The Society of Naval Architects and Marine Engineers; The American Society of Mechanical Engineers; Institution of Naval Architects (London, England); member of the Committee on Merchant Marine of the Philadelphia Chamber of Commerce; associate member Society of Naval Engineers; Art Club, Philadelphia, Pa.; Racquet Club, Philadelphia, Pa.; Engineers' Club, Philadelphia, Pa.; Engineers' Club, New York; Merion Cricket Club; Sea View Golf Club; Deal Golf Club of New Jersey; Pen and Pencil Club, Philadelphia (life member).

HOG ISLAND SHIPS MAKING GOOD

Many of the ships being delivered to the Shipping Board from the big fabricating yard at Hog Island are being chartered by various shipping companies on the Atlantic Coast. Among other companies, the National Shipping Corporation have found the operation of these ships very profitable. This company took the Sac City, the third ship delivered from the Hog Island yard and she has run since her delivery about sixteen thousand miles, functioning perfectly for the entire distance. They are now taking over the steamship Blair, the twenty-third ship from the Hog Island yard and have had an inspection made of this ship by Captain W. E. Heppell whose report says in substance that he has found this ship to be a first class up-to-date cargo boat, fitted with large, well placed hatches and ample deck machinery for the rapid handling of cargo. The vessel is well built with excellent finish. To quote the Captain: "Going over her, and having been associated with ships of all classes for the last thirty years, it is difficult to believe that this is a fabricated ship and put together during an emergency period when speed was a greater factor than finish. I very carefully examined her riveting and could find no fault with it. I would like to take over a huge fleet of her class to establish a real merchant marine, to dig into every trade and trade route throughout the world and prove to some of our critics that we can build and run a merchant service and carry the American Flag to the utmost corners of the earth, just as well as flags of other nations can be carried."

ARMCO IRON

The Page Steel & Wire Company has opened a branch office in Chicago, at 29 South La Salle Street. This office will handle all Armco Iron products, including Armco welding rods, twisted pairs, plain and galvanized strand, bond wires, Armco Iron fence and barbed wire and other brands of fence manufactured by the Page Steel & Wire Company.

This company has another new branch office in the Book Building, Detroit. Distribution in Canada is in the hands of Taylor & Arnold, Ltd., Montreal, Toronto, and Winnipeg. Local distributors for Armco Iron welding rods are located in all principal industrial centers.

The sales of the Armco Iron Department are under the supervision of W. T. Kyle, sales manager, at 30 Church Street, New York.

L. D. Lovekin

Injury Losses and Efficiency

By Chas. Wentworth Hill, Safety Engineer, Moore Shipbuilding Company.

THE problems which industrial managers must face during these after war days are likely to cause them to overlook the importance of evolving a constructive policy regarding accident prevention. In California the operation of the State Compensation Law leaves no loophole for escape from a definite money loss for every injury an employee suffers in the course of his occupation. And practically every state in the union is more or less active in enforcing the payment of adequate compensation to injured workmen.

But the duty of a business manager is not fulfilled by establishing funds for paying insurance or compensation. If he knows his business he will do the same thing with this accident output in his plant that he does with the output of every other department of his operations; which is to tabulate and analyze the details to find out how to get results with the least outlay.

Just now the huge shipbuilding industry of the Pacific Coast is occupying the thoughts of the readers of Pacific Marine Review and perhaps there is no other business which requires such skillful management to maintain without undue shrinkage. War contracts are expiring. War prices on materials and labor still exist but new contracts cannot be closed at much more than a normal peace time value. Managers are compelled, therefore, to increase efficiency and reduce waste to utmost.

If managers generally would but admit the fact, and study the matter they would see that the enormous waste in hospital and injury expense can be reduced easily by co-operation, plus individual plant activity. By co-operation is meant a systematic co-ordination of the safety activities of most of the shipyards on the Pacific Coast. I specify shipyards because that is the branch of safety work in which I am at present engaged, but the same thing applies to any kind of distinct industry. For a given industry the safety campaigns and methods should have a certain general character so that the employees in that sort of trade cannot escape from safety instruction and supervision when they change jobs. Everywhere they go they should bump into the same fundamental ideas. A few frills more or less can be added with profit, but the main ideas and methods should be similar. Individual plant activities for safety are the frills and particular device required in a given concern. No two plants are identical in layout or type of worker employed. To meet these variations will test the abilities of the best safety engineer that can be found. That is the human engineering of it.

At present a plant might be expending much energy, thought, and money to save its workmen from injury, and owing to the negligence of neighboring yards the safety organization of the better plant may be constantly undermined. Such a condition is certain to add to the overhead expense of all concerns in the shipbuilding line. It should be stopped at once.

Another important matter to consider is the fact that the skill or efficiency of the individual workman can be increased more rapidly by proper emphasis on safety for life and limb. It is impossible to tell where efficiency and safety cease to be identical for most man-power operations. A man who will reason out an operation which he performs will rarely be found in the hospital due to his own carelessness. Skill generally means care and the rule seems to be that a man able to exercise care in one or two matters can be taught easily to be careful in all things.

Personal carelessness causes about 60 per cent of injuries in industrial operations. In shipyards, at the present time, the percentage is higher owing to the large number of unskillful and physically unfit men urged into it by the war. It is going to take several years to overcome this condition unless the industry shrinks much below what there is any need for, or expectation of its doing. For this reason it is imperative that Safety be valued at its proper rate and quickly made a constructive force in the industry.

The old time shipbuilder cannot yet realize that the majority of the men now employed in shipyards will never acquire the skill which he possesses. It is no discredit to the new comers that this is true. It is very much to the credit of thousands of farmer boys and once anemic students, that they do so well in a complex line of work. But nobody who has not been brought up from early youth amid surroundings which make shipbuilding a second nature can be expected to be at home in a busy yard. So the facts must be confronted squarely. Either the new men must be safeguarded by more scientific safety measures; or the unnecessary losses must continue; or the old timers choose to sit back and let a vast industry wither up for lack of efficiency—or something else.

To sum up this article all I need to say further is to tell how it came about that it was written and why I have dwelt upon the efficiency side of the subject.

One day a stranger appeared with the question: "Why don't you put steel helmets on the men to protect their heads from falling objects?" At first thought the idea is interesting. The man who asked the question had been on the war front. Steel helmets had saved many a good man, so why not use them in the shipbuilding industry?

The answer is plainly that any industry that needs to protect its men in that way ought to be stopped by law. Add to this the fact that some five thousand men would be compelled to wear heavy helmets in order to be certain of protecting the few who get trifling injuries from falling bolts. Then the overhead expense would help to swamp the ship. Helmets are not a solution for injuries by falling objects. Skill, decency, common sense on the part of individual workmen is the remedy. Add to that a proper measure of good management and efficiency in shipbuilding and head injuries would become the rarest cases which occur.

There is a way to organize a **Safety First** movement which will produce most beneficial effects upon the entire industrial area of the Western Coast. For the sake of the shipbuilding industry, for humanity, and for profit let us organize at once on proper lines.

Puffed Brick Concrete

By David W. Dickie

THE concrete ships which are being built at Government Island in Oakland Harbor have received considerable press notice under the above caption. The concrete used is formed of an aggregate comprising larsite, manufactured by the Los Angeles Pressed Brick Company under the guidance of Mr. C. W. Boynton, a Shipping Board man from Alabama; diatomaceous earth or kieselguhr as mined by the Celite Products Company; and ordinary Portland cement.

The Celite Products Company is located at Lompoc, a small town in Santa Barbara County reached by a branch line of the Southern Pacific from Surf. The mine from which the product is taken is about five miles west of Lompoc and consists of a deposit of diatomaceous earth about five miles in diameter and about one thousand feet thick. This deposit is formed fro man accumulation of the siliceous cell walls of microscopic diatoms belonging to the family of unicellular algae which inhabit either fresh or salt water. Each individual or frustule of this family consists of two more or less symmetrical silicified halves or valves, the older of which is slightly larger than the younger, and fits over it like the lid of a box. These frustules are either isolated or attached in linear series or in zigzag chains.

The deposit formerly covered quite a large acreage, but much of it was eroded away thousands of years ago, leaving the present block of material, which is white and appears to be a crystalline, silicon dioxide. It comes in layers like a layer cake. Clearing off the surface leaves a layer at the slope of about 40 degrees. By means of a lot of cableways, saws are run down the slope, making cuts about one foot deep at intervals of four feet. These blocks, four feet wide and one foot thick are run down the slope to the plant and the slope is swept off and the process repeated. All of the sweepings and dust of all kinds are preserved as the powdered earth is used as a filler for dynamite, a polishing powder and a lubricant for concrete to make it flow in the forms. In fact it has the feel and appearance of very fair talcum powder. Before the source of this material was known, and while it was used merely as a base for dynamite and other explosives, it was called infusorial earth.

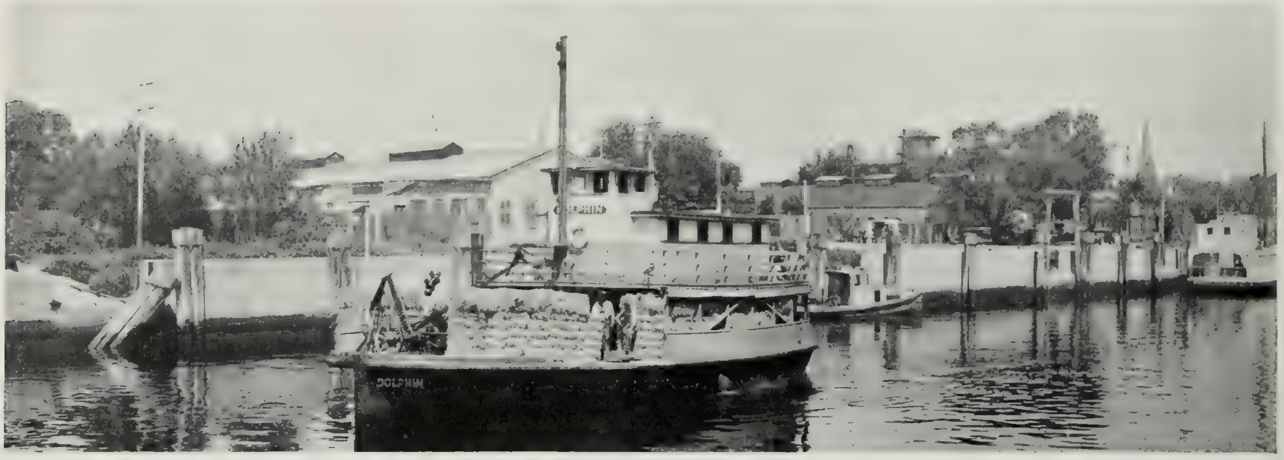
The large bricks are taken down to a plant where they are sawn into 8-inch blocks, then carried off at right angles to another saw which cuts them into 4-inch slabs, making bricks 4 inches by 8 inches. From this saw, they run along a platform and are allowed to fall off the end of a belt on a 14-inch vertical drop. Any bricks that break here are discarded, the rest pass through another saw which cuts them to 2¼-inch thickness. They are then stacked in an oven which is fitted up with an oil burner at one end and a suction fan at the other. The heat from the oilburner evaporates the water in the bricks and the exhaust fan draws off the steam and the moisture laden atmosphere. The bricks come out of the oven white, clean and with a soft powdery feel. All the dust about the plant as at the mine is gathered up, put through a grinder, sacked and used for various purposes. The bricks are used as the intermediate coat between the red on the outside and the fireclay brick lining in furnaces of all sorts.

Passing now to the Los Angeles Pressed Brick Company's plant, we find that they had never made the larsite commercially until the process was introduced by Mr. C. W. Boynton. The clay is put into a roller mill, and ground up fine, mixed with the proper amount of water and fed into a press which forces it out through a die 2¼ by 4 inches, thus forming a long ribbon of damp clay mud. This ribbon is then cut off into brick lengths by means of a paddle wheel arrangement with a wire across it, so that the speed of the belt combined with the velocity of the revolutions of the paddle wheel makes a square cut across the ribbon of mud. The belt that takes the bricks away from the cutter runs a little faster than the feeding belt, so that on the former there is a small space between each brick, giving them a chance to dry slightly on the ends. They are then placed in the drying oven, and after drying, stacked up in the brick kiln with an air space between each brick. The kiln is shaped like a half dome with the openings to the stack in the bottom and each burner has a combustion chamber arranged by leaving a vacant space in the pile of bricks immediately in front of the burner. So far, the process is practically the same as ordinary brick making, but for the ordinary brick, the fire used in this kiln would be regulated to give a temperature of 1400 degrees and would burn for eight or nine days. In making the larsite, or burnt shale, the fire is regulated to give about 1800 degrees and is burned for twenty-four hours only. In the form of kiln used the whole top row of bricks are melted into practically a solid mass and are swelled up and porus, while the bottom bricks are merely over-burnt ordinary brick. About 80 per cent of the charge of the kiln is taken out in the form of burnt shale and it is this material that is shipped to San Francisco to be crushed at the shipyards and used in connection with the diatomaceous earth from Lompoc in forming the concrete aggregate for the Government Island ships. A large element in the cost of this process is the labor charge for breaking the burnt mass out of the kiln.

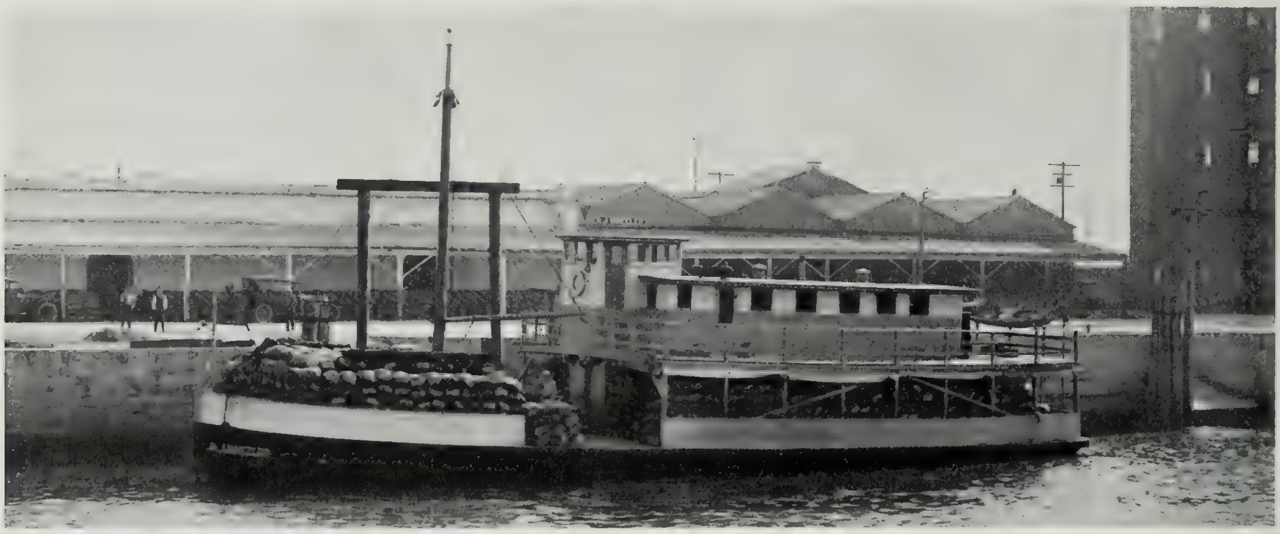
The burnt shale, or larsite, runs about 1350 pounds to a cubic yard of concrete. The crushed aggregate using 3/16 to ⅜-inch size mesh runs about 1080 pounds to the yard, or 40 pounds to the 1080 pounds to the yard, or 40 pounds to the cubic foot, and in ordering material one should specify a limit of 40 pounds to the cubic foot, because in the kiln run there would be a large portion of over-burnt brick which would weigh considerably more than this limit.

The cost of larsite seems to run at the present time about $20 a ton, but as it is only about half the weight of crushed rock, the cost would be about $10 a yard, as against $2.50 a yard for crushed rock, so that from a commercial point of view larsite has no future as a binder for concrete aggregates except in those cases where weight is a consideration, such as building concrete vessels or barges, or in the construction of a building where swampy ground is the only foundation available.

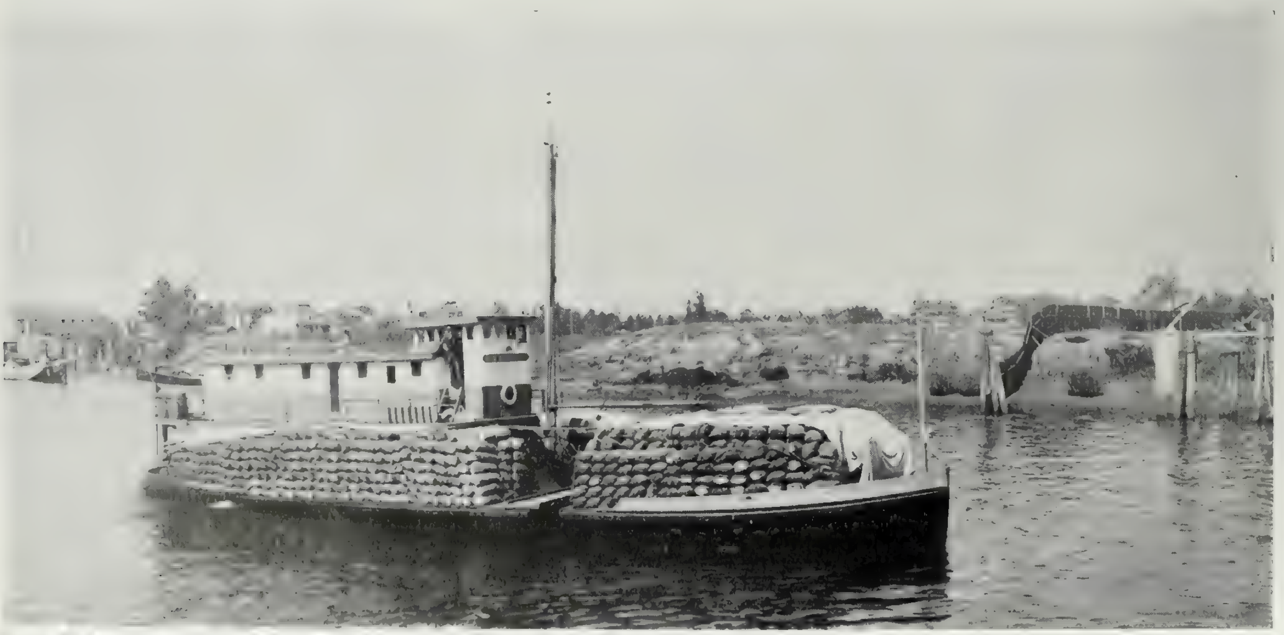
Three River Freighters of the Fletcher-Wheeler Transportation Company's Fleet



Motor Freight Boat Dolphin; length 64 feet, beam 26 feet, draft, 4 feet; 50 H. P. Acme engine; speed loaded seven miles an hour; capacity 1000 sacks of potatoes

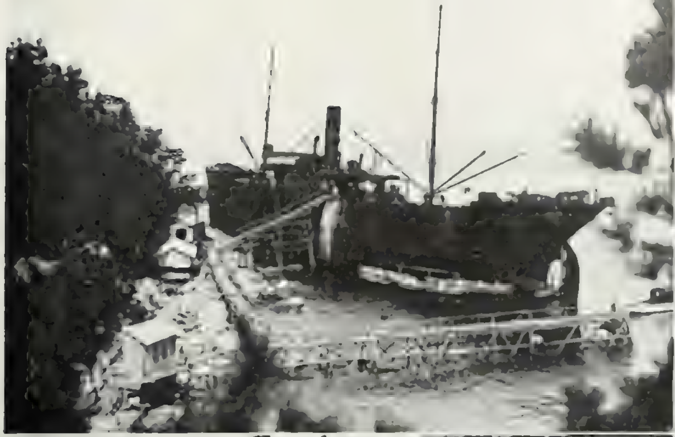


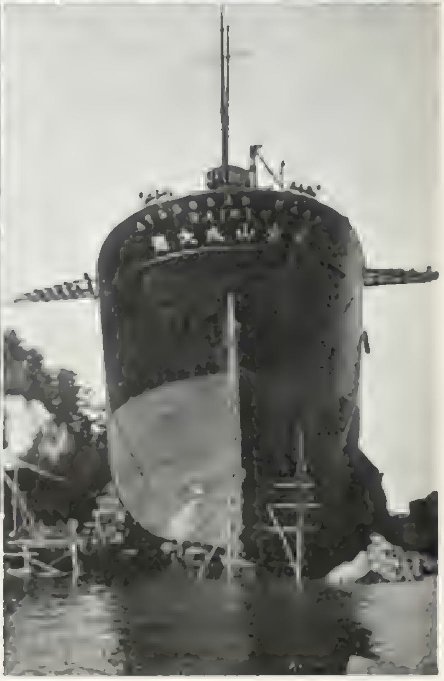
Motor Freight Boat R. G. Wheeler; length 100 feet, beam 32 feet, draft 5 feet 9 inches; two 40 H. P. four cylinder Acme Engines; load capacity 2700 sacks; speed, loaded, six miles an hour



Motor Freight Boat W. A. Fletcher; length 92 feet, beam 28 feet, draft 6 feet; two 45 H. P. three cylinder Acme engines; capacity 2500 sacks; speed, loaded, seven miles an hour

A Notable Japanese Salvaging Operation





The

Atagosan Maru

The Japanese steamer Atagosan Maru was stranded in August, 1918, during a storm which drove her high on the rocks on the shores of the Inland Sea. The Uno Shipbuilding Works of the Mitsui Bussan Kaisha undertook the salvaging of this vessel. The above views show graphically the difficulties involved in this undertaking. A foundation of rock was erected on the offshore side of the ship, ways were constructed, and she was wedged up into position and her broken plates and frames thoroughly repaired. When this job was completed the vessel was launched just as if she had been built on this spot, the work being completed in May, 1919, at a total cost of 1,000,000 yen. The Atagosan Maru is a well decked freighter of 6800 d. w. t. capacity.

Japanese Marine Notes

By Special Correspondent

THE Kokusai Kisen Kaisha, or International Steamship Company, which was organized by Kakichi Uchida, former vice-minister of communications of Japan, is now under way. When the formal organization meeting was held in Kobe, July 1, yen 25,000,000, or one-fourth of the capital, had been paid in. Yoshitaro Kawasaki, vice-president of the Kawasaki Dockyard Company, was elected president, but it was anticipated that ill health would cause him to decline the post, in which event it will be proffered to Kojiro Matsukata, president of the Kawasaki yard, which contributed about one-half the 500,000 tons of shipping. Half this tonnage was to be turned over August 1 and half February 1, 1920. The cost of this tonnage was yen 175,000,000, or yen 350 a ton, half of which was paid for in cash and half in shares of the company. Of the yen 87,500,000 in cash needed, the finance department of the Japanese government agreed to advance yen 25,000,000, and the remaining yen 62,500,000 was taken care of by the Japan Industrial Bank, the Daiichi Bank, the Daijugo Bank and the Naniwa Bank. The governmental advances will be made in two equal installments when the vessels are taken over and will be secured by debentures issued by the Japan Industrial Bank. Debentures for public subscription will be issued by the other four banks. For the first year or so of its existence, the K. K. K. will charter vessels; thereafter, it probably will operate them.

From what justly may be characterized as despondency, Japanese shipping men have emerged into a mood of pronounced optimism. This is reflected in shipbuilding, which, probably more in Japan than elsewhere, takes its tone from operations. Tonnage in Japan fell to about yen 300 after the signing of the armistice, but at the mid-year new orders were being placed at yen 320 and 330. The extraordinary demand of Europe for tonnage to transport foodstuffs (which, it may be remarked, was anticipated by Messrs. Suzuki long before the Japanese public in general knew what was happening, or about to happen) has contributed greatly to this optimism; and, besides, Japanese shipping men have become convinced that the "world shortage" of tonnage is an immediately real fact, and this also helps. At the mid-year, more than 600,000 tons had been diverted to Europe; more tonnage was required; and, with the consequent withdrawal of tramp tonnage from other routes, rates in general became firmer. Sales to France, at yen 360 a ton, were reported. The Nippon Yusen Kaisha was concerned with other rumors, which represented it as seeking to buy Kawasaki Dockyard tonnage and as placing an order with the Yokohama Dockyard Company for 100,000 tons; the Toyo Kisen Kaisha's three new steamers of 30,000 tons each, regarding which there is little definite, also was a considerable factor; and the Tokyo Kaiun Kaisha and Nippon Kaiun Kaisha had placed orders, it was reported. The Japanese newspaper, Chugai Shogyo, stated that the Mitsubishi yard quoted yen 270 a ton; the Osaka Iron Works and Kawasaki, about 300; the Yokohama Dockyard from yen 300 to yen 320; Uraga, Uchida and Ishikawajima, yen 310 to 320. The low Mitsubishi price, as given by the Chugai Shogyo, was due to its supply of materials from its Korean iron works. However, it had heavy naval orders, and, at the mid-year, when these prices were published, could not accept orders until September.

A 15 per cent mortality rate in accident cases is reported by the Japanese Department of Agriculture and Commerce. The accident rate was high for 1918. There were 12,227 injured men and 99 women. Men killed were 251, and women, 25. After engineering and similar factories, shipyards and car shops led in accidents. In shipyards, falls were frequent; and, of all accidents, 60 per cent was due to this. The Osaka district was first in all Japan, as is to be expected from its industrial leadership.

The Department of Communications announced that twelve steamers of more than 1000 tons each, aggregating 53,830 tons gross, were launched in June. This was a decrease of two vessels as compared with June, 1918, but an increase of 22,782 tons. The Kawasaki yard was first with four vessels.

According to the Mitsui Bussan Kaisha, there are 865 cargo vessels of more than 500 tons each, 1,800,240 tons gross, under the Japanese flag. This is an increase of 312 ships and 484,704 gross tons since the middle of 1918. The Mitsui calculations give the following cargo vessels and gross tonnage owned by companies (holdings less than 20,000 tons excluded): Nippon Yusen Kaisha, 47 vessels, 220,281 gross; Osaka Shosen Kaisha, 49, 151,727; Kawasaki Kisen Kaisha, 16, 89,605; Mitsui Bussan Kaisha, 26, 60,373; Tatsuma Kisen Kaisha, 13, 55,400; Yamashita Kisen Kaisha, 21, 55,414; Kishimoto Kisen Kaisha, 14, 46,598; Uchida Kisen Kaisha, 16, 45,650; Kstsuda Kisen Kaisha, 10, 39,997; Hashimoto Kisen Kaisha, 15, 29,306; Kusakabe Gomei Kaisha, 18, 25,707; Teikoku Kisen Kaisha, 9, 25,356; Towa Kisen Kaisha, 11, 22,750; Mitsubishi, 11, 21,478; Taisho Kisen Kaisha, 4, 21,373; S. Nakamura, 14, 20,833; Liaotung Kisen Kaisha, 5, 20,128. The Kawasaki Kisen Kaisha was established in 1919 and is affiliated with the Kawasaki Dockyard. The Osaka Shosen Kaisha made the greatest gain—six vessels, aggregating 89,000 tons. The Teikoku Kisen Kaisha increased by eight steamers—24,000 tons' gain.

It is reported that the Japanese navy department has decided to build two battlecruisers of 40,000 tons each, providing for the necessary expenditure in the budget for the next fiscal year, in addition to light cruisers and auxiliary ships. The plan, as outlined by the Japanese newspapers, is to make the high seas fleet consist of eight battleships and eight battlecruisers, the latter to cost about yen 1500 a ton or yen 12,000,000 for the two new vessels. The figures of tonnage, which are exceedingly large, are merely repeated from the vernacular press for what they are worth. The program would be carried out by the end of 1923. Seven or eight gunboats for use on the Yangtse also are proposed, it is reported. Two battleships, three light cruisers, ten destroyers and a "certain number" of submarines, most of which are to be built at private yards, are on the program to be completed in 1923.

In an address before a gathering of marine officials, Mr. Hara, vice minister of communications, stated that the merchant tonnage of Japan, including that registered in colonies, aggregated 2,419,928 tons, 11,943 vessels, at the end of 1914; and that the number of vessels at the end of 1918 was 16,676, 3,388,085 tons—an increase of about 40 per cent in both numbers and tonnage. Not a single good passenger steamer, he said, was built during the war, only standardized freighters being constructed. Ships amounting to about 400,000 tons gross were on the ways when he spoke.

In connection with Mr. Hara's address, it is interesting to note that the independent, unsubsidized lines, or "shagaisen" as they are known, have increased greatly since the war, thus giving Japan a tramp fleet of large proportions. Companies owning more than 10,000 tons deadweight number forty-six; and they have, in all, 379 steamers of 1,540,571 tons. The Kawasaki, Mitsui, Yamashita, Tatsuma, Katsuda, Kishimoto and Uchida companies head the list.

An official of the department of communications states that the government will await the policies of Great Britain and the United States before announcing its attitude toward a shipbuilding subsidy, suspended during the war. The government steel works at Yawata are being extended, he said, and this work will be completed in 1920, giving the works an annual output of 700,000 tons a year; but the total output of the whole country is not sufficient to meet one-half the home demand, which forces Japan to depend upon other nations for steel. This is a pronounced factor tending toward a continuance of the building subsidy.

A conference of the Pacific Mail agents in the Far East was held in Shanghai during July. It was presided over by D. A. Young, general passenger agent, San Francisco, and was attended by W. W. Campbell of Yokohama, M. H. Hunt of Kobe, P. H. Morton of Manila, W. L. Johnstone of Shanghai, P. O. Sheppard of Hongkong.

Nagasaki, Atsuta and Abashiri harbors are to be improved. Nagasaki breakwaters will be rebuilt and harbor and land communications bettered. The two first-named ports only will draw upon an appropriation of yen 5,000,000 for the next fiscal year, Abashiri having to wait.

The Yokohama municipality has announced the following population figures as of December, 1918: Tokyo, 2,331,860, a decrease of 75,352 as compared with 1917; Osaka, 1,633,338, an increase of 75,000; Kyoto, 668,930, an increase of 15,185; Kobe, 591,193, an increase of 33,074; Yokohama, 446,027, a decrease of 14,213; Nagoya, 433,701, an increase of 13,953.

It is reported that the Nippon Yusen Kaisha freight service to the West Coast of England will be made permanent, the London Freight Conference having acceded to the Nippon Yusen Kaisha's request. There will be one sailing each four weeks. Prior to the war the Nippon Yusen Kaisha vessels went only to London. The Nippon Yusen Kaisha and Osaka Shosen Kaisha have done away with the bonuses granted crews of vessels traversing the war zone, except for crews of vessels plying between the Orient and Europe via the Mediterranean. Another increase in freight rates, this time of 30 per cent, on cargoes to Europe, effective September 1, has been announced by the Nippon Yusen Kaisha. An increase of 40 to 50 per cent was made effective August 1. These increases apply only to unsubsidized steamers. A 30 per cent increase in trans-Pacific rates, to $12 on general cargo, was announced early in July by the T. K. K., O. S. K. and N. Y. K., following an increase in June.

Marine insurance in Japan met with a decline when shipping fell off after the signing of the armistice. At the end of 1918 contracts aggregated yen 2,067,816,000; the total fell to yen 1,900,090,700 at the end of January and to yen 1,834,286,000 at the end of February.

With the improvement in shipping, however, insurance picked up. Contracts reached yen 1,923,826,000 at the end of March, 1919; and yen 2,000,651,000 at the end of May. The greatly improved shipping situation is expected to react immediately and favorably upon marine insurance, but the more important Japanese companies, including the Tokyo Marine and Fire, Teikoku and Yokohama are branching out and expect their foreign business to aid them.

Japan's Foreign Trade in 1919

In five months, January-May, 1919, Japan's exports decreased and her imports increased as compared with the corresponding period of 1918. However, after April the excess of imports over exports, or the unfavorable balance of trade, began to decline. These statistics, issued by the Department of Agriculture and Commerce, tell the story:

	January to June, 1919 Yen	January to June, 1918 Yen
Exports	826,057,000	896,055,000
Imports	1,049,332,000	839,418,000

The principal items of imports and exports were:

Exports

	1919 Yen	1918 Yen
Foodstuffs	43,344,162	86,811,813
Raw materials	29,667,208	44,522,291
Part-manufactures	262,194,524	287,121,903
Manufactures	322,389,061	317,827,409

Imports

	1919 Yen	1918 Yen
Foodstuffs	137,709,336	36,085,784
Raw materials	478,906,829	407,154,380
Part-manufactures	152,764,494	186,275,689
Manufactures	98,072,575	63,096,962

Foodstuffs, raw materials and partly-manufactured goods exported fell off. Manufactured goods gained slightly, but not nearly enough to offset other losses. Foodstuffs, raw materials and manufactured goods (the last being principally machinery, paper, cotton cloth and petroleum) imported showed a gain. The lifting of embargoes by foreign countries, the larger supply of tonnage, the placing of new orders abroad and the fulfillment of old, the high prices of rice, the prosperity of the spinning industry, all contributed, the department states, to the large imports. The excess of imports over exports is discounted by the statement that the whole foreign trade of the world has been in a state of reorganization since the signing of the armistice in November.

A World Record in Shipbuilding

DURING the month of July just passed the Bethlehem Shipbuilding Corporation, Ltd., established a world's record for ship deliveries by completing and delivering to their owners nineteen vessels, consisting of ten 35-knot seagoing torpedo boat destroyers and two large submarines for the United States Navy; five large tank steamers and two oceangoing tugs for the United States Shipping Board Emergency Fleet Corporation.

Such a record has never been approached by any other shipbuilding company in the United States or Europe. During the same month all of the other American shipyards combined, some thirty-five, delivered only sixty-seven vessels, including destroyers and submarines, or an average of less than two ships a yard. The largest number of vessels delivered during the same period by any other single corporation was only eight ships, while from all the other yards building naval vessels, but three destroyers and one submarine were delivered.

When it is understood that all the engines, boilers and deck machinery required for these nineteen vessels were built by the Bethlehem Corporation, as well as the complete hulls, some idea of the magnitude of this accomplishment can be gained, especially when it is realized that for the destroyers alone Curtis turbine engines, totaling over a quarter of a million shaft horsepower were constructed, and also the Yarrow type water-tube boilers necessary to generate this vast volume of steam.

The fact must not be overlooked that it was necessary for every piece of material used in building these vessels to pass the rigid government inspection which, in the case of the destroyers and submarines, is the most exacting inspection known, and each vessel successfully underwent the severe government trials before being accepted for delivery.

To supply the shipyards with the steady flow of material necessary for the accomplishment of such rapid construction was in itself a record, as over 78,000 tons of material were used, requiring over 1500 freight cars, which would make a freight train over eighteen miles long, that is, a train stretching from the Grand Central almost to Tarrytown, New York. If all of the nineteen ships were anchored end to end in the Hudson River, they would make a parade over one mile long, or from 110th Street to 130th Street.

The building of these vessels was carried out on a regular eight-hour schedule and not under highly intensified war production conditions, so that the large number of deliveries seems all the more remarkable and can give some idea of what our country was preparing for the Hun submarines during 1919, as under war conditions these deliveries would have been materially increased.

The scientific construction of seagoing 35-knot torpedo boat destroyers has been so efficiently developed by the Bethlehem Shipbuilding Corporation, Ltd., that a destroyer has been completely built and delivered to the government in 174 working days. Such type of vessel took approximately one and a half years to build before the war.

July is a month of records for the Bethlehem Shipbuilding Corporation, Ltd., for in July of last year the Union plant of this corporation, located at San Francisco, launched a 12,500-ton freight steamer—the Invincible—in twenty-three working days and twenty-three working hours, and delivered this vessel in sixty-six working days from the laying of the keel, establishing another world's record, as over 3500 tons of steel were fabricated and over 1,000,000 rivets driven in the building of said ship.

At the present rate the Bethlehem Shipbuilding Corporation, Ltd., would deliver over one-fourth of the steel vessels completed in America this coming year, and two and one-half times as many vessels as any other shipbuilding company. Such production can only be obtained by a highly efficient organization having at its disposal the most up-to-date facilities for the manufacture of all articles needed in the construction of ships. The co-ordination of all the Bethlehem shipbuilding interests in one central office at Bethlehem has made such an organization possible.

THE S. S. MAUI AS A TRANSPORT

THE S. S. Maui, which was built in San Francisco by the Union Iron Works for the Matson Navigation Company and originally operated as a passenger and freight liner between San Francisco and Honolulu, has made an excellent record as a government transport.

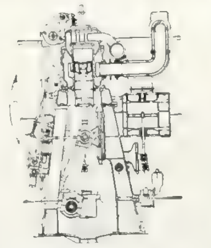
This splendid steamer is 501 feet long overall; her displacement is 17,500 tons, and her full speed, loaded, is 17½ knots. She has twin screws and is driven by two Westinghouse compound geared turbines, totaling 12,500 shaft horsepower.

She was among the first steamers to bring American soldiers back to the United States and when she entered New York harbor on January 25, with over 3000 troops, she received an ovation that will long be remembered.

She also distinguished herself when she brought 3600 members of the 28th division to Philadelphia in May. Almost all of these boys came from the neighborhood of Philadelphia, so the whole city was awaiting their arrival and a regatta had been planned. The crew of the Maui, however, decided that this was a good occasion to demonstrate what the boat could do, so as soon as the official reception steamers were met, some distance down the river, they put on full steam. As a result, the great steamer swept up-stream at 17½ knots an hour leaving all the welcomers away in the rear, scaring off with her wash all the small craft that swarmed out to greet her, and arriving an hour ahead of schedule time. On leaving Philadelphia, she went to Brest for another load of soldiers and was back in Newport News within twenty days.

Much of the credit of the Maui's excellent performance is due to Chief Engineer Lieutenant-Commander Alexander Ryan, U. S. N. R. F., who has been in command of her ever since she was first taken over by the government.

Oil Engines and Motorships



Lubrication of Diesel Engines

THE correct lubrication of Diesel engines is unusually difficult on account of the combination of high pressure and temperature within the cylinder and the high bearing pressure to be dealt with. The oil is subjected to severe service conditions such as contamination from impurities in the intake air, contact with high temperature combustion and carbon particles resulting from imperfect combustion, oxidation, the breaking down effect of continuous circulation in the lubrication system and, in some cases, from water gaining access to the oil. All of the foregoing conditions are the rule rather than exception so that the selection of a suitable oil and constant vigilance on the part of the engineer are necessary to continuous and economical operation.

In many cases an enforced shut down and repair will incur a loss greater in amount than the entire item of lubrication for a year, and even a minor interruption of service will cost more than the difference in the cost of a year's supply of high grade oil over one of inferior quality.

Experience has proved that only by the use of the correct grade of high quality oil, specially selected to suit the operating conditions of the engine and applied in the correct manner, in the right place and in the proper quantity, will the engine operate at highest efficiency, with minimum wear.

Lubrication Systems

The lubrication systems or combinations of systems usually applied to Diesel engines are: Mechanical force feed to the piston, and ring oiled main bearings; mechanical force feed to the pistons and pressure circulation to bearings; or mechanical force feed to the pistons and gravity feed circulation to bearings.

The cylinders and pistons of all Diesel engines are lubricated by mechanically operated lubricators. On some vertical engines the oil is introduced at several points around the cylinder, some at four and some at six points. Others have only two leads per cylinder, one at the front and one at the rear. In some types a single lead from the lubricator is later branched to two or three points and oil distribution is obtained by reducing the size of the outlets in an attempt to give each feed the right amount of oil. This is an unsatisfactory arrangement, because the oil cannot be depended on to distribute itself uniformly by this means.

In relation to the cylinder length all leads are so placed that they deliver oil to the piston between the first and second, or second and third piston rings when the piston is at the extreme outward end of the stroke.

From a lubricating standpoint the piston of the Diesel engine is one of the most vital parts. Unsuitable oil, or overfeeding develops deposits on the piston head and behind the piston rings in the form of a black, oily coating that soon causes the piston rings to cement in their grooves. As a result the rings do not function and the gas blows past the piston, removing the oil film from the cylinder wall, excessive wear takes place on the piston rings and cylinder wall and in extreme cases the piston may seize.

Exhaust valve spindles should be sparingly lubricated. This can be done by hand or by a mechanically operated lubricator. Overfeeding, or the use of an unsuitable oil will cause carbon to deposit on the spindle and spindle guide and the action of the valve will be sluggish.

Overfeeding oil to the power cylinder will cause serious trouble with the exhaust valve; the oil will combine with the impurities in the fuel or particles from the combustion of the fuel oil and the tarlike mass will deposit on the face of the exhaust valve, causing it to leak and become scored and ultimately both valve and seat will be destroyed.

The piston pin is subjected to the following extremely difficult lubricating conditions: high temperature due to its enclosed location, poor radiation of heat, heavy pressure, as well as the slight pendulum motion of the connecting rod. All of these factors make difficult the formation of an oil film on the piston pin except by the positive method employed in the pressure circulation system. The oil spreads with difficulty over the bearing surface; consequently, it is advisable, even essential, to use an oil possessing great staying and lubricating qualities.

When the gravity feed circulation system is used

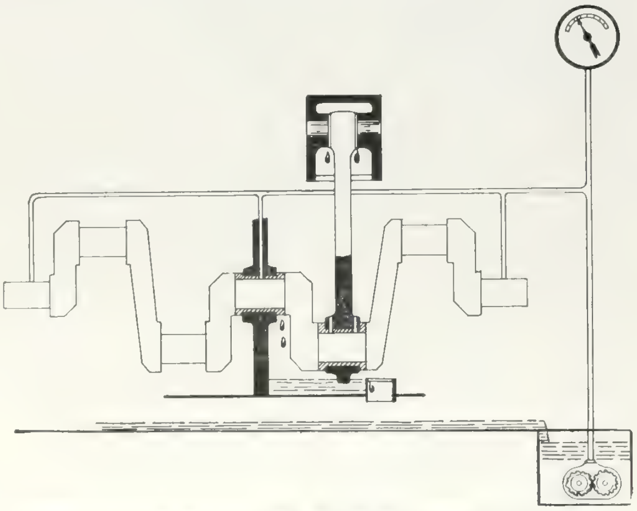


Diagram illustrating force feed and splash piston of lubrication for bearing lubrication, there is sometimes difficulty in securing an adequate supply of oil to the piston pin of a trunk type piston.

With the force feed lubricator, on one type of vertical engine, oil is supplied to the piston pin through a lead in the cylinder wall to a vertical "V"-shape groove machined in end of piston pin. The oil flows from the bottom of this groove through a drilled hole in the piston wall and enters a drilled hole leading to the center of the piston pin.

With a gravity circulating system, on one type of vertical engine, a special device is used which forces oil to the piston pin. A tube is rigidly fastened to the piston and is equipped at the bottom with a ball check. As the piston approaches the lower end of its stroke, the tube engages a fiber plate which has a spring adjustment and two ball checks. The object of the spring is to hold the plate in contact with the tube while the latter receives the required amount of oil. This oil displaces a similar amount at the upper end of the tube from which it is delivered to the piston pin bearing. Oil is supplied to the lower part of the apparatus from the gravity circulating system.

Ring oiled main bearings, as a rule, give little trouble and should run fairly cool. If the bearing temperature is high, it may be due to the use of an improperly selected or poor quality oil, to mechanical defects in the bearing, or mis-alignment. When using an inferior oil it must be changed every few weeks, whereas high-grade oil may last indefinitely with no appreciable loss. When inferior oil is used and the working temperature is high, additional oil is fed to the bearings daily, but even this fails to cool them, besides being wasteful and unsightly, as the oil will overflow from the bearings.

The crosshead of the open type Diesel engine requires special attention. The pressure forces acting on the pin and the crosshead shoes and the crosshead guides are large. Because the crosshead guides are in a vertical position, it is difficult to maintain an oil film on the surfaces.

The wrist pin is difficult to lubricate because the connecting rod has only a small angular motion, which produces oscillating or semi-rotary motion between the wrist pin and its bearing so that it is difficult to get a complete and uniform distribution of oil. In the two-stroke type there is an additional factor, in that the pressure is never relieved, being always maintained in one direction. Oil, having superior lubricating properties, is therefore required to maintain an oil film on the pin under these conditions.

The correct lubrication of the cam shaft, worm gear and governor shaft is essential to good operation. These parts are subjected to exceptional wear, but the importance of having them well lubricated is often overlooked by operators. The bearings are usually supplied with automatic devices to eliminate hand oiling, such as ring oilers, wipers, etc. The shaft is usually enclosed to prevent oil throwing. The lower part of this case holds oil to a sufficient height to permit the cams to dip into it, thereby furnishing ample lubrication. The worm gear that drives the cam shaft is lubricated in an oil bath or from a supply of oil from the circulating system.

Air Compressor Lubrication

The internal or cylinder lubrication of air compressors used in connection with the Diesel engines is a difficult problem. The tendency is to use too much rather than too little oil.

Oil is subject to oxidation from the highly heated compressed air. If an excessive amount of oil, or an unsuitable oil, is used, the oxidation results in the formation of a carbonaceous deposit which accumulates principally on the pistons and valves. The valves must work quickly and even a slight deposit may make them sluggish or stick. Under these conditions the air is wire drawn through the valves and may heat to a temperature of 1000 degrees Fahr. or more. The carbon deposit then becomes incandescent and the vaporized lubricating oil will flash. Unless relief of pressure can take place, the pressure air line and storage tanks are subject to rupture at the weakest point. It therefore becomes necessary to use a high-grade, specially manufactured oil which has only a slight tendency to carbonize, and even this oil must be used sparingly.

The mechanical force feed is the usual method of lubricating air cylinders, but sight feed cups are also sometimes used. Oils must be fed uniformly but sparingly to the low-pressure piston. The air may as a rule be depended upon to carry sufficient oil from the low-pressure stage to lubricate the intermediate and high-pressure pistons, also, but in large compressors these pistons are often directly lubricated.

Oil

The lubricating oils used on Diesel engines greatly influence their operation. High-grade oils, specially suited to Diesel engine requirements and properly applied, will reduce friction losses to a minimum. With a high-grade oil the formation of a carbonaceous deposit is reduced by reason of the superior quality of the oil and the smaller quantity necessary to procure complete lubrication.

Oil too heavy in body will result in poor distribution demanding an excessive consumption and will also produce excessive carbonization in the cylinders, particularly behind and between the piston rings; the friction loss will be high.

Oil too light in body will fail to maintain a complete oil film on the bearings and on the cylinder wall, the immediate result being overheating and excessive wear of all parts.

Reduction in friction loss: Owing to the high speed, great pressure and large rubbing surfaces of Diesel engines, the power loss in friction is always high, from 8 per cent in the case of large medium speed to 25 per cent in small high-speed engines. With the use of high-grade, specially manufactured oil, the friction loss will be reduced and the engine will operate at its highest efficiency.

With the continued use of the correct oil as compared with inferior or improperly selected oil, the cost of renewals and repairs will be much reduced and the certainty of operation greatly increased. There will be less likelihood of a breakdown and the engine will have a longer life, due to the full and efficient lubrication obtained.

Temperature conditions severe: The internal lubrication of a Diesel engine demands an oil that will, under high temperature conditions, furnish and maintain a perfect lubricating film and in addition will maintain a perfect seal for the piston. In the Diesel engine cylinder a temperature of approximately 3000 degrees Fahr. is developed during the combustion of the fuel, the temperature decreasing with expansion, the average temperature being

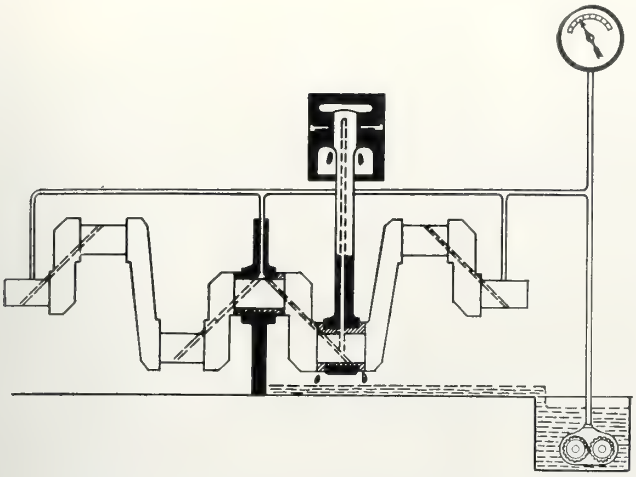


Diagram illustrating force feed piston of lubrication

about 1700 degrees Fahr. during the power stroke. The crank chamber of the box frame type engine is enclosed and the heat radiated from the piston and cylinder wall is largely retained in the crank chamber, so that the oil in the crank chamber reaches a temperature from 120 to 160 degrees Fahr. Where the temperature exceeds 140 degrees Fahr. the life of the oil will be much reduced and it may in time throw down a dark deposit.

Oil must be kept free from impurities: It is important that the oil in a circulation system, and particularly in a small system where the oil is rapidly circulated, be kept free from impurities of all kinds, including water. The presence of water usually indicates leakage from the cooling apparatus. Sometimes this leakage is promptly detected, but a small leak in an engine operating twenty-four hours daily may not be noticed before the oil has become badly contaminated. The presence of even a small amount of water in the lubricating system calls for prompt attention and action, and arrangements must be made for draining off the water.

Water generally contains impurities that have a corroding effect, which is a serious matter in every case. Another difficulty is that when subjected to rapid circulation, especially in a small system, the oil and water combination forms an objectionable mixture which clogs the screens, forms a slime on the cooling coils, and accumulates in the clearance spaces throughout the system. This mixture gradually becomes hard and in some instances causes a partial stoppage of the oil pipes. In such cases the increasing temperature of the bearings indicates an insufficient oil supply and this in turn demands an immediate shutdown to thoroughly cleanse the system.

Oxidation: The oil in passing through the bearings is subjected to heavy pressure and high temperature and in circulating is exposed to the action of the air. The result of continued use under extreme conditions is oxidation, indicated by darkening color, slight acidity, increasing viscosity and gravity.

In engines with cylinders mounted directly on the crank chamber, a dark carbonaceous substance from the pistons will find its way down the cylinder wall and fall into and contaminate the oil in the crank chamber.

All circulating systems should contain a screen or sieve to prevent the passage of comparatively large particles of foreign matter. A filter is necessary in addition, to take out the finer impurities from the oil which the screen is unable to remove. A filter usually forms a part of the lubricating oil circulation of Diesel engines.

Daily oil treatment: It is advisable to remove a certain amount, say two to six gallons of oil from the circulating system each day and treat it in a heated separating tank to remove carbon and other impurities, afterward passing the oil through a good filter. The purified oil can be returned to the system, with a little fresh oil, at the time a corresponding amount of oil is taken out for treatment. Where the quantity of oil in use is small, this practice is particularly desirable. In this way the vitality of the oil is kept up to as high a standard as possible and its life greatly prolonged.

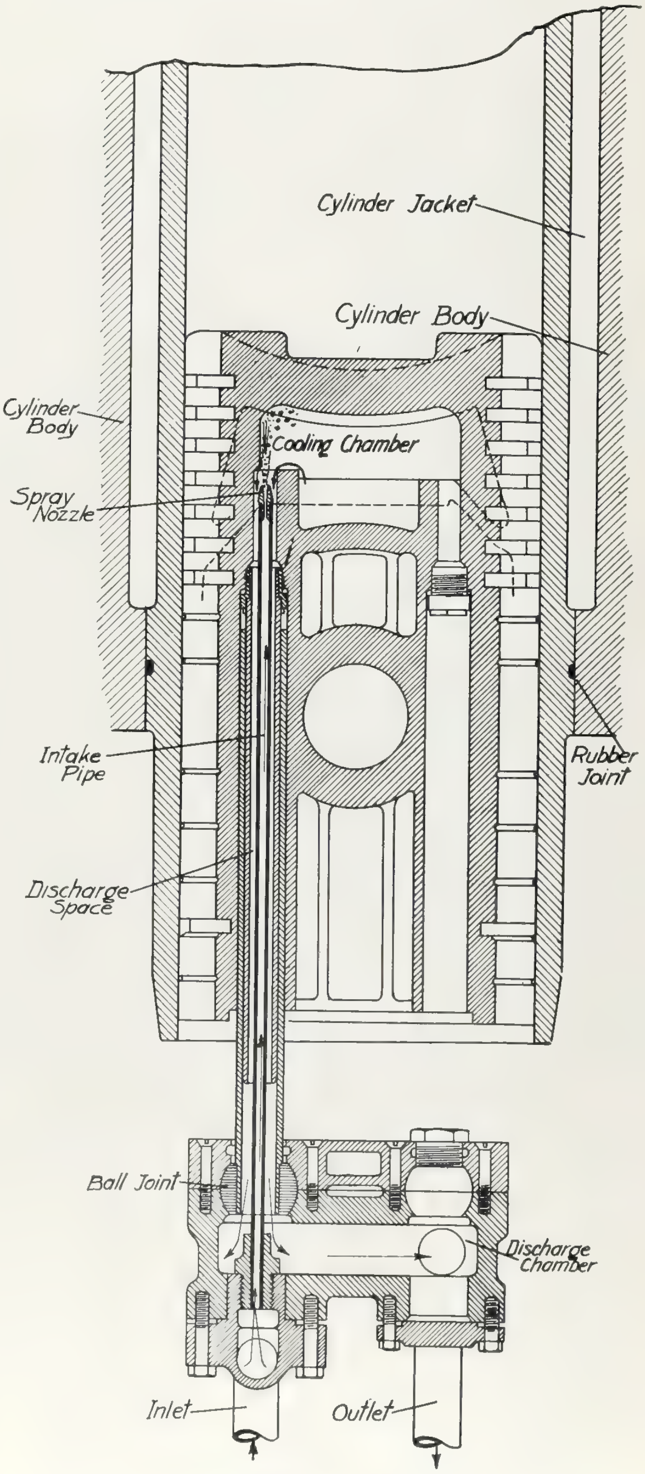


Diagram illustrating cooling arrangement for the pistons of Diesel Engines

The deposit found in the cylinder on the piston and elsewhere is generally, but not always correctly, called a "carbon deposit."

Oil charred in piston head: Carbon may be formed within the hot hollow trunk piston when oil from the piston pin or elsewhere is thrown into it and the high heat encountered carbonizes or chars the oil. This carbon when mixed with the lubricating oil in the crank case forms a sludge that is injurious and difficult to separate or filter out.

The cause of carbonaceous deposit in the cylinder may be one or several of the following: Overfeed of oil, unsuitable oil, impurities in the intake air, impurities in the fuel, unsuitable fuel, or incomplete combustion.

Excess lubricating oil passing to the cylinder causes a deposit to form within the cylinder, on the piston and behind and between the piston rings.

Unsuitable oil fails to provide satisfactory lubrication, even if used in excess. It chars freely, combines readily with fuel impurities and the products of incomplete combustion, forming a hard, crust-like deposit.

Impure intake air: Intake air is usually not filtered, even when engines are using dust-laden air. This frequently causes a so-called carbon deposit. In such cases an examination will prove the presence of sand, charred oil, due to the action of the impurities of the oil under high temperature and also a percentage of iron oxide, due to the wear of the piston rings and cylinder wall.

Impurities in the fuel: When the fuel oil contains too much free carbon and ash, the unburned impurities will deposit themselves on the cylinder wall and, adhering to the lubricating oil, will form a deposit which will cause the cylinder wall and piston rings to wear excessively.

Water in the fuel will cause irregular fuel charges and interfere with proper combustion, the result being irregular running, even mis-firing and the formation of a deposit in the cylinder.

Excess sulphur in the fuel will cause the wearing surfaces to blacken and may cause the internal parts to corrode.

Fuel containing too much asphaltum, or that is too thick to flow readily, will not atomize properly or burn completely. The unburned portions will accumulate on the piston top, behind and between the piston rings and form a hard, carbonaceous deposit. Low heat value and low hydrogen content are indications of an unsuitable fuel.

Combustion should be complete: In order to obtain a complete combustion, it is important to maintain the correct proportion of air and fuel and that the injection air pressure be correct for the fuel used. Incomplete combustion may be due to the blast pressure being too high or too low, to the fuel valve being out of order, or to the use of an unsuitable fuel.

It will be seen from the foregoing that correct lubrication is of vital importance to the satisfactory operation of Diesel engines. Diesel engine operators realize this fact and it is hoped that the suggestions itemized here will help in the analysis of future lubrication difficulties.

PROPOSED DIESEL INSTALLATIONS FOR WOODEN STEAMERS

MANY proposals have been made for altering the wooden steamships built by the Emergency Fleet Corporation so as to make them profitable freight carriers in economic competition for world commerce. Pacific Marine Review has been intensely interested in this matter, and has always maintained that these ships, if properly powered with internal combustion engines, should prove a profitable investment for the ship operators. We are very glad, therefore, to publish the following proposal for a Diesel installation for the Ferris type of wooden ship, based upon their equipment, with two 480 shaft horsepower N. L. S. E. Co. Diesels as proposed by the New London Ship & Engine Company. These Diesel engines could be installed in the afterpart of the ship, eliminating a shaft tunnel and giving free open cargo holds.

Comparison of Diesel and steam installations by weights, radius assumed as 4000 miles:

Speed of ship with 1400 I. H. P. steam installation taken as 10 knots.

Speed of ship with two 480 S. H. P. Diesels taken as 9¼ knots.

Weight of steam propelling machinery	275 tons
Weight of reverse feed water	80 tons
Coal for 4000 miles of 1.8 pound per I. H. P. per hour	450 tons
	805
Total deadweight with steam installation	3420 tons
Cargo deadweight 3420 (450/80) steam	2890 tons
*Diesel machinery, two 480 H. P. @ 240 R. P. M. and accessories	150 tons
Fuel oil at 0.5 pound per S. H. P. per hour	93 tons
Lubricating oil	7 tons
	250
Saving over steam installation (805/250)	555 tons
Gain in cargo deadweight over steam	555 tons
Cargo deadweight with Diesel machinery	3445 tons
Percentage gain of cargo deadweight over steam installation	19%

It is assumed in the above that the weight of fuel tanks in the Diesel installation is the same as the weight of bunker construction and reserve feed water tanks in the steam installation.

Comparison of Diesel and steam installations by volumes:

Volume occupied by 450 tons of coal	20,300 cu. ft.
Volume occupied by shaft alley	1,200 cu. ft.
Volume occupied by feed water	2,900 cu. ft.
	24,400 cu. ft.
Volume occupied by 100 tons of fuel and lubricating oil	4,100 cu. ft.
Volume gained by Diesel over steam	20,300 cu. ft.

The above figures do not allow for the gain in cargo space due to the smaller space occupied by the Diesel engines. This gain would be considerable; but on account of the incomplete data at hand it has not been calculated.

* This weight includes donkey boiler, generating set and reverse feed water for donkey boiler.

Motor Shipbuilding in Europe

By Special Correspondent

ALL matters connected with shipbuilding in Germany are naturally of great interest to shipowners and shipbuilders in the United Kingdom at the present time, owing to the fact that the Germans will have to hand over a large proportion of the tonnage built by them in the next few years. It is therefore a matter of considerable significance that a large company has been formed in Germany, which has the sole manufacturing rights of the well-known Burmeister and Wain Diesel engine, which is built under license in the United Kingdom by Messrs. Harland and Wolff and in America by Messrs. William Cramp and Sons. What is, however, more interesting still is that this German company is controlled by the Hamburg-American Line and the well-known engineering firm, the A. E. G. It is understood that a large shipbuilding and engineering yard will be established at Hamburg and that standard motor vessels with a deadweight carrying capacity of 10,000 tons will be constructed, fitted with two oil engines of 2000 i.h.p. each. It will thus be seen that these ships are of almost identical type to those being built under the United States Shipping Board in which Burmeister and Wain engines built at Copenhagen will be installed. Incidentally it may be remarked that the first pair of these engines has recently been shipped from Copenhagen.

Eight Motorships for the Glen Line

With the coal position becoming worse and worse in Great Britain it is not surprising that more attention is now being turned by shipowners to the possibilities of the motor vessel than for some time past. Steamers are already being held up for want of coal, and what the position will be in two years' time no man can tell. The Glen Line is hastening its programme of motor ship construction, and by the end of 1920 it will have added another four 10,000-ton deadweight carrying capacity ships and four 13,000-ton vessels to its fleet, making an addition of 92,000 tons which, owing to the reduction in weight and space of oil engines as compared with steam engines, is equivalent to 100,000 tons of steam shipping.

It is not difficult to show the enormous saving which will be effected by these vessels which are all to be placed on the Eastern run, trading to Hongkong or Vladivostok via Singapore. They will bunker at Singapore only, taking oil at a price of about £3 per ton, whereas steamers would have to pay £2 10s per ton for coal at British ports, and £6 to £7 per ton at Port Said or Suez, the average for the voyage being probably about £4 per ton. As the motor vessel will burn between one-quarter and one-fifth of the weight of fuel of a corresponding steamer it will be seen that the saving on the fuel bill alone is enormous, in addition to which there is the extra cargo carrying capacity and the reduced engine-room staff of the motor vessel.

Enlargement of Diesel Engine Works

In order to cope with the increasing demand for oil engines for motor ships the engine-building works of Messrs. Harland and Wolff at Glasgow, where their Diesel engines are built, have recently been enlarged and equipped with special machinery, so that they now form probably one of the finest factories for the construction of Diesel engines throughout the world. It is rumored, however, that Lord Pirrie, the head of the firm, who is a confirmed believer in the motor ship, intends to build large passenger liners fitted with oil engines, and in order to effect this, some still larger shops are being erected at Messrs. Harland and Wolff's works at Belfast, in which Diesel engines will be built of very much higher power than those which are now being constructed at Glasgow.

An indication of the progress of standardization and consequent rapidity of construction of oil engines for motor ships is given by the fact that there are now several sets of oil engines awaiting installation in vessels for which the hulls are not yet completed. This applies, however, only to those relatively few firms which have had sufficient practical experience in the construction of oil engines that they are able to standardize one or two types upon which they can concentrate their whole energy of production. For instance, Messrs. Harland and Wolff standardize two types, one a six-cylinder 1800 i.h.p. engine with cylinder bore of 670 mm., and a stroke of 1000 mm., running at about 120 r.p.m., and the second an eight-cylinder motor developing 3200 i.h.p. with cylinders 750 mm. in diameter and a stroke of 1100 mm., the speed of revolution being also 120 r.p.m. With a standard 10,000-ton deadweight capacity ship two sets of the former type give a sea speed of 11 knots, whilst in a 13,000-ton standard hull two of the 3200 h.p. sets drive her at a speed of 12½ knots. These may be taken to represent the standard types of motor ship which will be most constructed in Europe in the next few years.

Prominent Shipowners Ordering Motor Ships

As showing the practical interest now being taken by British shipowners in motor vessels, a list may be given of some of the more prominent shipowners who are now either running motor ships or have some on order. These include the Glen Line, the Bibby Line, Messrs. Lamport & Holt, The Anglo American Company, The Anglo Saxon Steamship Company, The Atlantic Transport Company, The Government of Western Australia, The Union Steamship Company of New Zealand, and the Elder Dempster Line. It will be seen that these firms are fairly representative of owners of ships sailing under the British flag and it may be noticed that the engines represented in the ships built or ordered by the various shipowners comprise four entirely distinct types.

The Marine Gas Engine

There has always been a desire among certain British shipbuilders to develop the gas engine for marine propulsion, and a few years ago something was done in this direction, although the results were not entirely successful. A new type of gas producer has recently been developed, which appears to be more promising for marine work than any previously manufactured, and it is understood that this will be tried in a short time, experimentally, on a fairly large vessel. Messrs. Armstrong, Whitworth & Company are interested in the venture, but it will naturally take some time before any commercial development may be anticipated.

The Nelseco Diesel in Marine Propulsion

THE New London Ship & Engine Company began the construction of Diesel engines about eight years ago and since that time has turned out a wide variety of sizes and types. Practically all of these engines have been for marine service and by far the greater majority have been of the submarine type, but some attention has been given to commercial work and these commercial engines have been installed in a great variety of types of installations. During the war, the energies of the plant were spent 100 per cent on submarine engines and it was necessary to abandon commercial work entirely for the time being but now that conditions are getting more normal, the construction of commercial engines has been undertaken again and some interesting installations are now under way.

The engines already installed in the past in boats operating on the West Coast show the wide adaptability of the Diesel engine. The first commercial engine installed by the company on the West Coast was in the cannery tender Warrior. This boat has already been in service four seasons. Another cannery tender, the Chomley, also has a 120 horsepower Nelseco engine, which is the same size as was installed in the Warrior, but the Chomley's engine was installed a year later than the Warrior's. The Suquamish, a passenger boat, has a 180 horsepower engine and has seen several seasons' work. The fourth installation was in a tug, the Chickamauga, with an engine of 240 horsepower. The Chickamauga has the reputation of being one of the best boats of her size and power on tht West Coast. There is on the way now to the West Coast a 360 horsepower engine to be installed in a cargo boat. It is of the directly reversible type, while all of the other engines mentioned are fitted with reversing clutches. More details of this new installation will be available later.

The number of engines installed on the East Coast is not only very much greater than that on the West Coast but also represents a much wider variety of uses. There is a 120 horsepower engine in a yacht; a 120 horsepower engine in a passenger and freight boat operating in the West Indies; a 240 horsepower engine in an oil tank boat, named the Cerrito, operating in the Gulf of Mexico; two 240 horsepower engines in a 1500 ton D. W. cargo boat, named the Edith Nute; a 120 horsepower engine in each of the two water boats used at the Atlantic and Pacific ends of the Panama Canal for supplying ships with fresh water, etc., and a large number of 120 and 180 horsepower engines in fishing schooners, operating off the New England coast. The entire list of installations has not been given but just enough to show the wide variety of services and the great adaptability of this type of engine for use under all conditions. Some of the installations mentioned are especially interesting and deserve special notice. The Cerrito, for instance, was an old iron ship which had been sunk in the West Indies for several years. When the great demand for ships came during the early days of the war, this old hull was raised, lengthened, put in first-class shape, equipped with a 240 Nelseco Diesel engine, and as already mentioned, is now doing good service as an oil tank steamer in the Gulf of Mexico. The Edith Nute is a new wooden ship, built in Maine and equipped with twin screw 240 horsepower engines. Her maiden trip was to South America and return, a matter of 16,000 miles, and she has just recently returned from a voyage to France. On both of these voyages the engines gave a good account of themselves and made more than one non-stop run of twenty days or so. The installation of so many Diesel engines in fishing schooners off the New England coast brings to light an interesting situation. Before the advent of the steam trawler, ten years or so ago, the sailing schooner was universally used in the fishing business but as soon as the steam trawlers entered the field, the schooners were threatened with being driven out of business. The installation of internal combustion engines and particularly Diesel engines saved the situation, however, and today it is practically impossible for a purely sailing type of schooner to compete on the fishing grounds with those equipped with auxiliary power. One of these schooners, the Francis S. Grueby, equipped with a 120 horsepower Nelseco Diesel engine, has during the past winter made the biggest profits per man of any fishing vessel sailing off the New England coast, and it is interesting to note that during some of the time when she was making her best profits the crew were at home every night and went out fishing during the day only. Without the sure and economical power supplied by the auxiliary Diesel engine this, of course, would have been impossible. Naturally all the fishermen are strong for the Diesel engine under the circumstances and the ever increasing number of installations is a sure indication of the satisfactory performance of the engines under the conditions.

The latest development in the fishing business is the advent of the Diesel engine trawler, which in turn, is bound to drive out the steam trawler. The great disadvantage of the steam trawler is the large amount of fuel which it is necessary to carry in order to make the long trip to the fishing grounds and back and still have enough to cruise around for any length of time on the fishing grounds. The Diesel engine meets all these requirements, due to its great economy of fuel and it is only a question of time before the steam trawlers will all have to retire from the field in favor of the new type. There are two Diesel engine trawlers under construction at present and both of them are being equipped with Nelseco engines. In fact, the Nelseco Diesel has the distinction of being the only Diesel type engine used by the fishermen off the New England coast. One of the trawlers is being built for John Chisholm & Son, and is being equipped with a 360 horsepower engine of the directly reversible type. This trawler is very little different from the ordinary type except for the substitution of the Diesel engine for the steam engine. The other, however, is quite unique and is well worth more than passing mention. This other trawler is being constructed for the F. L. Davis Company and is being equipped with the electric drive. The plan showing the general outline of the boat and the machinery installation accompanies this article and shows just how the conditions required have been met. This trawler has two 8-cylinder, 240 horsepower engines, directly connected to two direct current generators and run at constant speed. A single motor on the propeller shaft operates at considerably lower speed than the two engines and takes power from the two main generating units. The generating units are 125 volts each and are connected in series to the 250 volt motor. This arrangement has been chosen so that in case of accident or trouble with either generating set, it would have less influence on the operation of the main propelling motor. There is also a large winch located on the main deck for handling the trawls. This winch is motor driven by a 125 volt direct current motor and power is supplied by either one of the main generating sets. With this combination the power of both generating sets would be used in going to and from the fishing grounds and when on the grounds one engine would be used for supplying power to the winch, while the other would be available for maneuvering the ship as required. In this way, ample power is available for the various needs under all conditions and the equipment is used economically, that is, the greatest use is made of the engine equipment under all conditions.

As shown on the plan, the ship is equipped with fuel tanks with a capacity of 17,000 gallons, which gives a radius at full speed of 10½ knots of about 6000 sea miles. The boat has a water line length of 140 feet, a beam of 24 feet 3 inches, with a mean draft of 11 feet 9 inches; the displacement is about 500 tons. The engines operate at a speed of 350 RPM while the main motor runs at 200 RPM, giving an excellent propeller efficiency for the conditions. Looking at the machinery arrangement in detail, there were two reasons for locating the main motor forward of the main generating units. One was because of the fine lines aft which made it awkward to locate the motor aft without making the engine room length excessive, and the other was the provision by the owners that arrangements be made so that the tail shaft could be withdrawn into the ship. With the motor placed at the forward end of the engine room as shown, this latter requirement was very easily met and the tail shaft can be withdrawn into the ship by simply removing a length of intermediate line shaft.

The advantages of the electric drive for this type of installation and for other special types are manifold and are worthy of a brief enumeration. First, there is the great flexibility of control. No matter whether the ship is running light or loaded, the speed of the motor can always be adjusted to suit the conditions and load the engines to just their normal load. If anything happens to either one of the main generating units, however, power is still available and the speed of the motor can be adjusted to use the full load of the unit which is running and get the most speed out of the ship under the circumstances. The control can be taken right up to the pilot house, since no attention to the generating units is required by the engineering force except to give them the regular supervision as the generating units run on the governor at all times. This eliminates all difficulty due to mistakes in signals between the pilot house and engine room and gives a much quicker and more accurate control of the ship to the captain. Another advantage is the simplification of the engines themselves, due to the omission of reversing gear. The motor has to be made reversible, of course, but this control is quite simple. A further advantage is that full power is available when racing home from the fishing grounds, and every fisherman knows the importance of getting to port as quickly as possible after obtaining his catch of fish, while at the same time, there is plenty of power available for the big winch for the trawls and also for maneuvering of the boat when on fishing ground. In brief, the machinery installation is used to good advantage under all conditions. Finally, the more suitable speeds can be chosen for the engine and for the propeller to suit the conditions of the particular installation.

It would seem that this Diesel electric drive type of installation would be most suitable for certain other special types, such as fire boats or tugs in special service, where a great deal of maneuvering is necessary and particularly at low speeds. The case of the fire boat is very similar to the trawler, that is to say, full speed is wanted in going to the fire, and when there a large amount of power is required for the fire pumps. An electric drive installation would meet these requirements exactly, with the main generating units running constantly on the governor and with motors on the propeller and on the fire pumps. Of course, a further advantage in connection with the fire boats is the almost instant availability of the Diesel engines, since they can be started and brought up to full power in a few seconds and yet there are no standby losses. In the case of a tug boat doing a good deal of maneuvering, especially at low speed, the ease and flexibility of the control with an electric motor particularly commends itself and is, of course, superior to any other type of installation available today.

The results of the two different installations in the trawlers, that with the direct connected Diesel engine and that with the Diesel electric drive, will be watched with great interest and no doubt further details will be available after these boats have been in service for a sufficient length of time to show what they can do.

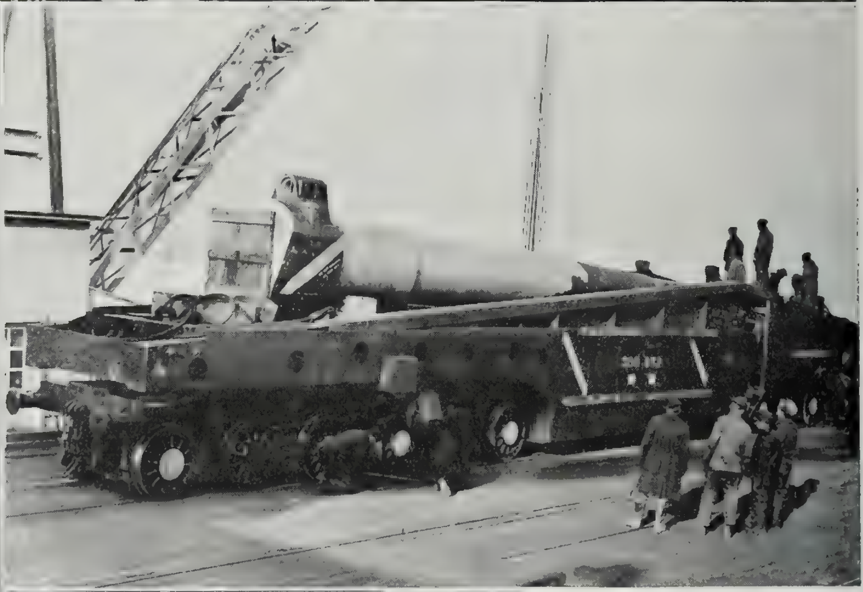
SETS NEW RECORD FOR ATLANTIC ROUND TRIP

A record for a trans-Atlantic round trip of 12 days, 1 hour and 35 minutes has been established by the steamship Great Northern from Brest to New York. This vessel formerly held the record of 13 days and 12 minutes. Before being pressed into transport service the Great Northern plied between Honolulu, San Francisco and Portland, Oregon.

COLUMBIA STEEL COMPANY

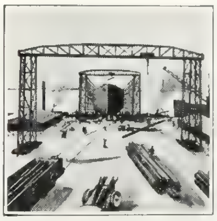
The Columbia Steel Company is planning to begin the erection of new rolling mills in addition to the already large plant maintained at Pittsburg, California, by the company. The equipment for the mill has been purchased and is awaiting the construction of buildings to house it.

American Cargo Handling Machinery at Bordeaux



Lower left: Shows big derrick handling a huge navy field gun. Upper right: Shows sling arrangement for this gun. Upper left: Gun on dock. Center right: Gun on special railway carriage ready to be sent to the front. Left center: Two groups of semi-portal gantry cranes for handling general cargo. Lower right: Grace & Company's steamer Santa Louisa at dock.

Material Handling



The New Port of Seattle Smith Cove Terminal Pier "B" to be the Largest Pier in the World

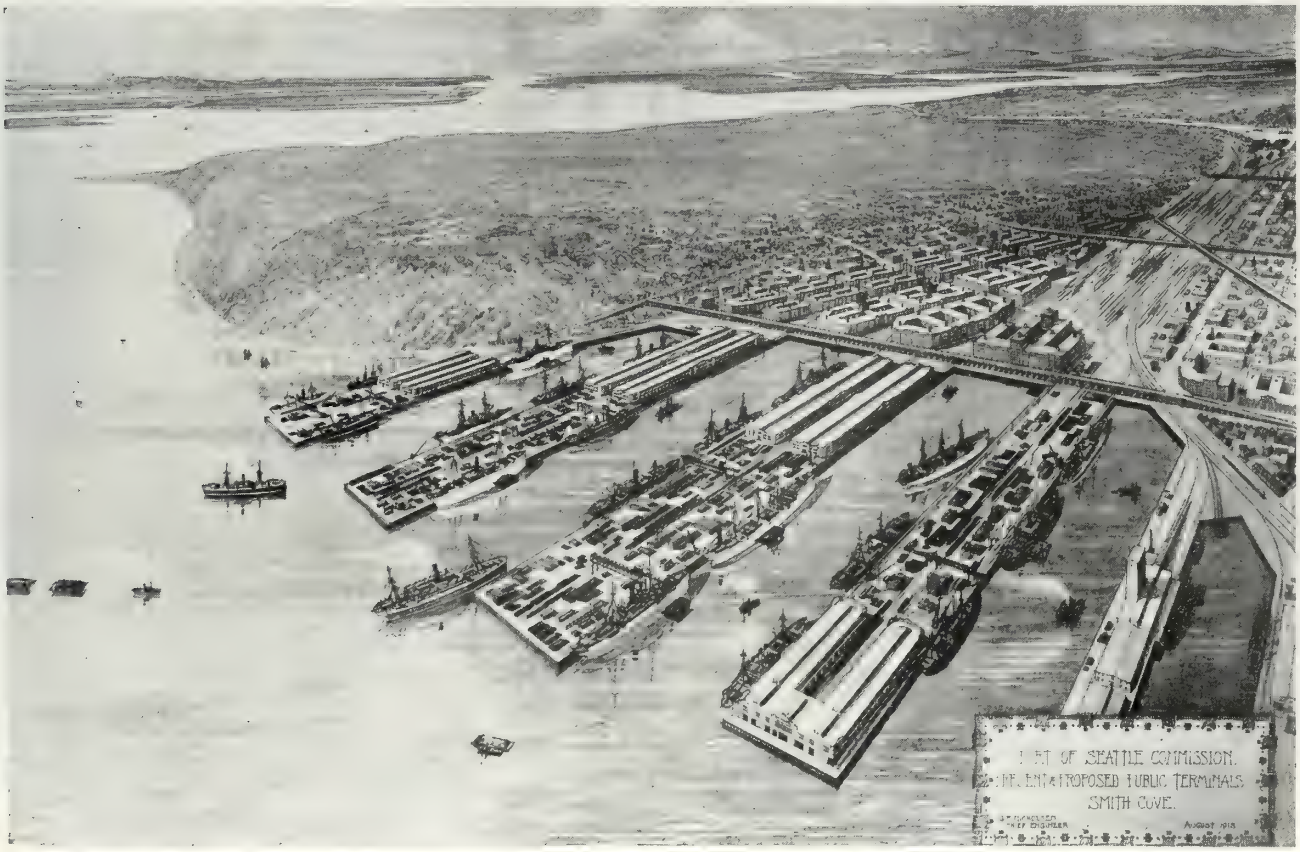
By G. F. Nicholson, Chief Engineer, Port of Seattle

SINCE the new Smith Cove Terminal being built by the Port Commission is well under way, and on account of the existing pier making such a fine record during the year 1918 in the handling of Seattle's foreign commerce, it is interesting to know the main features of these two piers.

The Smith Cove Terminals are located in the north part of the city and are bounded on the west by Magnolia Bluff and on the east by Queen Anne Hill, the latter being a residence district. To the rear of the terminals is what is known as the Interbay District, which is largely taken up by railroad yards, at the north end of which is Salmon Bay, the latter being connected with Puget Sound by the Lake Washington Canal.

In the lower right hand corner of the accompanying perspective, which is really a birdseye view of the present and proposed Smith Cove Terminals, can be seen the Great Northern Railway Dock, showing the grain elevator which is quite a landmark in this district. Next is the existing Smith Cove Terminal known as Pier "A." Although shown completed in this picture, it is unfinished and approximately 75 per cent completed, there being a narrow neck of land at the inner or street end of the pier for the accommodation of railway trackage and roadways to the main pier. This portion will be widened and the pier entirely completed probably within the next year. Next is the proposed Smith Cove Terminal known as Pier "B", which is now being built by the Port Commission. The other two piers "C" and "D" are proposed piers and will be built sometime in the future.

The names Smith Cove Pier "A" and Pier "B" are only temporary in order to distinguish them, and very likely, in the near future these terminals will be given permanent names, and in all probability will be named in honor of prominent men who have been instrumental in providing


PORT OF SEATTLE COMMISSION.
PRESENT & PROPOSED PUBLIC TERMINALS
SMITH COVE.
G. F. NICHOLSON
CHIEF ENGINEER
AUGUST 1918

good terminal facilities for the Seattle harbor and have been responsible for the great increase of foreign commerce to the Port of Seattle.

You have probably heard that the new Smith Cove Terminal Pier "B" will be the largest pier in the United States. This statement is correct but misleading, since the present Smith's Cove Pier "A" is the largest pier in the world. The latter is 310 feet wide and 2543 feet long or practically one-half mile. It has a berthing capacity of seven large ocean going vessels and in actual practice has accommodated six overseas vessels at one time, loading and discharging. During the year 1918, 808,000 tons of freight were handled over this pier, and a net profit was made by the Port Commission of $378,000 after all operating and maintenance charges were paid. The Smith Cove Pier "A" far exceeds in size any commercial pier in the world. The largest piers on the Atlantic Coast will not exceed 1600 feet in length. Almost all of the European ports are situated on rivers and the length and size of piers are very much restricted for the reason that a fairway in the river channel has to be provided for navigation purposes. Also in some cases, basins are dredged out alongside these rivers to provide for additional port improvements and of course the size of piers in these basins is very much restricted. In fact, in most of the leading ports a pier 1000 feet long is considered a large pier.

The new Smith Cove Terminal Pier "B" will be 365 feet wide or 55 feet wider than the present pier and 2560 feet long or approximately the same length. It will cost when completed $2,500,000. The present pier cost $1,000,000 five years ago, and when the inner end is widened and the pier finally completed the total cost will be approximately $1,500,000. The difference of a million dollars between the cost of these two piers is due to the increased cost of material and labor, and to the fact that the new pier is larger and better equipped.

The construction of the new Pier "B" is well under way, the bulkheads having been driven about three-fourths the distance out from the street end and a considerable number of piles have been driven in connection with this work. The overhead viaduct on West Garfield Street to the rear of the terminal has been elevated to allow for railroad trackage underneath to accommodate the new pier. Two electrically operated dredges have been operating for approximately five months in the dredging of the slips alongside the pier. It will take fifteen months to complete the new pier. As it was started February first of this year, it will be finished May first, 1920. It took two years to build the present Smith Cove Pier, but that was due to an unnecessary delay by one of the contractors.

The type of construction of the new terminal is interesting. The center section, including 215 feet of pier, is solid filled, that is, the earth is pumped hydraulically by the use of suction dredges from the slips alongside pier in making this fill. Around the outer edge of pier will be a wharf 75 feet wide, this wharf being necessary for the reason that we have to maintain a depth of 35 feet of water at low tide alongside pier for the accommodation of overseas vessels. Having a tidal variation of 17 feet, this gives us 52 feet of water at high tide alongside pier. As the fill in center of pier is the same elevation as the street grade to the rear of the terminal, we have a difference in elevation between the top of the center fill and the bottom of the slips alongside pier of 58 feet. This difference is taken up by a 1 to 1 slope 75 feet wide. The wharf is constructed over this slope on creosoted piles, there being approximately 12,000 piles in the whole structure. This slope is covered with two to three feet of rock rip-rap to protect it from the wash of tides and wave action.

There will be 2,000,000 yards of earth dredged from the slips alongside the new pier, 700,000 yards being pumped in the center of the pier to make the fill that I have referred to and 300,000 yards will be placed north of West Garfield Street or back of the terminal to complete the filling of the Port Commission property in that vicinity. The remaining 1,000,000 yards will be pumped into Elliott Avenue, which fronts on the north waterfront of Elliott Bay and this fill will form a foundation for a paved street reaching from the Seattle business district to the Smith Cove Terminals.

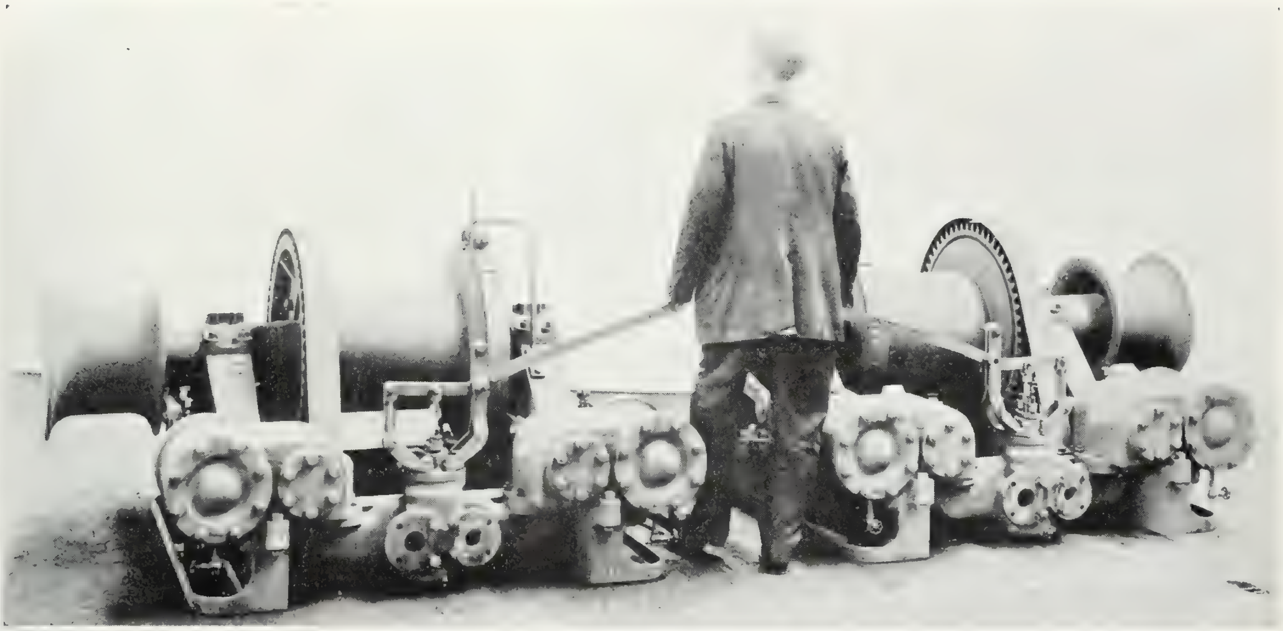
There will be four miles of railroad trackage on the new pier, two shipside tracks on the outer side of pier, and four depressed tracks in the center. There is also an additional mile of track in the rear of the terminal connecting the pier trackage with the Interbay Railroad yard, making five miles altogether. At present there is four miles of railroad trackage in connection with the existing Pier "A", so that we will have one more mile of trackage on the new pier.

The mechanical handling equipment will consist of two Gantry cranes, of 12½-ton capacity, one on each side of the open wharf section. Also a heavy handling revolving crane at the end of the pier for the handling of heavy lifts. The latter crane will have a maximum capacity of 100 tons. Three 35-ton and one 15-ton locomotive cranes will be provided for the handling of heavy commodities on the open wharf section. There will also be eight electric elevators with 10 feet by 24 feet platforms in the transit sheds and the necessary electric tractors, trailers, stackers, conveyors and portable platforms in connection with the two-story sheds.

The transit sheds will be 120 feet wide and 1000 feet long, one being located on each side of the pier with the depressed tracks between. The remaining 1600 feet of pier is taken up by the open wharf section with the depressed tracks in the center.

When the present and proposed Smith Cove Terminals are completed it will be possible to berth twenty-two ocean going vessels at these terminals at one time. There is no question but that when the Smith Cove Terminals are finally completed, they will be a large factor in the handling of the future foreign commerce in the Port of Seattle.

The Standard Cargo Steam Winch



Two standard steam cargo winches in position showing one-man control

THE Lidgerwood Standard cargo winch was the logical outcome of the conditions that arose in the shipbuilding industry when America entered the war. There was the same necessity for standardizing the cargo-handling gear that there was for standardizing hull and engine construction, and the same advantages would follow in the equipping of the ship and in its operation when afloat.

Ships built prior to the war carried various types of winches. Some ships had two single-drum winches at each hatch, others used one double-drum winch. Two operators were used in each case. The type of winch varied—some were friction drum, non-reversing, the load overhauling the drum under control of the brake. Friction drums on winches having reverse locomotive type link motion were used, the drum either being overhauled by the load or, if skilled labor was not available, the friction was kept engaged all the time and the lowering done by the reverse link motion. Other winches had fixed drums and link motion, lifting and lowering the load under steam. These types were all satisfactory. The choice depended largely upon the personal preference of the ship owners or the engineers in charge. In some cases the nature of the cargo or the facilities and labor available at the ports between which the ships would run determined the type of winch that was preferable.

Conditions under which the new ships must be built and operated would differ vastly from past practice and this fact was recognized by the officials in charge of the work. Their first thought seemed to have been to determine which of the existing types was in most common use and also best adapted to the new conditions. They appreciated, however, that the enormous number of winches required, about 8000, would exceed the capacity of any one builder, and in fact far exceed the combined capacity of all existing winch builders. It was desirable that some standard of design should be obtained. Builders of machinery in no way allied to ship winch work, whose ordinary products would be curtailed by the war, would have to be called upon to help supply the demand. Their ignorance of ship's needs and the necessary details of construction particularly required in ship's work must be, so far as possible, nullified by uniform specifications for the winches. Another point they fully appreciated was that the winches must be, so far as possible, interchangeable between ships. The ideal would have been one type of winch built absolutely interchangeable in all parts. Could this have been obtained every company operating ships built by the Emergency Fleet Corporation could have carried at all times a stock of repairs fitting every winch in its fleet, every ship could have carried a supply of spares, and one ship meeting another in a foreign port could have obtained parts from her if needed. The need of haste in manufacture prevented this.

Lastly, there was the question of available labor. Seamen or longshoremen skilled in the use of

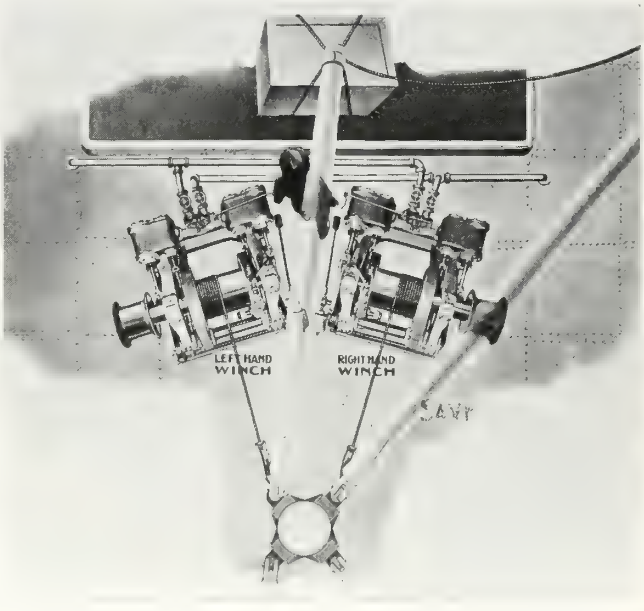
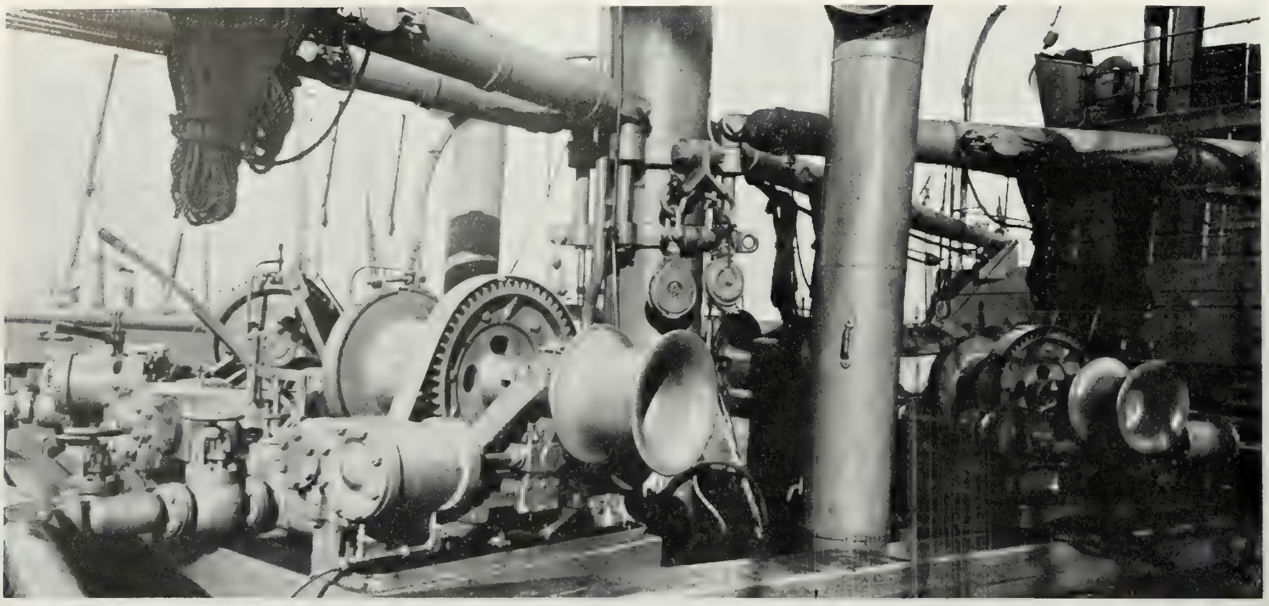


Diagram showing position of ship cargo winches with respect to hatch



Winch installation on S. S. Keola. Four standard steam cargo winches at each hatch

winches would not be obtainable. It was absolutely necessary to get a winch so simple in control that its operation could be mastered by inexperienced men after a few minutes' instruction. It must be safe; it must be speedy. The speedy handling of cargo meant less time spent in port for each ship, and a corresponding increase in the number of voyages a ship could make in a year.

This was the problem that presented itself to the members of the United States Emergency Fleet Corporation. Concurrent with their work was that of Mr. Spencer Miller, chief engineer of the Lidgerwood Manufacturing Company. Mr. Miller had spent many years in the development of apparatus for coaling warships at sea, oil fuel bunkering at sea, and marine transfers for coaling in harbor—many United States and foreign warships being equipped with these machines. As a member of the United States Naval Consulting Board, he was invited to confer with officials of the Shipping Board to determine upon a suitable winch for general adoption. About that time the marine engineers and designers of the Lidgerwood Manufacturing Company were completing the designs of a new type of winch in accordance with Mr. Miller's ideas of what was required, to be called the Lidgerwood No. 1917 cargo winch. This design was presented to the Shipping Board for consideration and in its general design and characteristics was adopted.

Over 6000 Lidgerwood No. 1917 cargo winches were built by a large manufacturing concern in the West. This new winch was frequently imitated and sold in considerable number.

The Lidgerwood No. 1917 cargo winch is a strong, compact winch. There was no unnecessary weight in its construction. It was simple in every detail, so that ordinary labor could keep it in proper running condition and prevent undue wear due to neglect. The bedplate dimensions are 57 inches wide by 56 inches long, the diagram herewith showing overall dimensions and the centers of gravity. The second diagram shows a group of four Lidgerwood No. 1917 winches installed, working two hatches. This was the standard installation on ships building up to the signing of the armistice.

The fixed type of drum was used, as the operation of this called for less experience than the friction drum type; one man could operate two winches with fixed drums, the cost was less, and it was simpler to build, and an advantage both in multiple production and for those manufacturers who had not the experience necessary to build friction drum winches.

A reverse valve was used. This was no experiment. The Lidgerwood Manufacturing Company had previously built fixed drum winches with reverse valves for use on United States colliers and they had proved successful. They had also built reverse valve winches for use on Pacific Coast ships. The entire operation of the winch was controlled by one lever operating this reverse valve. The movement of the load followed the movement of the lever. The winches installed with the cylinders close to the hatch brings the operating levers in such position that the man standing between them sees his load from the time it comes overside until it reaches the bottom of the hold. His eye is on the load, it follows the load, his hands work at all times in the direction that his mind calls for the load to follow, physical and mental movement is always along the same line and in the same direction. He wishes to lift the load, he lifts his lever; he wishes to lower the load, he lowers the lever; he wishes to hold the load, he holds the lever in center. The speed of the winch is governed by the distance he throws the lever. It is a co-ordination of movement of mind, hand and load, that enables the untrained man, even though he be of the ignorant type, found in many foreign ports, to master the operation of the winch with a few minutes' instruction. He need not understand the language of his instructor; show him how the load follows the movement of the lever, and in a few minutes he is competent to handle the cargo.

Reversing valves have been objected to on account of excessive steam consumption. This may be due to imperfect design of valve and to overcylindering the winch. The Lidgerwood Manufacturing Company installed twenty-six winches on each of the United States colliers Neptune, Jason and Orion. These winches had 9¼ by 10 cylinders as against 8¼ by 8 cylinders on their No. 1917 Standard ship winch. The duty of the collier winches was to fill, hoist, lower and discharge a clam-shell bucket of coal every thirty seconds, work that required these larger cylinders. Frequently 75 per cent of these winches were operated at the same time, yet inquiry at the Navy Department showed there was no complaint as to steam consumption. The valves were properly designed, the cylinders the correct size. This valve design, somewhat improved, was followed in the No. 1917 winch and there has been no complaint from any source of increased steam consumption.

The 8¼ by 8 cylinders have been found the best size for cargo ships. The Lidgerwood No. 1917, which has this size cylinders, will handle light loads at 400 feet a minute and loads of 10,000 pounds on a single line at reduced speed. This capacity takes care of the greater parts of a cargo. Heavier pieces have occasionally to be handled and for these tackle can be quickly rigged and the heavy pieces handled on several parts of rope. It is better to have a winch designed to handle 90 per cent of the cargo quickly and economically and be able to take care of the other 10 per cent by the addition of a little tackle than it is to have a larger pair of cylinders wasting steam 90 per cent of the time. Where there are many heavy pieces to be handled there can be placed at the hatch a compound geared two-speed winch, hoisting the light loads on the single gear reduction, and heavier pieces on the compound gear reduction. Many winches are built with cylinders larger than 8¼ by 8, but with no corresponding increase in strength in the drumshaft, side stands, gearing, etc., and the result is a winch that not only is extremely wasteful of steam at all times, having more cylinder power than is required for most of its work, but when it is worked up to its full cylinder power a breakdown of the winch and the rigging occurs with the resultant smashing of cargo. In the Lidgerwood No. 1917, appreciating the adverse conditions under which the winch would operate, the opposite course has been followed, the winch being built stronger in proportion to its cylinder power than is usual practice.

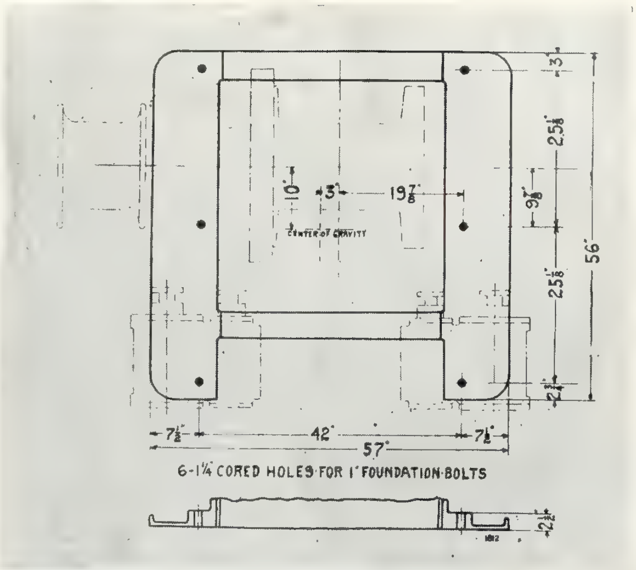


Diagram showing position of center of gravity and dimensions of base of standard steam cargo winch

A feeling has prevailed among ship owners in the past that a winch being placed on deck, exposed to the weather, need not have the same refinement in design and construction that would be required of an engine room equipment. This is true so far as the exterior finish of the winch is concerned, but the mechanical efficiency of a winch on deck is just as important as that of the ship's engines. This fact has been lost sight of by many owners and officers. They have called for rugged, rough winches to stand exposure, forgetting that these qualities can be combined with mechanical excellence. The result has been carelessly designed steam passages, resulting in back pressures; bearings that are seldom in proper alignment, carelessly constructed and filled with cheapest bearing metal, gears that do not mesh properly, and cylinders bored out rough. One need only listen to the racket made by an ordinary ship's winch to appreciate the loss of power. This is accepted by many ship's officers as being natural and proper in a winch—it is their accepted standard of a winch. However, these conditions have changed.

Emergency Fleet Corporation Steamer Benzonia loading ties for England at Grays Harbor Lumber Company's dock, Hoquiam, Washington

Building Marine Terminals for the Future

By James A. Shepard

Vice President and Chief Engineer, Shepard Electric Crane and Hoist Company, Montour Falls, N.Y.

MANY of the seaport cities of the United States and Canada have either in process of building or project for early construction, important extensions to their marine terminal facilities. A recent estimate in the columns of a well informed publication devoted to terminal engineering places the aggregate cost of these proposed improvements in excess of $100,000,000.

That the completion of these enterprises will have an important bearing not only upon the volume of water-borne commerce of these cities, but also upon the cost of handling and consequently the ultimate cost of many necessities, admits of no question. Potentially, the improvement of these important facilities for transportation represents one of the great forces on which we must depend to stay the rising tide of living costs.

The people of the country generally, realizing their dependence upon higher efficiency in transportation and also the necessity for the relief which it may bring to them, have generously voted or approved as the case may be, the large expenditure already authorized and will continue to favor similar expenditures so far as needed. But, they are not in mood to add to their present burden of high living costs and taxation, except for facilities producing such pronounced improvement over present conditions as only the most serious and concentrated efforts of the engineering profession in wisely planning and equipping these terminals, can accomplish.

With our present extreme costs for every kind of labor and with no prospect for the future, except a more acute stage of the difficulty, but one resource remains; we must requisition at once, every mechanical expedient which will enable us to apply our high priced labor more scientifically and thus produce for each dollar expended as much or more than was produced under pre-war conditions.

Industrially the enormous economics effected by mechanical handling are now a matter of history and the money value of the process has been proved by countless balance sheets.

It only remains to apply the lessons learned under the roof of the factory, to the railroad or marine terminal; the problems are identical, the results obtainable by identical treatment cannot successfully be called into question when applied to transportation.

Mechanics is one of the exact sciences, mechanical operations function perfectly only when all of the parts of a given mechanism are arranged to co-operate according to their own fundamental laws, hence it happens that while the problems of mechanical handling in industry and transportation are identical economically, there are certain differences mechanically.

The machine which performs perfectly a certain function in the factory may be either entirely unsuitable for a marine terminal or applicable only when greatly modified.

We have not progressed far in identifying and prescribing these mechanical modifications because there has not been heretofore the necessary incentive for active study of the situation and those who were potential users of mechanical handling equipment in transportation have not provided a market for the specialized apparatus required.

The gradual process by which the development of efficient methods and machinery in other divisions of industry have taken place, are not applicable at this time, because we must have results in the shortest possible length of time.

Lack of opportunity for deliberate and careful decisions may lead us into some mistakes, that is perhaps inevitable, but no consequences can be so serious in their effect as failure to make adequate and positive provisions in all marine terminals which are now being constructed or projected for complete mechancal handling of cargo throughout every stage by the most rapid and efficient processes which have been devised.

In the construction of marine terminals, as in practically all other works in which mechanical appliances are to be, or may be employed, provision must of necessity be made in the size, strength, character and sometimes the details of the main structure for the particular type of machinery to be employed.

The most difficult problem confronting those persons having the responsibility for the design and construction of marine terminals at this time, is what provisons should be made in the terminal structures to facilitate the application when desired of the most efficient mechanical cargo handling equipment.

Recognizing the necessity for an answer to such a question before rapid progress could become possible in any program for higher efficiency in cargo handling at marine terminals, and the great loss in efficiency which must follow to the country at large should there be failure to find and apply the answer, the writer in collaboration with several associates, has conducted an investigation of the subject extending over many months and has also obtained the opinions of many engineers occupying positions which qualified them to judge intelligently.

This investigation led to the conclusion that the following features are considered essential and should therefore be incorporated in the design and construction of all marine terminals intended for general cargo, in order to facilitate the installation of cargo handling machinery.

General Cargo — Covers all commodities not otherwise classified in bundles, boxes, barrels, sacks, bales, or unpacked, the weight of individual pieces or packages not exceeding ten tons.

It is assumed that the greatest uncertainty as to method applies to the mechanical handling of general cargo, also that the greater portion of the terminal development projected, is for the purpose of handling general cargo. For that reason the following comments are made, applicable to general cargo only:

Quay or Pier

With either the quay or pier type of marine terminal, intended for handling general cargo, a portion of which must be received or dispatched by railroad, it is considered essential to provide two independent railroad tracks between the bulkhead and transit shed, arranged with crossovers at suitable intervals.

Sub-structure construction should always provide for such tracks whether immediately applicable or otherwise.

Handling Between Ship and Pier

For rapidity and all around economy the semi-portal type of jib crane electrically operated with direct current, or one of the several modifications of this type of crane, operating independently or in connection with the ship's winches should be provided for, whether immediately applicable or otherwise.

Sub-structure construction should therefore be made suitable for a gantry track rail about three feet back from the outer face of bulkhead, and for two wheel loads on such track, in addition to all other loadings of not less than 60,000 pounds spaced not to exceed 25 feet center to center.

The transit shed should be arranged for carrying runway girder and track rail along its face when of two story construction, arranged for a full clearance of at least 12 inches from center of rail to face of building and having a gauge with the gantry rail along the bulkhead, measured horizontally, of not less than 26 feet. Provision should be made for two wheel loads on such track, in addition to all other loadings, of not less than 35,000 and spaced not over 18 feet center to center.

When transit shed is of one story construction the runway may be placed on top of building columns, the total horizontal distance from face of transit shed to bulkhead being maintained the same as for two story shed.

Construction of Transit Shed

The clear height of transit shed should not be less than 24 feet, within which height and bounded by the inner face of the building columns there should be no knee braces, leader pipes, sprinkler pipes, projecting doors, or door operating mechanism, so as to permit the necessary clear room for the installation of some one of the various types of traveling crane available for handling cargo within the building.

The carrying capacity of columns should be made sufficient in addition to all other loads for two wheel loads along each outer row of columns and four wheel loads along each row of inner columns of at least 13,000 pounds each, spaced not over 12 feet apart.

It is considered preferable to employ two rows of interior columns dividing the interior of transit shed into three bays.

No railroad track should in any event be placed within the transit shed as they represent a severe interference with interior handling of cargo and are also wasteful of transit shed floor area.

Transit Shed Doors

It is considered advisable to provide doors affording a full opening between all side columns of the pier shed; door openings about 18 feet high will be ample. The practice of providing doors in alternate panels of the pier shed will affect adversely any system of mechanical unloading or handling of cargo. Doors should be of a type which will not conflict with crane runway or interfere with the passage of cranes either inside or outside of the pier building.

It is a simple matter to construct transit sheds so that cranes may be employed at any time their use appears to be advisable. As has proved to be the case in industrial buildings, pier buildings will have a much greater permanent value if they present no obstacle to the employment of machinery as the art of cargo handling advances to the point where its use is considered essential.

Cargo Masts

It is thought that cargo masts will prove to be of little or no value in any comprehensive scheme of mechanical cargo handling and that with the development of the art they will fall into complete disuse.

Duplication of Mechanical Units

It will be well to bear in mind the fact that the foreign commerce of neither the United States nor Canada is fully developed. As a consequence certain ports which specialize in certain classes of cargo may within a few years experience a decided change in the character of cargo which must be handled. The fact that a certain type of machinery is not now necessary presents no assurance that it will not within a few years be required. A wide variety in the character of the cargo to be handled will demand variety in the handling equipment of many piers in order that specialized and consequently efficient equipment may always be available when needed.

When the various sources of economy effected by mechanical handling of general cargo receive full consideration, there will be no room for doubt that mechanical equipment, even if only used at comparatively long intervals, is more efficient than any alternative.

NEW LONDON DOCK NEARING COMPLETION

The extension of the Royal Albert Dock is sufficiently advanced, according to the London Times, to justify the expectation that the water may be let in during November of this year. When completed the existing Albert Dock and the extension, which lies directly to the south, will be joined by a passage or cut 100 feet wide, through which the water will be admitted. Until the great entrance lock is ready vessels will approach the new dock by way of the old; afterwards they will come in straight from the river. At present the water in the Albert Dock is kept from rushing into the other by a bank of earth, behind which, as a reserve protection, lies a temporary dam of concrete. When the time arrives the bank of earth will be removed and the water allowed to run gradually beyond the dam. On its completion the two docks, situated side by side, will be made one for practical purposes by the broad waterway of communication. The Port of London Authority will not consider the dock complete until the entrance lock from the Thames comes into operation.

ELECTRIC FURNACE ACTIVITIES

The Electric Furnace Construction Company, Finance Building, Philadelphia, reports the receipt of the following orders for "Greaves - Etchells" Electric Furnaces: Sullivan Machinery Company, Claremont, New Hampshire, 1 ton furnace; Imperial Japanese Mint, Osaka, furnace for manufacture of coinage bronze.

An Electrically Equipped Lighter

By William H. Easton

PENNSYLVANIA Railroad Lighter No. 151 enjoys the distinction of being the first vessel of her type to be equipped with electrically-operated winches exclusively. She is used for carrying express shipments around New York Harbor; and as this service is one in which time is an important factor, her winches were arranged for electric drive instead of the usual steam engines, because it was believed that the use of electricity would materially reduce the time required for handling cargoes. She has now been in commission about two years, and experience goes to show that this idea was correct; for, although it is difficult to carry out an accurate efficiency test in the handling of miscellaneous packages, it is generally conceded by those who are familiar with her work that No. 151 can take care of 300 tons while the average steam-operated lighter is disposing of 200 tons.

As shown by Figure 1, No. 151 has two systems of booms, one forward consisting of a single main boom with a maximum capacity of ten tons, and one aft, of the mast and yard type with a maximum capacity of two tons. Most steam lighters of the capacity of No. 151 have only one boom system; but with electrical operation, two can readily be employed because the motor-driven winches are so compact that they can be housed in a very small compartment. This compartment is situated in the hull just forward of the pilot house; and, as shown in Figure 2, all the lines run down in front of the pilot house to their respective winches in the most direct manner possible.

There are eight motors altogether, their purpose and sizes being shown in the following table:

Service

For Forward Boom	H.P.
Main Hoist	24
Main Boom	24
Starboard Guy	15
Port Guy	15
For Aft Booms	**H.P.**
Starboard Hoist	15
Starboard Guy	15
Port Hoist	15
Port Guy	15

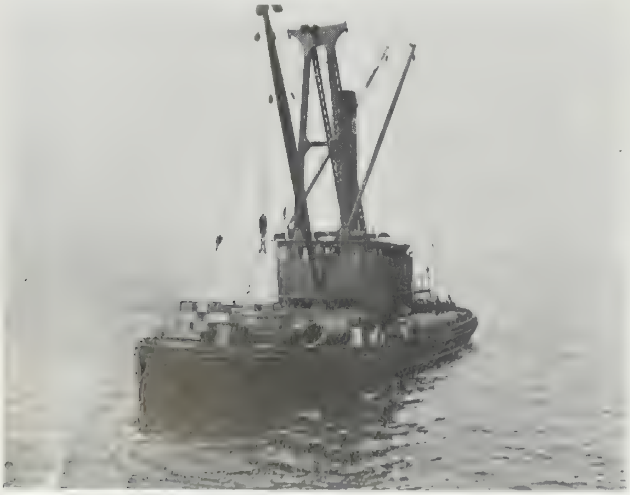


Figure 1

These motors, shown in Figure 3, are of the Westinghouse direct-current crane-type, totally enclosed and equipped with magnetic brakes. Each motor is geared directly to its winch and the winches are arranged in two rows, one above the other.

The control of the winches is located in the pilot house, as shown in Figure 4. The four controllers (one for each motor), for the forward boom are located at the forward end of the pilot house. For the aft booms, there are two sets of controllers, one located at each side of the pilot house, either of which can be used. The object of this arrangement is to give the operator an unobstructed view of the operations of the booms under all conditions.

The controllers in the pilot house are of the type known as "master switches." They do not control motors directly, but control the operation of a series of magnetically-actuated switches, which make the actual connections. These switches are mounted on panels located in the motor compartment, and some of them can be seen in the upper righthand corner of Figure 3. There are several advantages of this arrangement. In the first place, the master switches handle only the small currents needed to energize the magnets and so are light in construction and easily handled. Secondly, the heavy cables carrying the motor currents are of minimum length, and do not have to be run up to the pilot house and down again. Finally, the magnet switches permit the use of automatic acceleration; that is, the operator is not obliged to operate the master switches slowly in order to prevent burning out the motors by applying the currents too suddenly. He merely

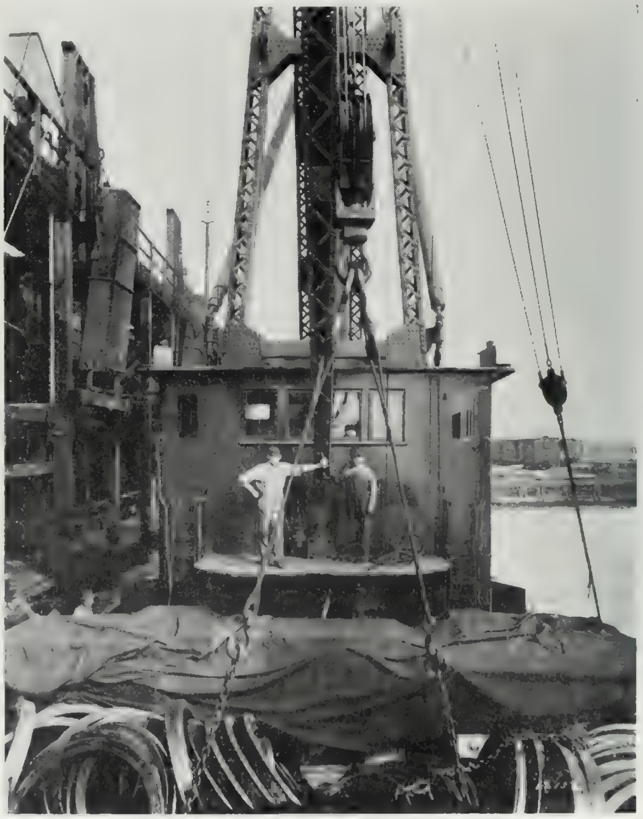


Figure 2

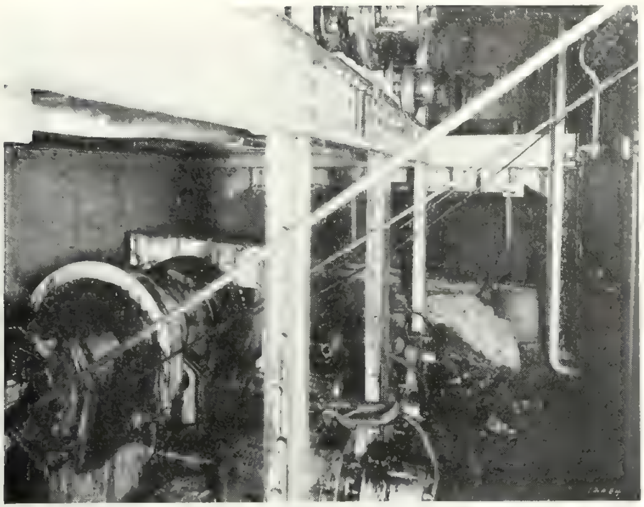


Figure 3

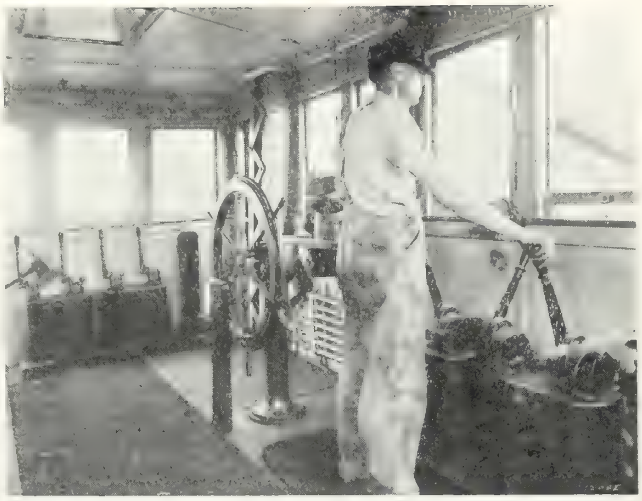


Figure 4

moves the handles at any speed he pleases, and the magnet switches then close in the proper order and at the proper rate. The motors are thus protected from injury, and all of their operations are carried out at the maximum speed consistent with safety. Each controller provides a number of motor speeds.

The current for operating the motors is generated by a 25 kilowatt, 125-volt Westinghouse turbine-generator, shown in Figure 5. This unit consists of a high speed turbine geared to a standard generator. It is operated by steam at pressures of from 75 to 250 pounds and can be used either condensing or non-condensing. A governor keeps the speed, and therefore the voltage, constant, and an emergency stop prevents accidents due to over-speeding. This outfit is only about 3 feet wide, 3 feet high, and 5½ feet long, so that it can easily be installed in a corner of the engine room.

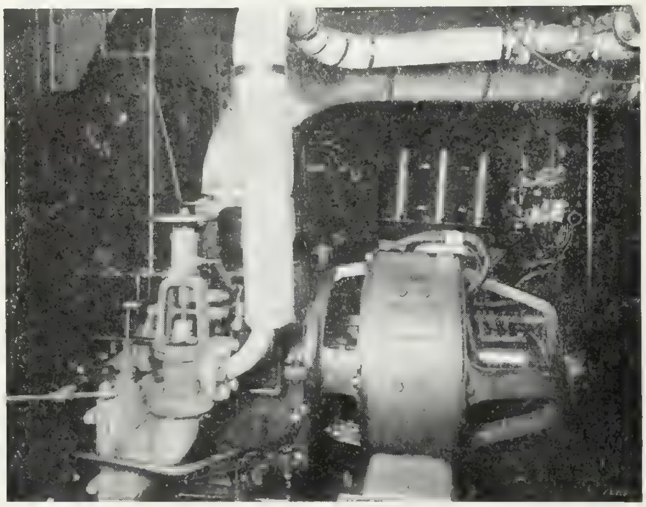
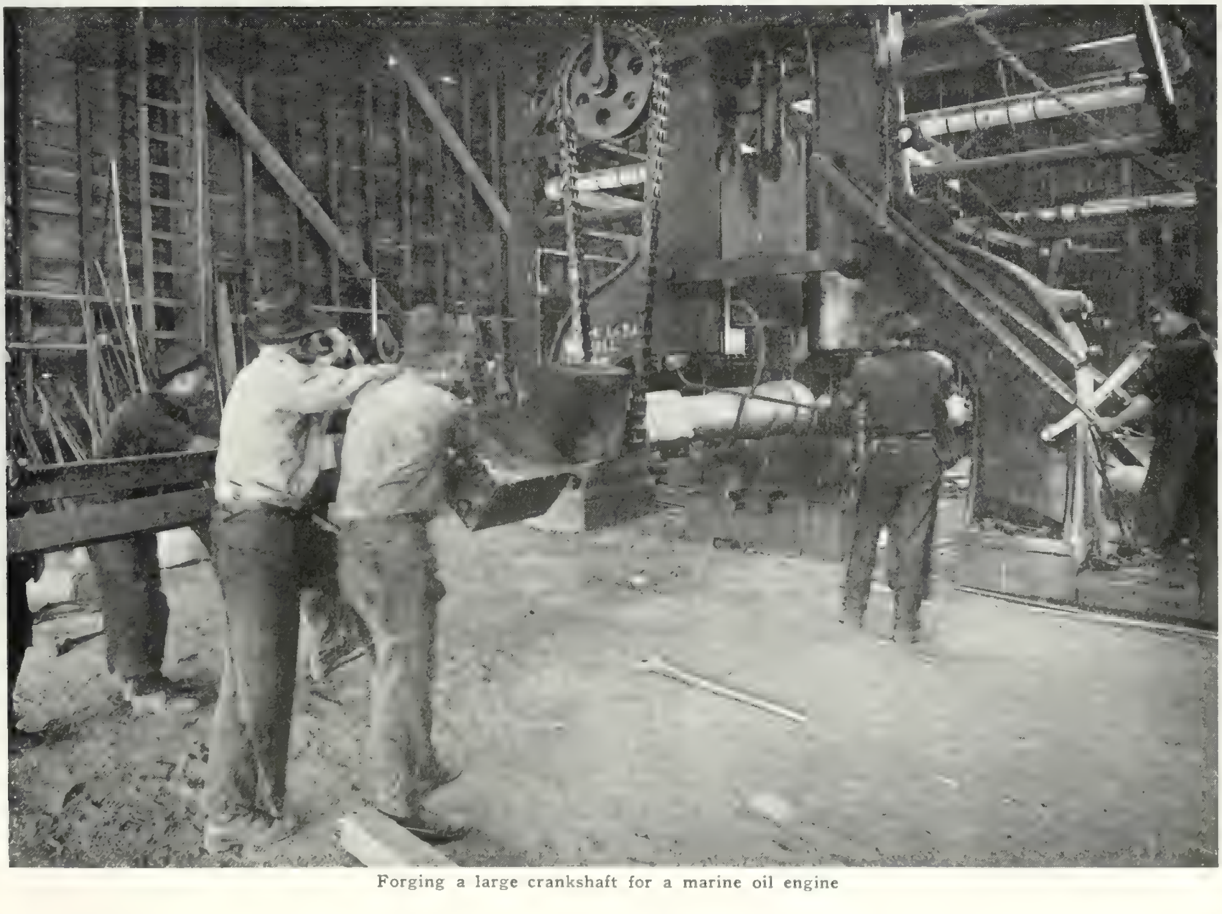


Figure 5



Forging a large crankshaft for a marine oil engine

A Complete Shipping Board—Marine Classing and Insurance—What of the Wooden Fleet?

By Winthrop L. Marvin

A UNITED STATES Shipping Board complete in membership, and honestly bi-partisan as the Act creating the board required that it should be, is something for which maritime America may well be thankful at this time. Moreover, it is collectively a good board, in ability and sincerity of purpose. Judge John Barton Payne of Illinois, who succeeds Mr. Hurley as chairman, embodies a notable degree of intellectual strength and force of character. The knowledge and experience of Commissioner Donald of New York are very fortunately retained. Mr. Stevens of New Hampshire faithfully represents the Wilson administration, its spirit and its purpose. Of Mr. Robinson of California many gracious words are said, and the board receives a genuine salt-water accession in Lieutenant Commander "Tom" Scott of Connecticut. Undoubtedly there ought to be a very much larger representation of thoroughgoing, practical maritime Americans upon this tribunal which holds in the hollow of its hands so much of the fate of the United States merchant marine of the future. This is a proposition which nobody can or will dispute. But equally indisputable is the fact that the ideal men for the board are the very men whose vast personal responsibilities would absolutely veto their serving on it for any considerable period in a time of peace. Allowing for this hard actuality which critics sometimes overlook, it will have to be acknowledged that the Shipping Board as now constituted stands handsomely up to, and indeed above, the level of most of like politically-selected groups that have in charge other important functions of our government.

One lack is to be regretted, that there is not one representative of the active new maritime industries of the South Atlantic and Gulf range of states that have embarked with such admirable courage on ocean shipbuilding and navigation. This is an error of President Wilson's own making, which in fairness should be corrected at the very first opportunity.

For American Insurance

First of the important sub-committees of the House Committee on Merchant Marine and Fisheries to complete the special line of inquiry which it was charged with is that which has been dealing with marine insurance and cognate interests. At the hearings held at Washington by this subcommittee the tide of evidence significantly ran all one way, in emphasis after emphasis upon the fact that a real American merchant marine, in order to be safe, prosperous and enduring, must be able to place the bulk, and later all, of its underwriting in competent American companies, which would have the disposition and the strength to guarantee fair play. This basic fact has now come to be very thoroughly understood in Washington, in spite of—or perhaps in part because of—persistent intimations that our marine insurance, surveys, classifications, etc., could better be performed by organizations of an "international" character—or, stripped of its transparent camouflage, the intensely British Lloyds' Register of Shipping.

It is scarcely necessary to say that activities in this direction were all of the "sub rosa" kind and were not exposed to the hazard of a searching cross-examination from any inquisitive Yankee member of a congressional committee. Freed from diplomatic "pressure" and intrigue, and left to National lawmakers responsible to American constituents, it goes without saying that the entire problem of marine survey and classification and insurance could be determined only in an American way. In this connection it is interesting to observe that one of the final official acts of Mr. Edward N. Hurley before retiring as chairman of the Shipping Board was to place the board definitely on record on this "international" issue in a communication to Commander Stevenson Taylor, president of the American Bureau of Shipping:

"Dear Mr. Taylor:

"Your letter of July 25, outlining the growth and development of the American Bureau of Shipping during the trying period of the last two years, and also giving expression to your opinion and ideas of the needs of the future, is to my mind a splendid statement.

"The data you give are interesting and illuminating and it would be of very great benefit to have the facts in relation to your organization, its work, growth and development, and its prospects more generally disseminated, not alone among shipping men, where the problem is understood, but throughout the country. It is doubtful whether the public generally appreciate how very important an organization such as yours is to the maintenance and operation of shipping, but it is needless for me to say to you that it is one of the most necessary factors in the successful operation of shipping.

"The development made by your bureau is extraordinary, both in personnel and in the character of the work done, and it is beyond question that one of the greatest needs of the future for the proper maintenance and development of an American merchant marine is a strong organization operating on the lines of your bureau and developed to meet the needs as outlined in your letter.

"In conclusion I feel that I am warranted in saying that you will have the sympathetic support of the Shipping Board toward the end of developing your organization as you have outlined the plans in your letter.

"Very truly yours,
"Edward N. Hurley, Chairman."

In a report to Chairman Hurley, Commander Taylor had stated that from the early part of 1916 up to and including six months of 1919, the American Bureau of Shipping had classed a total of 1027 seagoing ships, and that it was now surveying for classification the larger part of the new steel tonnage of the Shipping Board. With the great technical organization thus evolved, the American Bureau of Shipping is undeniably now in a position, as Commander Taylor says, to survey and classify all of the ships built in the United States, and "the time is now at hand when the Shipping Board should not permit vessels built under its direction to be classed by any foreign society." The Shipping Board in all its future policies may well heed these words, and remember that the present is a Republican Congress dominated by a strong National spirit and of stalwart protectionist convictions. Any Senator or Representative who might venture to defend the payment of funds from the United States Treasury into the coffers of the British Lloyds' Register of Shipping for a distinctively National service which an American organization was capable of performing would be sure to hear from his people in a prompt and decisive way.

The present temper of the National lawmakers is clearly reflected in the quickness with which Representative Scott's bill (H. R. 7500) was passed by the National House, for the immediate repeal of the Emergency Act of October 6, 1917, that suspended until 120 days after the war the historic coastwise law of the United States. Throughout our entire coastwise commerce the former policy of permitting only vessels of United States registry and—as a general principle— of American construction again becomes effective, with the one exception that, in order to relieve a special situation, foreign vessels and foreign-built vessels admitted to registry under the Act of August 18, 1914, may engage in the trade between the Hawaiian Islands and the American mainland, on special permits of collectors of customs. But this privilege can be terminated as soon as the President finds a sufficient number of American ships available. With the enormous tonnage which the great war has called into existence, there can be no question of the ability of American shipowners to handle our entire domestic commerce at reasonable rates. In fact, there is cause to fear that after a time coastwise competition may be excessive, with more ships than cargoes offering.

The New Sea Wages

After nineteen days of deadlock, the strike of seafaring unions on the Atlantic and Gulf Coasts brought on July 29 a still further substantial enhancement of operating costs of American overseas and coastwise vessels. Deck officers, engineers, seamen, firemen, stewards—all hands, in fact—are now receiving a wage increase fairly measured in general by the advance to the seaman class from $75 to $85 in monthly wages—a standard destined, of course, to become universal throughout the American merchant marine. No more can it be contended that American sea wages are practically on a parity with British and North European wages, unless a proportionate increase is won abroad, as the leaders of the seamen's unions are predicting. The outcome will be eagerly awaited, for it will involve a practical test of the normal efficiency of the La Follette seamen's legislation. If crews of foreign ships were enabled to leave their vessels in American ports, as made possible by Section 4 and Sections 16-18 of the La Follette law, with the power to draw a part of their wages due and without facing forcible return by the strong hand of Federal authority, it was prophesied by the Wisconsin Senator and others that eventually full American wage rates would have to be paid by foreign shipowners. True enough, this result substantially followed in 1918-1919—but was it due to the La Follette act or to the passing emergency of war? This the next few months will determine, beyond any possible controversy.

American masters on the new salary basis will receive from $330 a month on board of the smallest class of cargo steamers up to $412.50 a month, or almost $5000 a year, on large steamers of over 10,000 tons, and chief engineers will receive only $25 a month less—the original demand that chief engineers should have the same pay as masters having failed to win the sanction of the steamship companies and the Shipping Board. These salaries compare not unfavorably with the compensation received on shore by the superintendents or other officials in direct charge of manufacturing or mining plants of considerable magnitude. But the seagoing master and chief engineer are supplied in addition with food and quarters and generally are subject to less individual expense. Salaries of mates and assistant engineers are generally advanced in the same proportion. No American will begrudge these officers—the real soul of the ship—the highest remuneration which the earnings of the ships will justify—but they and their country must squarely face the facts of foreign competition and of its indirect but inevitable pressure even on the ships employed in our coastwise carrying. Can American shipowners continue to grant a salary scale fairly proportionate to what men of like ability could earn on shore, and yet hold the seas against the Europeans and the Japanese? That is the unescapable question which both shipowners and officers are asking of the future.

So far as the seamen, firemen, stewards, etc., are concerned, they have demonstrated that they do not hesitate to strike against the government. It makes no difference to them, apparently, that the principal American shipowner, and a very large ship operator, is the United States. The temporary entrance of the National Administration through the Shipping Board into the sea-carrying business has manifestly wrought no change and no improvement in general industrial relations—for this strike of July is the most determined and general that has ever occurred on the Atlantic seaboard. It brought no indication whatever that seamen as a class had any preference for government as against private control and operation, and the possibility that the ships might be manned at any time by American bluejackets of the naval reserve was always disquieting. In the long run, the seafaring men will realize that they have nothing to lose in dealing with employers who are accustomed to them, who know their life and understand their character.

A 13,000,000-Ton Fleet

It is always refreshing to turn from the inflated "deadweight tons" of the Shipping Board's past habit to the clear and accustomed record of the Bureau of Navigation, in the Department of Commerce—the bureau so long and ably administered by Commissioner Eugene T. Chamberlain. His official returns for the complete fiscal year ended June 30, 1919, show that on that date the American merchant marine, Shipping Board vessels included, amounted to 27,300 vessels of an aggregate of 12,800,000 tons gross register—detailed figures of certain small craft from minor ports had not been received and embodied. But to this impressive total, as Commissioner Chamberlain explains, should properly be added fifty-six large ocean steamships of 405,000 tons gross register, still engaged in the task of repatriating the American army.

Of course, this total of 12,800,000 tons includes our great domestic fleet on lake, river and ocean—the steamboats of the inland waterways, the barges, tugs and small sail craft of the coast. A nation might boast a huge flotilla of such petty traffickers, and yet command no standing in the actual elements of sea power. But Mr. Chamberlain's analysis reveals the gratifying fact that our 755 seagoing ships of 1000 gross tons or over which had a total of only 2,128,731 gross tons on July 30, 1914, at the outbreak of the world war, had increased on June 30, 1919, to 2058 ships of a total of 7,300,022 gross tons. That is to say, virtually all of the actual increase in our merchant marine has been in the larger ships capable of foreign voyaging. Our distinctively coastwise tonnage has, indeed, decreased, and for the first time since 1856 one-half of our entire merchant marine is registered for foreign commerce. Our documented steel steamers of 1000 gross tons or over numbered on June 30 last no fewer than 1436, of a total of 6,072,901 gross tons, while in spite of the war spurt of wooden shipbuilding, our wooden steamers of 1000 gross tons or over, complete and documented, were 293, of a total of 693,541 tons.

Wooden Craft Abroad

More of these wooden steamer hulls are being finished and launched, but on the other hand the Shipping Board has announced the active beginning of the anticipated sale of these wooden craft to foreign purchasers, at a price of $300,000 each. In spite of the wholesale disparagement to which these standard wooden steamers have been subjected, the best of them have a lengthening record of satisfactory performances on such voyages as from our Pacific to our Atlantic Coast, and across the Atlantic to the United Kingdom and the Continent. We have many more of these wooden steamers than our commerce can employ—just as we have many more of the relatively small lake-built steel steamers, which have also begun to win purchasers abroad. We are prone to forget that the Continental nations have a considerable coastwise traffic of their own—up and down their western seaboard, and in the Baltic and the Mediterranean. Much of this traffiic, which is actually international, is nevertheless a trade of relatively short distances. For example, the "foreign" voyage, from Sunderland, England, to Copenhagen is only 586 miles; from Plymouth, England, to Corunna, Spain, only 530 miles; from Plymouth to Lisbon, Portugal, only 755 miles; from Shields, England, to Riga, Baltic Russia, only 1053 miles, or a little more than one-half of the length of the American "coastwise" voyage from New York to New Orleans.

In fact, both because of the distances to be traversed and of the volume of commerce available, the Baltic trade and such Mediterranean voyages as those from Southern France to Algiers or Morocco call on the average for smaller craft than the modern ships of American domestic carrying. There is no reason why the surplus light tonnage of the Shipping Board fleet should not be disposed of to advantage to enterprising shipowners of the Continent during this present year and next year, if satisfactory prices and terms can be arranged. The war well nigh put an end for four years to commercial shipbuilding on the Continent. France and Italy lost one-half of their seagoing tonnage to German submarines. Spain and all Scandinavia were heavy sufferers. There is a great void of tonnage to be filled in European waters. The Shipping Board has shown sound commercial strategy in sending types of its smaller craft to trans-Atlantic destinations. Thrifty Continental merchants find real value in strong wooden-built American steamers at $90 to $100 a ton.

Thirty-four wooden steamers of the Shipping Board are in service to the United Kingdom, thirteen to Scandinavia, nine to France, three to Spain, two to Italy, and three to Holland. Many of the latter wooden hulls are being finished as barges. In one way or another this wooden tonnage that once seemed excessive and menacing will be gradually absorbed or eliminated from American service. The most successful of the wooden vessels, of which the Pacific Coast can claim a generous share, should be able to find employment in congenial trades where before the war good wooden carriers continued to earn dividends.

Fixing Ship Prices

One movement of practical sense and hope for the future is embodied in the proposition of Mr. Edmonds of Pennsylvania, Chairman Greene's capable lieutenant on the House Committee on Merchant Marine and Fisheries: "That a special commission be appointed, to be composed of three members of the Commerce Committee of the Senate to be elected by that committee, three members of the Merchant Marine Committee of the House to be elected by that committee, and three members elected by the United States Shipping Board, which commission shall arrange a price for the sale of the ships owned by the United States Shipping Board or its subsidiaries, giving due consideration in the naming of the price to the necessity the American merchant marine will be under of meeting the world competition that will exist after the present war conditions have ceased."

This predicates an unwillingness on the part of the Shipping Board to grapple with the most urgent maritime problem of the day—the marking off of the extravagant "war costs" of war-built government-owned tonnage. It is another familiar instance of "passing the buck" to Congress—and this in spite of the undoubted fact that the fundamental act of the board gives it abundant authority to sell these ships and put a price upon them and gradually to take the government wholly out of the shipowning and operating business. There is need of prompt and definite action, or the government before many months will be face to face with the competition of superior vessels thoroughly and carefully built in time of peace, for which contracts are being shaped by experienced and competent American steamship companies with the older American shipyards whose building ways are gradually being relinquished for commercial use. The first merchant steamers of a new fleet launched at Fore River or Camden or Philadelphia or Chester or Newport News, or on San Francisco Bay, San Pedro, Columbia River or Puget Sound, will inevitably slice at least $40 or $50 a ton from the price at which most of the present Shipping Board tonnage is held. Why should not Congress and the Shipping Board frankly recognize this circumstance?

The Ship that Would Not Sink

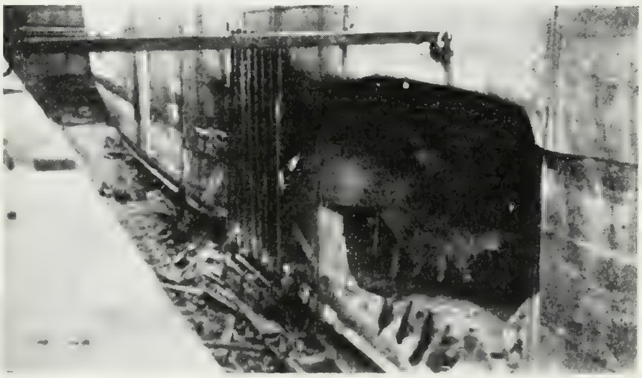
J. T. DUTHIE & CO. of Seattle have delivered to the Emergency Fleet Corporation sixteen steel steamers of the standard 8800 d.w.t. type. All of these steamers have given a good account of themselves, but probably among them none is more famous than the steamship West Bridge, known now to shipping men on the Atlantic Coast as the steamer that would not sink.

On May 21, 1918, laden with full cargo en route to France, she was attacked by a submarine about four-hundred miles from Brest and struck by two torpedoes almost simultaneously at a point between frames ninety-four and ninety-five in No. 3 hold. The force of the blast was so strong that many of the pieces of plate were driven clear through the ship. No. 1 boiler had its shell plates caved in and the whole boiler torn off its saddle and driven back through the engine room, where it settled down on the tank top crushing all bilge piping. The forward saddles of the center boiler were torn off and all holding down bolts of that boiler sheared off and the boiler driven back partly through the engine room bulkhead. The vessel settled by the head immediately. The crew took to the boats and were picked up by the patrol steamers. A Seattle boy about eighteen years of age, acting as quartermaster, succeeded in taking the snap shot of the vessel from which one of our illustrations is made. In the condition shown in the photograph, with her stern high in the air, tow lines were attached to the West Bridge by patrol steamers and she was towed to Brest. There her original crew succeeded in partly discharging her cargo from the after hatch. She was then towed to a sand bank and allowed to settle gradually to the bottom. When time could be spared for the work, a coffer dam was built across the hole in her side and she was floated and put into the dry dock for repairs. Our illustrations show very graphically the size of the hole in her side which measured nineteen feet high and ninety feet long. The fact that this vessel was able to float under these conditions showed the remarkable work that had been put into her bulkheads and decks. The boilers for this ship were three in number of the Scotch Marine type, built by the Commercial Boiler Works at Seattle, and she was engined by De Laval turbines.

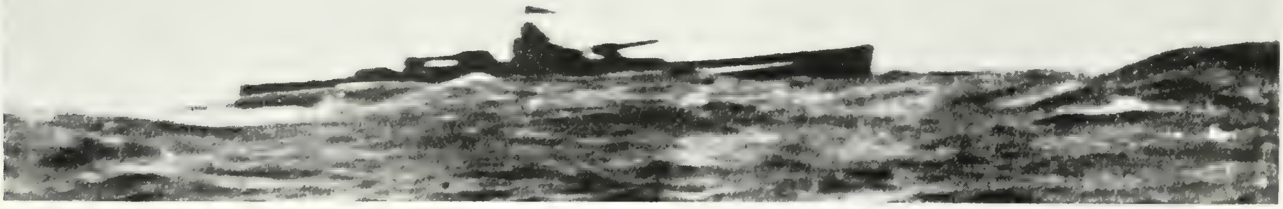
The West Bridge just after being struck

The West Bridge half submerged

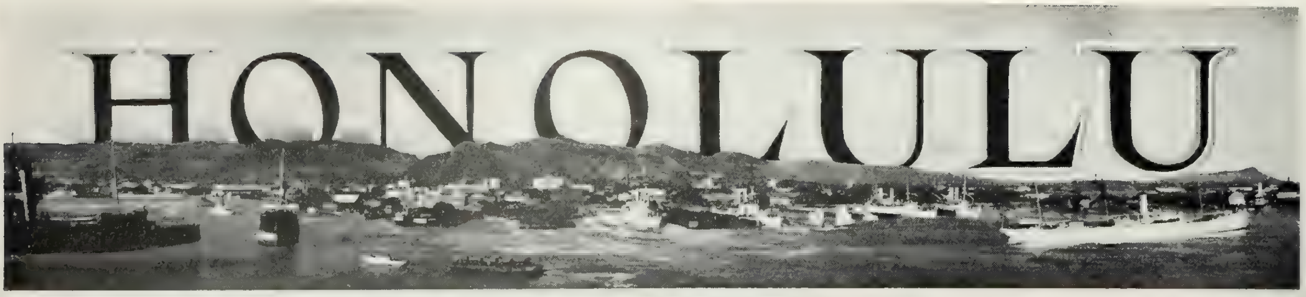
The West Bridge as she finally settled



View of West Bridge in drydock, showing hole in side



The German "U" boat on the Atlantic. This remarkable picture was taken off Cape Hatteras at the time of the last German raid



HONOLULU

By Special Correspondent

DREAMS of far seeing shipping men in Honolulu who have planned for several years the ultimate expansion of port facilities to meet the increasing tonnage that is predicted will come to Honolulu are about to be welded into actuality, at least in part, according to an announcement by Colonel H. C. Newcomer, United States engineer corps, that definite work on the Kalihi reserve channel will be started next month. Bids for the contract on the big basin will be opened August 26 and actual dredging work is expected to be under way early in October.

The contract will also include dredging a large yardage area near the quarantine station, and the two projects will run into several hundreds of thousands of dollars. While the appropriation will not at this time be sufficient to dredge out the entire channel, the start will be made and every Congress will be asked for funds to push the construction successively further and further until it is finally an accomplished fact in its entirety.

This is to be the contribution of the Federal government from the Rivers and Harbors appropriation and is entirely separate from the two-million-dollar improvement scheme provided for at the last session of the Legislature and on which work is now progressing.

Dredging of two projections or sand spits on either side of Kalihi proposed channel has already been done, thus relieving visiting vessels from the necessity of a difficult turn in the inner harbor. The quarantine station area will be dredged out first and it is the belief of Colonel Newcomer that sufficient funds to complete this work are already at hand from the Rivers and Harbors allotment. It is estimated that about 212,000 cubic yards of material will have to be removed from the quarantine basin and when this is done the original lines of the harbor will in large measure be restored, with a uniform depth of thirty-five feet, which is believed sufficient to take care of any vessels visiting the port.

As soon as work on the quarantine project is finished the government, under the direction of Colonel Newcomer, will commence digging out the first unit of the Kalihi reserve channel. Present Federal plans call for a channel 800 feet wide and 1000 feet long, but the work will be extended, as soon as additional money is at hand, into Kalihi Bay. To put through the channel to the desired point, thus connecting the bay with the harbor proper, it is estimated will require the removal of 1,400,000 cubic yards of material at a cost of $439,000. At present, work must be started under the available sum of $50,000 to which will be added whatever surplus remains in the available Rivers and Harbors fund set aside for Honolulu, after the quarantine improvements are completed.

It is the plan of the government, Colonel Newcomer says, to develop the reserve channel to a point 100 feet from each bank. The work from the start will be carried out as far as funds will take it to the full authorized width. By this means, although the channel cannot be finished at once, a channel or turning basin will be provided into which ships can back and maneuver much more easily than at present.

The urgent need of Honolulu's harbor now and in future will be berthing facilities in addition to those now in use, which are often much overcrowded. Governor McCarthy has been interested in this angle of the situation for some months and believes that the solution to the problem lies in the acquisition of Sand Island on the southwest side of the harbor, from the Federal government. The island is now under control of the war department and negotiations with this department were almost put through last November for the transfer to Territorial control. At the last minute, however, the treasury department intervened with a complaint that the quarantine station was not being taken care of properly under the plans for the proposed transfer. The plan then fell through. The Governor, however, has not dropped the project and important concessions on both sides were agreed to recently which it is confidently believed will remove the objections of the treasury department and result in the deeding over of the land within a few weeks.

The Territory has agreed to build for the quarantine station a new wharf in exchange for the one which was recently completed and must be torn down if the new scheme is put into effect. Other objections that prevented the transfer last fall are said to have been overcome in the opinion of the Honolulu quarantine representatives and the matter will go to the treasury department heads at Washington.

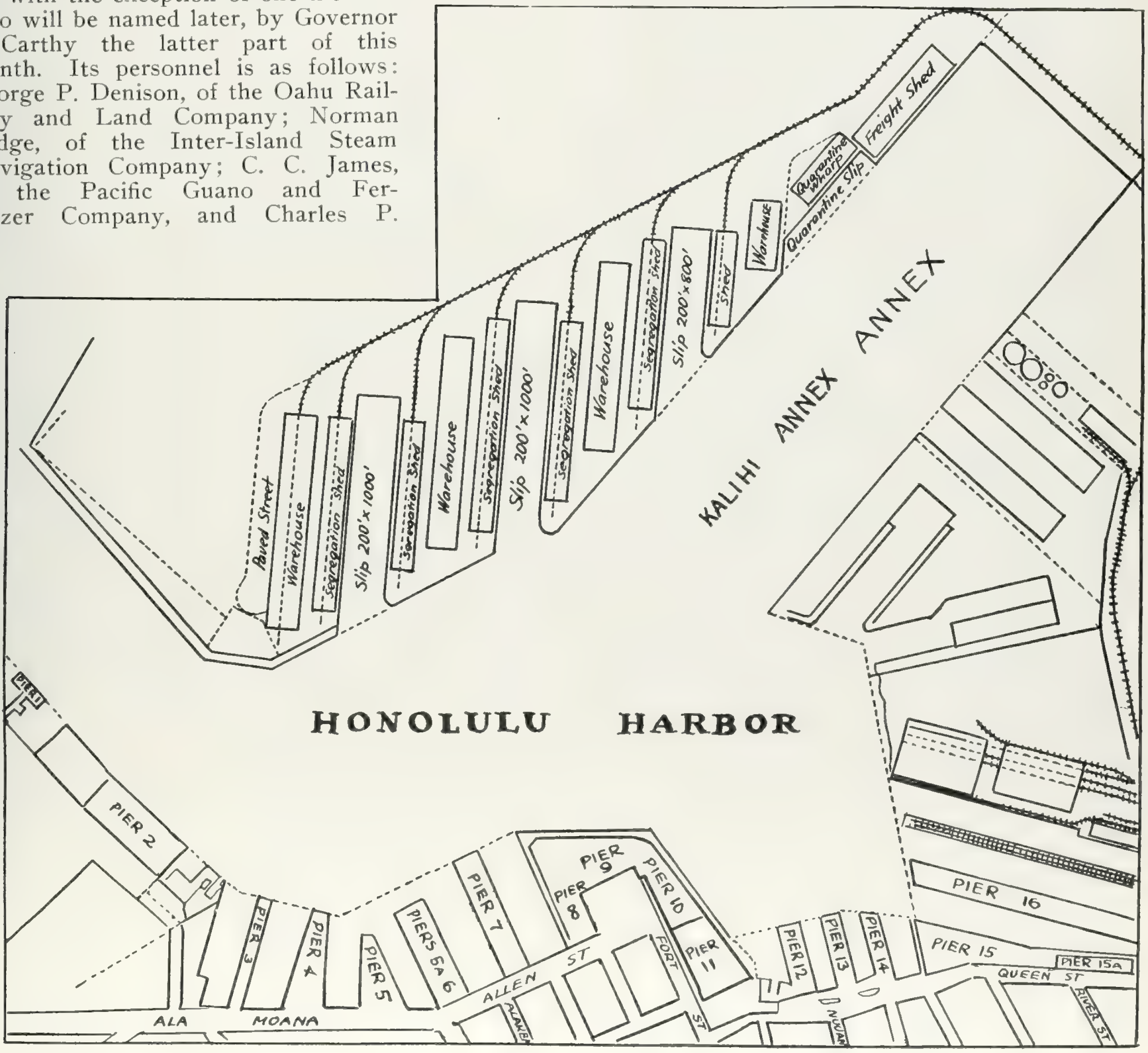
The war department has two anti-air craft bases on Sand Island and a cement ammunition foundation but these have never been fitted up or used, and the Territory is willing to compensate the war department for these items by filling in the reef seaward from the island with the sand to be dredged from the slips which will be built on the city side of the island, thus forming an equal area of reclaimed land for the war department.

The acquisition of Sand Island will provide at least ten additional berthing spaces and if it is deeded over to the Territory the next Legislature will be called upon for appropriations to build them. Railroad facilities will be built from Iwilei to connect with each one of the wharves and warehouses.

One of the largest construction jobs completed in Honolulu in the past year was finished August 1, when contractors for the new Inter-Island Steam Navigation Company pier on the Iwilei side of the harbor, near the coaling plant, announced the structure finished and ready for use. Slightly more than 600 feet of concrete pier have been installed at a total cost of about $165,000. The building was started last fall but a shortage of materials held up the construction for the first few months. One of the unique features of the pier is that all piles were driven in from the shore instead of from floating pile drivers. A line of wooden test piles were driven first and a track was built, over which the pile drivers were rolled into position. The permanent concrete piles were then driven home and the test piles removed. The Inter-Island plans to add to the new pier in the near future another 320 foot section in order to bring the wharf back to the shore, and when this is finished it is intended to construct a large warehouse.

The free port commission to determine upon the merits of the question of establishing a free port zone or general free port was appointed, with the exception of one member who will be named later, by Governor McCarthy the latter part of this month. Its personnel is as follows: George P. Denison, of the Oahu Railway and Land Company; Norman Gedge, of the Inter-Island Steam Navigation Company; C. C. James, of the Pacific Guano and Ferailizer Company, and Charles P. Morse, American-Hawaiian Agent, and formerly agent in Honolulu for the Shipping Board. The committee will make its report and forward it to the Governor.

Honolulu this month welcomed the news that the China Mail liner Nanking is not to be removed from the Honolulu run after all. Reports some weeks ago were to the effect that the Nanking would make a special run to carry back wounded soldiers of the Czecho-Slavs from Siberia and then go on the direct San Francisco-China run. Japan advices say the Siberia Maru of the Toyo Kisen Kaisha Line will be removed from the Honolulu run after her next in-bound trip here and go on the express Yokohama-Hongkong-San Francisco service which was established July 6. The Tenyo, Korea and Shinyo Maru vessels, however, will remain on the present schedule, which includes Honolulu. It is confidently believed here that by next July, the date when the coast-wise restriction goes into effect with reference to Honolulu and prohibits foreign steamers from carrying Hawaii passengers to and from the mainland, the present traffic congestion will be relieved and things return to normal again. Advices received here place the return of the large Matson boats variously between October and December.



By Special Correspondent

INAUGURATION of the Pacific Coast-European service of Williams, Dimond & Company, according to Portland figures, dates from August 20, when the steamer Eelbeck was dispatched by way of San Francisco for London and Liverpool. The West Harland, launched August 4 at the yard of the Columbia River Shipbuilding Corporation, has been assigned to the same line to load here this month for Scandinavian ports. The Columbia Pacific Shipping Company, Oregon agents for the fleet, report that cargo offerings for Northern European ports are numerous.

With the delivery of the 3800-ton steel steamer Doylestown, August 16, the Albina Engine and Machine Works concluded its compact with the government to furnish tonnage for the war merchant fleet. There were seventeen ships in all turned out there, two of 3300 tons deadweight, and fifteen of 3800 tons.

J. R. Bowles, president of the Northwest Steel Company, who returned August 15 from the East, after an absence of a few weeks, says his company has not closed with the Shipping Board for two more 8800-ton vessels, as was rumored. Mr. Bowles said the wages being negotiated for the future would have a bearing on construction and that contracts with private interests were not to be considered so long as costs could not be computed and they were in doubt until the wage features were settled. The only alternative, says Mr. Bowles, is a cost-plus arrangement, which is not favored by owners as a peace-time system.

The steamer West Harlan, which has been under repairs at Seattle as a result of damage sustained in the Columbia River, when her steering gear failed and she grounded, being then fully laden, returned to the city the last of August to load flour and lumber. Her first cargo was wheat and that was transferred to a sister ship after the accident and dispatched for the Atlantic.

Among additional terminal facilities planned by the Commission of Public Docks is the construction of three barges, each to have from 300 to 400 tons capacity, for use in handling vegetables, oil, molasses and general cargo between terminals and to and from ships.

Deciding that a bid of $146,000 for building a steel hull for the dredge Columbia was higher than should be considered, the Port of Portland Commission has decided to have the wood hull of the dredge rehabilitated so that she can be retained in the service two or three years.

The 8800-ton steel steamers West Harts and West Chatala have been assigned by the Shipping Board to load lumber for Shanghai, the cargoes to be furnished by Dant & Russell, but a question relative to carrying bunker oil in the deep tanks, which are not double riveted, has resulted in the vessels being laid up until a decision is received from the Shipping Board at Philadelphia. Six other vessels of the type will be affected should an order be made to proceed with the double riveting and installation of "swash" plates in the tanks. The two lumber ships are the first allocated for that trade on the Pacific.

Demands of longshoremen presented early in the month for an increase in the straight time wage from 80 cents to $1 an hour and in overtime from $1.20 to $1.50 resulted in a large delegation of Portland shippers going to Seattle for a conference of employers and union men August 12. A decision to submit the matter to committees representing each side was counted on as the best means of a speedy and satisfactory adjustment.

The schooner Georgette, turned out by the Columbia Engineering Works, has been fixed by the Pacific Export Lumber Company to load lumber on the river for Alexandria, Egypt.

The Admiral Line, which is operating the Portland-Oriental fleet of 9500-ton steamers, has adopted a schedule that provides for sailings every twenty-eight days, which means a steamer will get away every fourth Saturday.

The steamer West Nosska, one of the 8800-ton steamers completed by the Columbia River Shipbuilding Corporation, reached New York August 7, after a record trip from the Columbia river of twenty-three days and six hours. It was learned later that she was ordered to Italy to discharge her cereal cargo.

One highly important transaction of the past month was the purchase by Bert C. Ball, president of the Willamette Iron and Steel Works, and his active associates in the operation of the plant, of the stock of others who have not been identified individually in the conduct of the property. It was also announced that the interest of C. E. Grelle in the Independent Foundry Company had been acquired, so that establishment will be conducted hereafter as an adjunct of the Willamette plant.

Colonel J B. Cavanaugh, Corps of Engineers, U. S. A., who was in charge of work in the State of Washington during the construction and completion of the Lake Washington Canal, and organized and went to the front with the 18th Regiment of Engineers, reported in Portland early in the month to assume charge of the First Portland District. That embraces harbor and channel projects on the coast of Oregon, other than the mouth of the Columbia River, and inland waterways such as the Columbia River above the mouth of the Willamette, also the Snake River.

TACOMA

By Special Correspondent

Ending litigation, John L. Roberts, president of the Puget Sound Iron & Steel Works purchased the shipbuilding plant of the Martinolich Company at Dockton at a recent sale held by the trustees of the company. The two vessels under construction there were not included in the sale. Mr. Roberts is not prepared to say just yet what will be done, but if the owners of the vessels want the work finished it is probable that the new owner will complete the contracts. It is said that the plant went for $9000. The machinery alone is said to be worth this amount.

One of the fastest voyages recorded by Garland line vessels from Tacoma to Shanghai and return has just been completed by the Javary, Captain Charles Poindexter. Captain Poindexter put his vessel from Tacoma to the Chinese port and back in seven weeks. When it is taken into consideration that the Javary is the smallest steamer crossing the Pacific and flying the American flag, Captain Poindexter feels that he made quite a record.

Lumber shipments from Tacoma following a slight falling off during the early part of August now give promise of showing a better trade. Chinese interests have their first order booked here with local mills. It is expected that this cargo amounting to around 3,500,000 feet will be taken by one of the Shipping Board vessels. Besides this there are several cargoes loading for United Kingdom and the old-time brig Geneva is loading for a West Coast port.

Following a long hope that some arrangement would be made whereby the Foundation Company could resume work here it has been definitely announced that the plant will be dismantled. The machinery and gear that cannot be sold here will be shipped to France. The work of tearing the plant to pieces commenced August 1.

Captain Phillip Fechter, former chief officer of the Garland line steamer Justin, assumed command of that vessel August 7 when she sailed for the Orient. Captain W. F. Eckert who has had the vessel since she was purchased from the government by the Garland interests will remain ashore for several months and then take up new work. Captain Fechter was in the Petrolite when that vessel was torpedoed and sent to the bottom but he managed to get all his crew ashore safely.

After a month of near idleness, due to light vessel movement, August saw a rush of shipping for the Osaka Shosen Kaisha line. Eight vessels of this line arrived during the month both from the East Coast bound for Japan and the direct vessels of the Tacoma-Oriental trade.

Following differences among the workers and management of the Todd Drydock & Construction Corporation yard which at one time seemed likely to force a close down of the yard, satisfactory arrangements were made and the men went back to work. The trouble on this occasion was between the blacksmiths and plant heads. It is said that an ultimatum was placed by Mr. C. W. Wiley, president of the company, before a committee from the blacksmiths stating that it was work or close down and while no information has been given out by either side regarding the controversy, the plant is working.

Captain Sigmon Uddenberg has succeeded to the position held by Captain John M. Smith in command of the freighter Wakena. Captain Smith who was widely known here among local steamboat men died suddenly on his boat at Everett the latter part of July.

The Foss interests have purchased the hull of the famous old stern wheel steamer Greyhound and will make a float of it for their boats during the time the fleet is here. The machinery was taken out of the Greyhound some months ago by a local junk company.

Tacoma will be made the salvage headquarters for the Emergency Fleet Corporation. The department will be in charge of Thomas Stark formerly in the Shipping Board offices at Seattle. It is estimated that $30,000,000 worth of shipbuilding material will be gathered together here. The government is using the site occupied by the Seaborn Outfitting docks for storing the material.

There was a feeling of regret among local shipping men when word was received here of the death of Captain Alexander Ogilvie, master of the Quittacas, who took his life while bound from Tacoma for New York. It is generally believed that his act was caused by nervous troubles brought on by shell shock and the strain undergone when his vessel was torpedoed two years ago. On that occasion he nearly lost his life and Tacoma friends noticed a decided change in the ship master before he sailed on this voyage. Captain Ogilvie sailed out of Tacoma some twenty years ago in the vessels of the Boston Steamship Company to the Orient. He had been residing prior to the outbreak of the war at his farm on Wollochet Bay. He offered his services when sailors were needed and was given the Westover which was torpedoed on the homeward passage. He is survived by his wife and family.

On the Shores of Grays Harbor

By Special Correspondent

GOVERNMENT dredging operations on Grays Harbor, suspended for two years, have been resumed by the dredge Seattle. The first work to be done is the digging of a deeper channel through the bar that has formed in the inner harbor opposite Grays Harbor City. The government and the Port Commission are cooperating in this undertaking, and when it is completed the dredge probably will start in on the Commercial Club's project for deepening the inner channel from that point up to Hoquiam and filling in waterfront property.

Work is progressing rapidly on the four wooden vessels being built on private account at the yard of the Grays Harbor Motorship Corporation in Aberdeen. The first of these vessels will be launched in September. A force of about 800 men now is employed at the yard.

Efforts to have Grays Harbor designated as a sub-naval base, with this section as the home for a quota of destroyers and subchasers of the Pacific Fleet, have been inaugurated by the Hoquiam Commercial Club. Through Admiral Hugh Rodman, commander of the Pacific Fleet, recommendations will be made to the Navy Department. The strategic location of Grays Harbor, being immediately adjoined to the open sea, permitting quick action, and midway between Columbia River and the entrance to Puget Sound, and being also the eastern terminus of the great circle of commerce of the Pacific, are points which are expected to have strong bearing in obtaining a favorable decision.

The Hoquiam Commercial Club and the Aberdeen Chamber of Commerce, working through the harbors committee, an organization composed of several members of both bodies, have made official application for a lightship to be stationed off the Grays Harbor bar. H. M. Delanty, chairman of the committee, announces there is every indication that the request will be given favorable consideration. Steps also have been taken to establish a sub-coast guard station on the north side of the Grays Harbor entrance, and to secure a wireless compass adjusting station for the coast guard station at Westport on the south side of the entrance. All three of these projects are of vital interest to shipping and will safeguard vessels beween Columbia River and Puget Sound as well as those booked for Grays Harbor cities.

The Hoquiam Commercial Club and the Aberdeen Chamber of Commerce are assembling data as to the probable amount of exports from Grays Harbor which might be expected if a sufficiently low rate of water transportation were secured to enable the entrance of Western products in Eastern markets. These data, along with similar statistics now being prepared in other cities of the Northwest, will be submitted to the industrial committee of the Seattle Chamber of Commerce. The committee will use the figures in its investigation of a plan proposed by Victor H. Beckman, prominent Seattle lumberman, to secure lower cargo rates for Pacific Coast commodities and continue the life of the wooden shipbuilding industry.

The Aberdeen men at work assembling data in that city include John T. Elson, chairman; Monte R. Ward, T. H. Blyth, T. W. Tebb, A. F. Peterson and W. L. Morris. The Hoquiam figures are being compiled by Secretary L G. Monroe of the Commercial Club. At meetings held recently at Raymond and South Bend, the following committees were named to work on the proposition: Raymond—G. E. Dickey of the Sanderson-Porter Company; W. S. Cram of the Silo Mill Company; Charles L. Lewis of the Raymond Lumber Company; W. C. Boggs of the Central Grocery Company, and E. F. Rhodes, realtor, South Bend; T. E. Pierson of the South Bend Mills and Timber Company; Elbert Peterson of the South Bend Canning Company, and W. C. Cressy of the shingle mill industry.

While the idea that Mr. Beckman is now advocating for the saving of the wooden shipbuilding industry, as well as others, may not be entirely new, it has many new phases. Mr. Beckman is receiving warm support in his project and has succeeded in getting many Pacific Coast business men, including lumbermen, shippers and the commercial organizations interested to the extent of taking hold of the project.

The plan proposed is that the wooden shipbuilding industry be revived and great fleets of this type of vessel be built to carry lumber, canned salmon, wheat and other Western products to the Atlantic Coast markets at low freight rates. Mr. Beckman proposes rates as low as $8 per ton. He says it may not be possible to handle business at that figure, but does declare emphatically that it can be handled at much below the present charge. From the Atlantic Coast these vessels would bring back cargoes of raw materials and manufactured goods needed on the Pacific Coast.

One of the large features of this freight from the East to the West Coast would be steel for the Western steel shipyards. With the mild Western climate the Western yards could be kept in continuous operation at the highest efficiency, while the Eastern yards are forced to close down often or operated at reduced efficiency on account of the excessive cold in the winter or the extreme heat in the summer.

The effect of the plan on the lumber trade, it is declared, would be far reaching. In the first place the amount of lumber required for the ships themselves would be considerable. That was demonstrated during the government's emergency fleet building drive, and under Mr. Beckman's proposal a far greater number of these vessels would be built. Then comes the effect on the lumber market of being able to reach the Atlantic Coast at rates that would permit Western lumber to compete with the Southern products beyond a certain point. The Missouri and Mississippi valleys were about as far east as Coast lumbermen could expect to ship before they ran into the territory in which Southern pine had too great an advantage due to lower freight rates. The Atlantic Coast was impossible except in isolated cases of some particular order for a particular stock which the South could not furnish.

By Special Correspondent

THE shipping of bulk grain from the Pacific Coast to Europe is an innovation that was launched at this port last month, when the Emergency Fleet steamer West Islay was dispatched. The vessel loaded 4000 tons of bulk wheat in her lower hold and 4600 tons of sacked wheat between decks for England.

As a time saver in handling cargo, bulk loading has been proved to be far superior to the stowing of sacked grain. While the West Islay was not properly equipped for handling this character of cargo, having insufficient hatches, thus necessitating a vast amount of extra trimming of cargo, the bulk grain was put on board at the rate of 180 tons an hour. This capacity will be more than doubled so soon as the additional equipment, which the port is planning, is installed. In order to thoroughly test the condition of the bulk grain during its journey through the tropical waters, the West Islay was equipped with numerous thermometers placed at various points in the hold, and these are to be carefully watched and their readings reported to the grain corporation, as well as to the insurance underwriters.

During the present month the steamer West Isleta loaded 4925 tons of flour at the Astoria Port terminals for Great Britain and the steamer Askawake loaded 4000 tons of sacked wheat for the same destination.

The first shipment of the 1919 crop of wheat arrived at the Astoria terminals on August 10. It was a small shipment of only a few carloads, but will be followed by large consignments so soon as the elevators are cleared of the 1918 crop.

The Foundation Company has four piledrivers at work constructing the foundation for No. 3 pier at the Port Terminals, and operations are being crowded as fast as the piling can be secured. In order that this construction may not be delayed, the Port Commission is urging the Shipping Board to make some disposition of the two unfinished hulls at the Rodgers shipyard, near the land end of the proposed new pier. Work on these wooden hulls was suspended several weeks ago. A few days ago, the hulls were examined by Federal inspectors and rumor says recommendation will be made that the hulls be completed and launched as quickly as possible.

The Pacific Power & Light Company, which was preparing to erect a 4500 kilowatt power plant in the Young's Bay industrial district, has decided to double the capacity of its proposed plant. Options have been secured on three sites and test piles are now being driven to ascertain which is the most suitable. The machinery has been ordered and work on the erection of the plant will be started in the immediate future.

The port dredge Natoma is at work making the fill for the Astoria Marine Iron Works' new plant on the west side of Young's Bay, as well as for the 12,000-ton marine railway, which the Shipping Board has authorized be erected in connection with the iron works' plant. A fill 1400 feet wide and about 4000 feet in length is being made with a bulkhead along the entire frontage. At the same time the Natoma is making a fill to widen the dike highway on the south side of Young's Bay to make room for the laying of the belt line railway to that industrial center.

The construction of the bulkhead for the third reclamation district in Astoria is well under way. The district extends from Twenty-third to Thirty-seventh street and the bulkhead will be 4300 feet in length. The dredge is on the ground ready to make the fill by pumping sand from the river so soon as the bulkhead is finished.

Astoria port dredge Natoma making fill for Astoria Marine Iron Works belt-line road and marine railway

PANAMA

By Special Correspondent

A SPECIAL welcome was extended to Admiral Hugh Rodman when he brought the Pacific fleet through the Panama Canal, because he was an old friend returning. Admiral Rodman, then Captain, first came to the Panama Canal in January, 1913, to fill the position of naval assistant to General Goethals, then governor of the Panama Canal Zone, for the purpose of assisting in the preparation of traffic rules and regulations and preparing for the opening of the great waterway to commercial vessels. After this work was well under way he left in March of the same year and returned the next year to take up the duties of superintendent of transportation under the permanent operating organization of the Canal.

Admiral Rodman had been mainly instrumental in drafting the rules and regulations, and now it was put up to him to apply them and make them work in actual practice. His title was changed in February to that of marine superintendent and he continued in that capacity with the Panama Canal until he was relieved September 30, 1915, by Commander H. I. Cone, and Admiral Rodman was assigned to sea duty.

The services of Admiral Rodman were of great value to the Panama Canal and to the commercial ships passing that way. His duties involved the preparation of traffic regulations for vessels transiting the Canal, the piloting and handling of vessels in the Canal and Canal Zone waters, management of vessels in the locks, measurement for the payment of tolls, and the organization and co-ordination of all business and work related to the use of the Canal by commercial and other vessels.

Admiral Rodman is strongly for efficiency and simplicity and just as strongly against devious methods and red tape. The system and regulations installed by Admiral Rodman have been changed but little since the beginning of operations and they have brought forth praise from the patrons of the Canal that is a real tribute to his ability and foresight.

The commerce of the world that uses the Panama Canal should be thankful to Admiral Rodman for the fact that they can make the passage without vexatious delays and without having to struggle through a tangle of red tape.

The masters of many ships bound for the Canal have been neglecting to report by radio to the captain of the port at the nearest terminal of the Canal the probable time of the arrival of the ship. Vessels should report their names, nationality, length, draft, tonnage, whether or not they desire to pass through the Canal, require coal, provisions, supplies, repairs, to go along side of wharf, the use of tugs, probable time of arrival, length of stay in port, or any other matters of importance or interest. If this information has been previously communicated through the agents or otherwise to the captain of the port, it will not be necessary to report by radio. However, the probable time of arrival should always be sent.

There is no charge for transmitting such reports by radio, as the rules provide that "No radio tolls, either coast station or forwarding, will be imposed on radiograms transmitted by ships on Canal business."

In addition to the reports of probable time of arrival, position reports (TR) should be the first communication between ships approaching the terminals and the Canal radio stations. Such compliance on the part of vessels will greatly reduce the radio work and unnecessary interference, as it will enable shore radio stations to know when a ship is in communication range. Ships can always hear the shore stations long before they themselves can be heard by the shore station concerned.

The Salaverry, the fourth of the five German steamers brought to the Panama Canal shops at Balboa for repairs, was found to be in satisfactory condition after her trial trip and was thereupon turned over by the mechanical division to the marine superintendent, acting for the Shipping Board. This ship, formerly the German ship Uarda, is now named after the Peruvian port of Salaverry. She is a beautifully and substantially built steel screw steamer of a net tonnage of 5751 tons, built and registered in Hamburg in 1899. After making the passage of the Canal, the Salaverry went on to New York, from which port she will be operated by the Shipping Board. She left the shops as good as new, in spite of the damage done by the former German crew.

The dry dock at the Cristobal Marine Shops at the Atlantic entrance of the Canal set a new record on July 3 for vessels drydocking at one time at that place. The drydock is only 300 feet long, but the total length of vessels occupying it at that time was 685 feet. The vessels were three United States submarine patrol boats, Nos. 1841, 2232 and 2235, the auxiliary schooner Linda S., the schooner Aviator, and the submarine C-3.

Provisions have been made in the accounting systems of the Balboa and Cristobal marine shops to include in bills rendered to individuals and companies for work done at the shops, statements showing the cost by main items. Each large repair job at the shops is divided into a number of items, and the bills will hereafter show the cost of performing the work under each of the items instead of consolidating the charges into one grand total. This practice has been adopted as the result of complaints from patrons to the effect that they have no way of determining the cost of the various units of a job, and it is believed that in the future the bills will give the necessary information.

Perhaps the best performance the Canal has made to date was the passage of thirty-three vessels of the Pacific fleet of the United States Navy through the Canal from Atlantic to Pacific, thirty of them being handled in two days, together with supplying large orders for coal, fuel oil, supplies and foodstuffs.

The destroyers were handled in groups, with a Canal pilot in charge of three destroyers, and in the locks six of these 310-foot vessels were placed in a single chamber, in two ranks of three each lashed together. This made a total length of vessels of over 1800 feet in a 1000-foot lock. The other vessels were handled individually with a pilot on each.

Two of the dreadnoughts, the Mississippi and the New Mexico, are the largest ships that have ever passed through the Canal, being 624 feet long and with a displacement of 32,000 tons. The Mississippi at the time of transit had a draft of 32 feet, 8 inches. Prior to the coming of these huge ships the largest ship that had passed through the Canal was the merchantman, Minnesota, 622 feet long, with a beam of 73 feet 5 inches, and a gross tonnage according to Panama Canal rules of measurement, of 22,053 tons.

The total length of ships in the fleet was 13,409 feet or a little over two and one-half miles, and their aggregate displacement was approximately 265,000 tons.

It took 10 hours, 46 minutes, to put the Mississippi through the Canal and 3 hours, 43 minutes, of the time was spent in the locks. The New Mexico spent over thirteen hours in Gatun Lake at anchor, during which time Admiral Rodman went over to the spillway to fish for tarpon at his old fishing grounds.

The Canal plants furnished 13,000 tons of coal and 48,233 barrels of fuel oil to the fleet. Ten thousand five hundred tons of coal were furnished from the Cristobal coaling plant, including 1200 tons sent in barges to Gatun Lake for delivery to the Arkansas and Texas. The Balboa coaling plant furnished 2500 tons, of which 500 tons were delivered by barges, and the remainder direct from the plant.

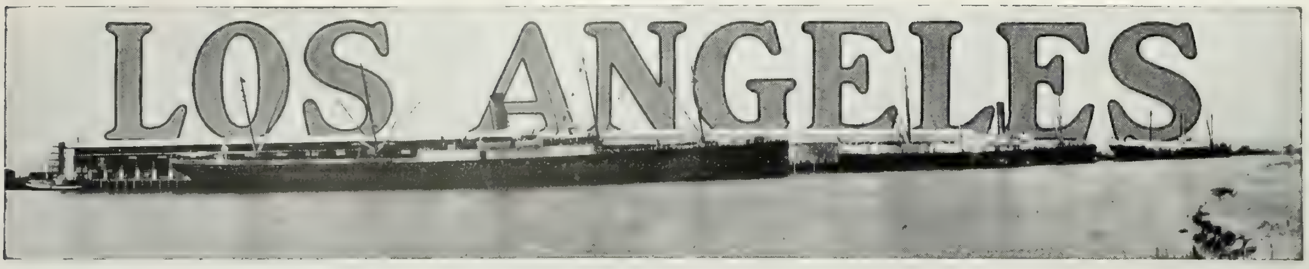
In coaling four cruisers at one time the Cristobal coaling plant delivered an aggregate of 2051 tons of coal to the four vessels in five and one-half hours. All four were handled simultaneously, three of the cruisers at the reloader wharf of the plant and the fourth at the wharf bunker at the north end of the plant. Also during these operations the five-masted French auxiliary schooner Lieutenant Degoud, was being coaled on the unloader side of the plant from De Mayo barges.

Admiral Hugh Rodman as a landsman, photographed in his former Canal Zone residence

The fleet was handled smoothly and without mishap or unwarranted delays. The passage of the thirty-three ships in two days occasioned no interruption in or delay to commercial traffic through the Canal, although the commercial traffic was below normal on account of the marine workers' strike in the Eastern ports of the United States. By the way the Pacific Fleet was handled the Canal has shown that it has a well-trained force which can meet efficiently and promptly and demands in the way of increased traffic.

S. S. Salaverry, formerly the German steamer Uarda

LOS ANGELES



By Special Correspondent

WHAT is declared to have been the biggest event in the history of the local port from the standpoint of future improvements took place when Secretary of the Navy Daniels made an inspection of the harbor with Admirals Jayne, McKean and Parks with a view of locating a submarine station on the Pacific Coast.

The visit of the Pacific Fleet taxed the transportation facilities of the harbor to the utmost. All of the huge battleships and superdreadnaughts were accommodated with plenty of room in the outer harbor and given coaling positions with no interruption to the usual water traffic. The destroyers and one cruiser were docked in the main channel of the inner harbor without interference with passing ship traffic. However, the launches and the street cars were unable to accommodate the hundreds of thousands who came to view the warships and in many instances it was dark before the last of the visitors could leave the vessels.

The downtown business section of San Pedro was blocked off to vehicular traffic, the streets and sidewalks being turned over exclusively to pedestrians. Even then the streets were filled as never before in the history of the port.

The visit of the fleet is believed to be a good criterion of the future needs of the port and local shipping men and city officials agree that early improvements should include a better method of entry into the port from the land side, the completion of the Harbor boulevard to the outer harbor, and the installation of coal bunkers for vessels burning coal.

One of the most important announcements by local shipbuilders came within the last few weeks when officers of the Los Angeles Shipbuilding and Drydock Company stated that the company had been awarded by the Emergency Fleet Corporation contracts for the construction of five 12,000-ton steamers. Construction work on the vessels will be begun as soon as the present contracts are out of the way. Within a few days following this announcement by the Los Angeles yard, officers of the Southwestern Shipbuilding Company confirmed a report that it had entered into negotiations with J. S. Emory & Company of Boston for the construction of ten 10,000-ton steamers to be operated by the Boston firm in trade between the coasts via the Panama Canal.

The strike of the employes of the Los Angeles Shipbuilding and Drydock Company is dragging along with apparently no end in sight. Officers of the Metal Trades Council announce their firmness to remain on strike until the ends for which they struck are attained. The officers of the shipbuilding company are as firmly determined to operate the plant without paying any attention to the demands of the Metal Trades Council and procured an injunction restraining the strikers from interfering with employes of the plant.

The company announced that there was a gross loss of wages to the men of $1,650,000. Four vessels which should have been completed are not completed. In summing up the loss the company stated that no one was benefited by the strike, the company, the country, the community, members of the unions and the families all suffering alike according to their interest in the plant.

Fishermen of Southern California are greatly interested in the suit recently filed in the Superior Court in Los Angeles by some of their number associated with several large canneries in an attempt to open Santa Catalina fishing grounds to commercial fishermen. Several fishermen were arrested there last month for seining within the limits proscribed by the State Fish and Game Laws. The canners and the fishermen contend that the laws make the island fishing grounds a sportsman's paradise and that through the operation of these laws, commercial fishermen are prevented from supplying canners and markets with the quantity of fish they could.

Fishermen also are protesting against the plan advocated by State Market Director Weinstock proposing that all the fishermen pool their catch and sell to the markets through one man. The local fishermen declare that the plan would make a combine of the men and launches.

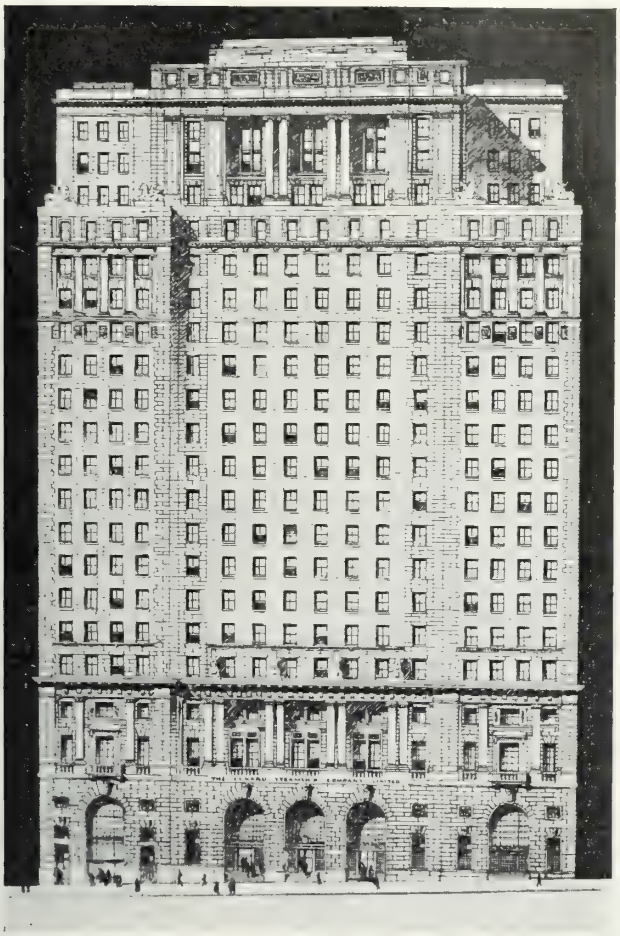
The Mexican government fish agency here, which has been open for the last two years in order to give permits to San Pedro fishermen desiring to fish off the Mexican Coast, has been ordered to be closed by the Mexican government. Local fishermen hereafter will be compelled to procure the permits in San Diego, involving trips of many miles out of their way.

Customs Collector John B. Elliott has declared that all launches and other vessels built in the local harbor and with this as their home port shall place the name of Los Angeles upon the vessel. Before annexation of the harbor towns of Wilmington and San Pedro to Los Angeles, vessels with their home ports there used the name of Wilmington or San Pedro and after annexation several of the harbor concerns continued to use the original name.

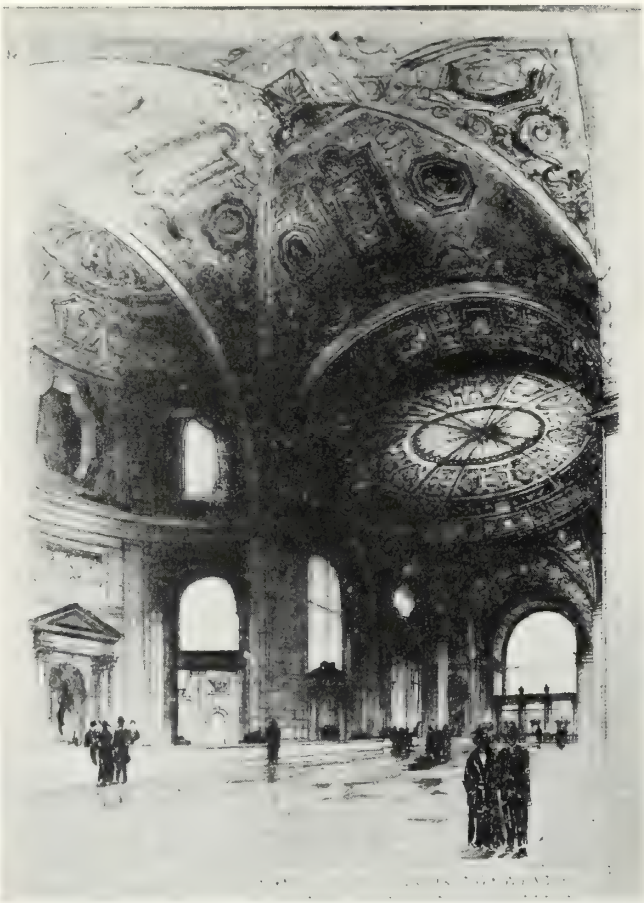
The West Aleta arrived last month from the North to load cargo for European ports. This is the first of the service inaugurated by Williams, Dimond & Company between this Coast and European ports.

Fire Chief Scott, on a recent harbor inspection tour, advocated greater fire protection. He said that the harbor was protected by but two companies and one tug, whereas there should be at least two more engine companies in the port owing to the great increase in its industrial activity.

New Cunard Building at New York



The Broadway frontage of the new Cunard Building

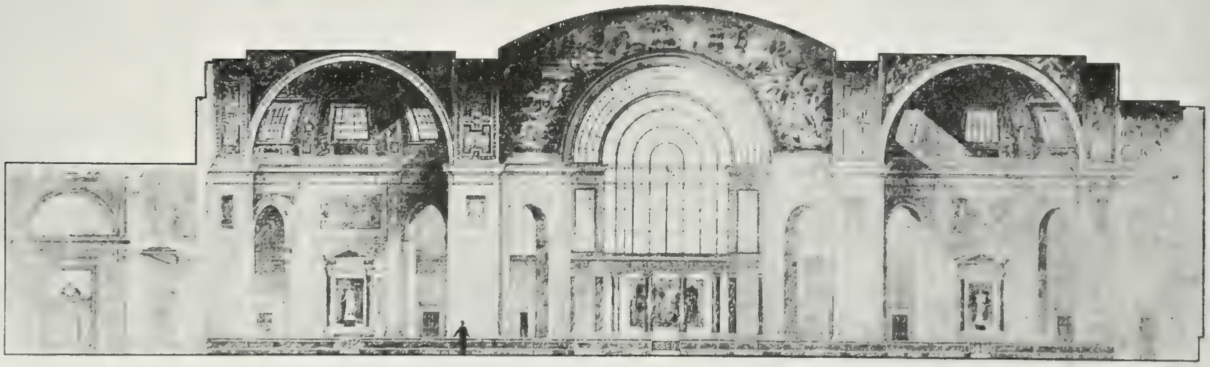


Architect's sketch showing perspective view of the great hall in the Cunard Building, looking west

THE building wreckers are now removing the last traces of the old Stevens House and some eighteenth century buildings on the adjoining Morris street from the plot bounded by Broadway, Morris and Greenwich streets, on which is to be erected a twenty-one story office building to house the New York offices of the Cunard Steamship Company, Limited, the Anchor Line, the Anchor-Donaldson Line, and other allied and subsidiary lines of the Cunard Company. This is the largest building proposition and realty operation ever undertaken by a shipping firm.

As indicating the confidence of this premier steamship organization in the future business relations between this country and Great Britain, the project is highly significant. The negotiations for the acquisition of the plot were begun during the war itself and were consummated February 21, 1918, nine months before the success of the Allied arms. The building plans, now complete, have been filed, and operations are already under way.

The acquisition of the plot itself involved some $5,000,000 and more than twice that sum will be expended in addition to complete the structure.



Longitudinal section of great hall in the new Cunard Building at 25 Broadway, New York City

Vancouver Notes

By Special Correspondent

CONSTRUCTION of wooden ships in British Columbia yards is decreasing. Three yards have ceased construction, having completed contracts; one is practically finished, two are working but have no permanent assurance of a future. The Lyall yards at North Vancouver are out of orders, the Northern Construction, formerly the Western Canada, is in the same position; the Pacific Construction yard at Coquitlam is through. The new Westminster yards will finish in a few weeks. On the Island the Foundation Company has about eight 3000-ton French ships to complete, and the Cholberg yards have eight or nine hulls. The latter is a Norwegian company building 1400-ton schooners for Norwegian interests.

The Union Steamship Company has instituted a new departure regarding its officers, so far as this port is concerned. Arrangements have been made to provide one day off in seven for second and third mates. Previously they had to stand by to unload when in port here. Now a wharf officer takes over this work and releases the officers. The same arrangement has been provided for engineers.

Shipping companies of British Columbia are organizing to provide relief from some useless governmental red tape. At the present time they have to clear through customs, every trip. For instance the C. P. R. steamer Princess Patricia, running twice a day between Nanaimo and Vancouver, must clear through customs, each time out of Nanaimo or Vancouver. The companies assisted by the Board of Trade, seek blanket clearances covering six months or a year between British Columbia ports.

The British government order of 70,000,000 feet of fir from the mills of British Columbia is now going forward rapidly. The lumbermen have formed an export company known as the Associated Timber Exporters of British Columbia under management of Mr. C. E. Huddard. The order was given in March and the lumber commenced to move just before the general strike in June.

The lumber men have been fortunate in securing the use of a fleet of forty French ships building in British Columbia yards. This fleet consists of wooden steamers, twenty of them being of 3000 deadweight tons, the remainder of 1500 tons. The larger ships carry 1,400,000 feet each, the smaller ones 550,000 feet. The C. Gardner Johnson Company is acting as agent for the French vessels.

The Union Steamship Company of British Columbia will place a new steamer on the coast run next spring. A contract has just been placed for the building of a wooden ship, 145 feet long and 27 feet beam, on the British Columbia marine ways. This is the first step this firm has taken in the shipbuilding line. The new vessel will be fitted with the engines from the Washington. When completed the vessel will run to Selma Park and Buccaneer Bay. The Union Company intends adding to the fleet of steel ships already operating coastwise. The new vessels will probably be built on the British Columbia coast instead of in England as formerly.

Mr. W. S. D. Cook, manager for the William Lyall North Vancouver shipyard, recently returned from a conference with his principals in Montreal and announces that unless more orders are obtained for wooden ships the yards will close about October 1. The company's last contract of eight wooden ships for France is completed now, excepting the installation of machinery and fittings. That will be done by October 1, it is believed.

Laid down on May 13, the thirteenth French ship built in the Foundation yards, Victoria, B. C., was launched on August 6. The hull holds the record for speed. Though on the ways eighty-five days, the work was done in sixty-seven working days, the waste time being due to strikes, Sundays and holidays. She is a wooden 3000-d.w ton steamship.

The Canadian Trooper, a 4300-ton steel ship built by the Wallace North Vancouver yards for the Federal government, made the fast time of 14.26 on her trial runs, averaging 13.62 knots. She loads lumber for Great Britain.

The new fishery patrol ship Givenchy is now on duty patrolling the British Columbia coast from Vancouver to the Naas River and along the west coast of Vancouver Island. She is of the trawler type and was built for mine sweeping in Canadian Atlantic waters.

The Canadian Pacific Railway Company's coasting steamship Princess Ena had two six-foot holes ripped in her bottom on Ripple Rock, Seymour Narrows, early in August. The holes were on each side of the keel, beneath the tunnel recess, and the ship was saved by prompt shutting of the watertight door between the tunnel and the engine-room. Otherwise she would have gone down in ten minutes.

Sailors on coasting ships of the Union Steamship Company of British Columbia are drawing $110 a month and board. The regular scale is $70 a month, but with overtime averaging $40, they are getting bigger pay than junior officers.

GENERAL INSURANCE FOR WOODEN VESSELS

Mr. George Grant, a director of the well-known firm of club managers, Robert R. Douglas, Ltd., of Liverpool, England, has recently been on a business visit to this country. We are informed that a new class general has been established within the United Kingdom Marine Mutual Insurance Association, Limited, under their management, specially for the insurance against all risks of a line up to $50,000 per bottom on modern and well-valued wooden sailing or auxiliary-powered vessels.

The same firm can accept in their other associations a further $50,000 on hull, F. P. A., disbursements, etc., T. L. O., and freight, all risks, so that full opportunity is now given to owners of this class of vessel to obtain an insurance for a substantial amount on the Mutual principle, which form of insurance has proved the most economical in the past.

New Marine Railways and Floating Dry Dock

A FLEET of seven coast-wise schooners is engaged in carrying the lumber to be used in the two marine railways and floating drydock that are under construction at the shipyard of the Moore Shipbuilding Company of Oakland, California. Of the 7,000,000 feet of lumber to be used in this work, 4,872,758 feet has been delivered and stacked in the west end of the shipyard. Of this amount 1,146,329 feet has been received for the marine railways and 3,726,429 feet for the floating drydock. The lumber is mostly Douglas fir and is being cut at the mills of the McCormack Lumber Company in Oregon, the shipments being made from St. Helena, West Port and Portland.

There is a great deal of work attached to sorting and piling the lumber after it is discharged from the schooners. It varies in length from 3 feet to 110 feet, is 6 inches to 18 inches in width and from 1 inch to 16 inches in thickness. Already many acres are covered in the shipyard with the piles of lumber, the greatest care being exercised to insure the best aeration between the individual pieces of lumber and perfect ventilation underneath the piles.

It is proposed to expend $2,500,000 in building the drydock and marine railways. The floating drydock will consist of five pontoons. Each pontoon will be 125 feet wide, 90 feet long and 16 feet depth of trusses at the center. The height of the wings will be 51 feet, 4½ inches. The two end pontoons will have an overhang of 20 feet. The total over-all length of the drydock, when the pontoons are assembled, will be 498 feet, with a maximum docking capacity of 16,000 tons.

Each pontoon will be separated into six water-tight compartments, which can be emptied by two volute motor driven pumps; or a total of ten pumps for the drydock. These pumps and valves are being made at the plant of the Moore Shipbuilding Company and the electric equipment is to be supplied by the General Electric Company. The pumping equipment will be operated from a central control station by means of start and stop push buttons. The flooding will be accomplished by hand operated gate valves connected to sea stools. Nearly 5,000,000 feet of lumber will be required for the five pontoons. Each pontoon will have nineteen trusses and two truss bulkheads, weighing about eighteen tons each. Two pontoons are being built at one time on the ways and when completed will be launched like the hull of a vessel. An additional 1,000,000 feet of lumber will be used to block up the pontoons and build the launching ways.

The marine railways are of the Crandall type. Each railway will be capable of hauling a 6000 ton vessel into a docking position. The length of each way will be 800 feet. Each cradle will be 390 feet long and 80 feet wide. There will be four roller tracks. The foundations of these marine railways will necessitate the driving of 1744 piles, of which number more than 50 per cent have been driven. The greater portion of these piles will be cut off under water by divers using an air operated saw. To make a place for these railways approximately 400,000 cubic yards of earth must be dredged. The dredged material is being loaded on scows and dumped in the deep water of San Francisco bay. There will be 1,352,000 feet of lumber, exclusive of piling, used to build the two marine railways. Work on the marine railways and drydock was commenced June 1 and will be completed some time in December, 1919.

A third marine railway in the shipyard of the Moore Shipbuilding Company was recently overhauled and 135 feet added to its length. Since this railway was completed it accommodated the Cotati, an 11,000-ton refrigerator boat. The vessel was hauled from the Oakland estuary, painted and returned to the water in six hours. This is considered by officials of the Moore Shipbuilding Company record time for lifting and painting a vessel of the tonnage of the Cotati. The task of hauling the enormous vessel out of the water was accomplished without the slightest difficulty. The Cotati was recently built at the plant of the Moore Shipbuilding Company and was placed on the marine railway to be painted before going on her trial trip.

The schooners engaged in bringing the lumber from Oregon for the drydock and marine railways are the Daisy, Wapama, Willamette, Multnoma, Celilo, Daise Freeman, E. H. Meyer and Klamath. The vessels have all made two round trips, and some three, from the Oregon ports.

9400-ton steamer Tuckanuck in drydock, Moore Shipbuilding Company

By Special Correspondent

FURTHER expansion of The Admiral Line's already large organization in the Orient has been announced by A. F. Haines, vice president and general manager. The announcement followed the return to the United States of Roger D. Pinneo, manager of The Admiral Line's foreign department, after an absence of nearly a year.

It was announced that John J. Gorman, general Oriental agent, will be transferred from Hongkong, where The Admiral Line has opened new offices at 53 Szechuen Road. Fred C. Charman, formerly agent of the China Mail Steamship Company at Shanghai, has been appointed agent for The Admiral Line there. E. L. Matteson, formerly secretary to Mr. Haines, has been appointed the company's agent at Vladivostok. E. E. Johnson, formerly agent at Vladivostok, has been appointed agent at Kobe, where the company has opened new offices at 40 Akasi Machi. Mr. Gorman will transfer his general headquarters to Shanghai just as soon as an agent has been named to take charge of the Hongkong office.

With this organization, The Admiral Line is now firmly established at Manila, Hongkong, Shanghai, Kobe, Yokohama, Vladivostok and Singapore, and also has its representatives at all outports in the Orient.

Mr. Pinneo returned from the Orient about the same time that H. K. Laidlaw, the company's purchasing agent, returned. Mr. Laidlaw has been in the Orient for The Admiral Line for two years, where he was engaged in helping establish and equip the company's chain of Oriental offices. Both Mr. Pinneo and Mr. Laidlaw were impressed with the possibilities for the development of trans-Pacific trade. "Business prospects in the Orient at present are very good," said Mr. Pinneo, "and as soon as the political situation is settled in Russia and China, there is no reason why there should not be a big increase in the business between those countries and America."

Hardly a month has gone by during the last year that some member of The Admiral Line's Oriental staff has not gone to the Orient. During the past few weeks J. B. Armstrong, formerly with Dodwell & Company, Seattle, departed from Seattle August 8 for Manila, where he will become assistant to M. J. Wright, general agent of the Philippines. Mrs. L. M. Bechtold, formerly assistant in the New York office, left Seattle, accompanied by her son, Louis Bechtold, on August 14 for Kobe. Mrs. Bechtold will be assistant to E. E. Johnson, agent at Kobe, and her son will be a stenographer in the Kobe office.

Mr. Pinneo left Seattle for the Orient in October, 1918, accompanied by Mr. Gorman and Dean J. Hanscom. They first visited Japan and then Manila, where they were joined by Mr. Laidlaw. The party arrived at Hongkong on December 1. At this time the armistice had been declared and matters were in a chaotic condition, but regardless of this, the Company's officials proceeded with the establishment of the Oriental agencies.

Subsequently, Mr. Pinneo went to Singapore. From Singapore, Mr. Pinneo returned to Manila and thence proceeded to Saigon, French Indo-China, to investigate conditions there. From there he returned to Singapore, where he was met by Mr. Matteson, who accompanied him on a trip through Java, visiting the very important sea ports of Sourabaya, Batavia and Samarang, where agency connections were established, and reports made to the head office with reference to future possibilities. From there they proceeded to Hongkong and thence to Shanghai and Vladivostok. Following this they visited Harbin, Tientsin, Pekin, Hankow and the Yangtse River.

At the present time, The Admiral Line has twelve ships on the Seattle-Oriental route and six ships on the Portland-Oriental route. On account of the increase in Oriental business, the company recently enlarged its general foreign department offices in Seattle.

LIFE INSURANCE AMONG SHIPYARD WORKERS

IN the shipyards of the Skinner & Eddy Corporation of Seattle, whose record breaking achievement in the production of Seattle ships has won for them world-wide recognition, the management has been singularly successful in winning the hearty co-operation of the thousands of men employed.

Many enterprises have been undertaken by the corporation for the furtherance of this co-operation between themselves and the employes. One of the most interesting of these was the establishment of a department for furnishing free life insurance to every employe who desired it. This department issued to the men who had worked sixty days or more in the employ of the company, policies of the Equitable Life Insurance Society of New York for $1000, payable in cash to the beneficiary on the death of the insured, regardless of the cause of death, provided that the name of the insured was still carried on the payroll of the company at the time of death. No physical examination is required, and there is no age limit. The corporation secures the policies from the insurance company at a flat rate on the group plan, the assumption being that the average of nine to ten thousand men would qualify physically for the requirements of average life insurance.

The system has worked out very successfully and since its introduction has materially lessened the labor turnover of the yard.

The Gorham Producer Gas Engine

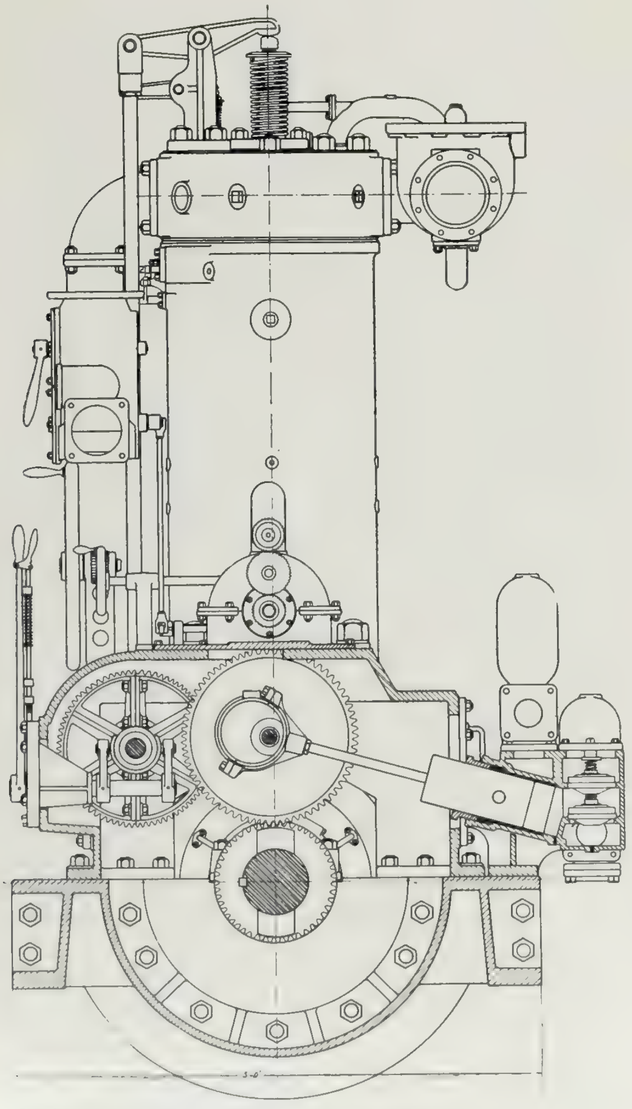
THE Gorham Engineering Company of San Francisco have designed and are now building two 500 horsepower marine producer gas engines, embodying many new features. The two engines are being built for foreign account, and it is asserted that because of the low price of coal in Oriental ports, these engines will operate at a cost comparing very favorably with that of the most economical Diesel motor. The company in addition have designs for similar engines from 200 to 500 horsepower along the same lines, as will be described. The producer gas engines are not an entirely new thing in Oriental ports, as there have been a number of successful marine installations operating there for four or five years.

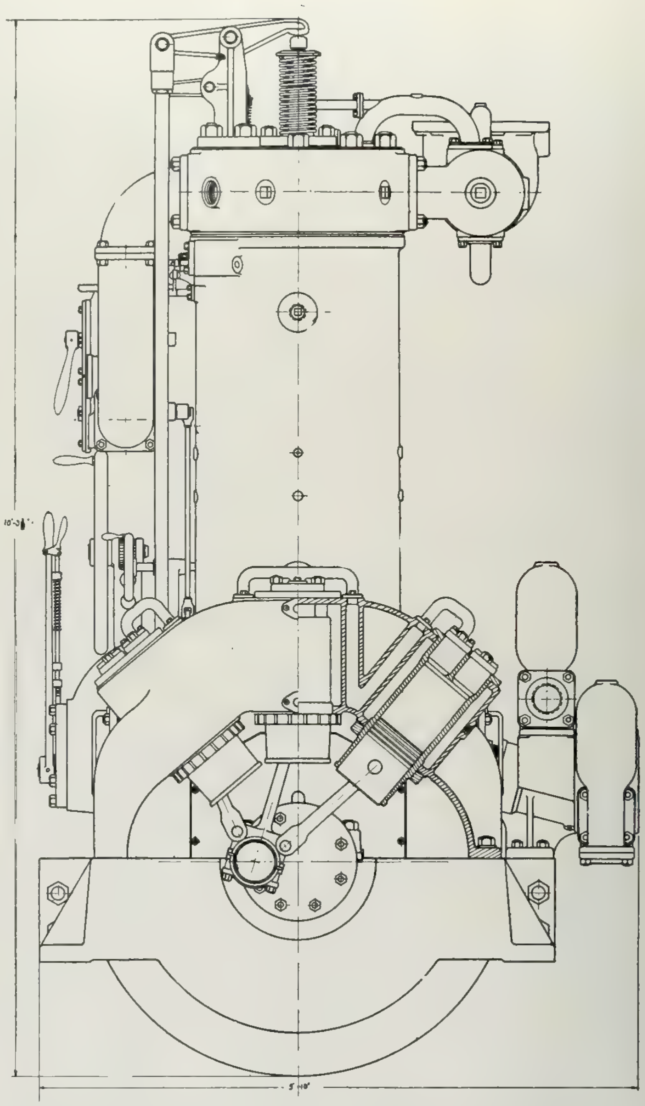
The Gorham engines are arranged for running in either direction, reversal being accomplished by use of compressed air furnished by a compressor mounted on, and forming part of, the engine. To economize in the use of compressed air when maneuvering, a disengaging clutch of the multiple disk type is attached to the engine. The 500 horsepower engines are built with six cylinders, each 17-inch bore, with a 20-inch stroke, and are intended to run at a normal speed of 225 r. p.m. The bed plate is of the box type, heavily ribbed, made in two sections fastened together with fitted bolts. The forward half is provided with the necessary arrangement for attaching a three-cylinder two-stage single-acting compressor, the cylinder pistons, valves, etc., being the same on all three cylinders for interchangeability. This construction permits of carrying the smallest number of spare parts, and while it results in a lower efficiency in generating the compressed air this is of minor importance, as the air compressor is working only when it becomes necessary to charge the air storage tanks. The accompanying drawings show the construction of the air compressor, and the method by which it is driven off a single crank on the forward end of the main crankshaft. The compressor cylinders themselves are in the shape of a liner and cylinder head combined, the valves being set in cages and readily removable. The cylinders are inserted into a box type "A" frame which forms a water jacket, and especially cored passages are provided for use as inter-coolers between the low and high pressure stages. Lubrication of the crank pin, piston pin and cylinder walls is identical with that of the main engine, being supplied by Madison Kipp force feed visible oilers.

Circulating and bilge pumps are furnished with the engine and are provided for in three individual cylinders of triplex design. Here again the valves and pump parts are interchangeable, the pump being driven off the intermediate shaft, giving a reduction in piston speed which is claimed will add considerable life to the pumps. The pumps are so arranged that it is possible in emergency to use all three cylinders for circulation or bilge, as may be required. The main cylinder heads are removable, being cast with water jacket integral and provided with removable valve cages for both air inlet and exhaust valves, as well as for the air starting valve. It is possible to remove any of the valves in the cylinder head without dismantling the working gear of the engine. The inlet and exhaust valves are identical, as well as the valve cages. Water jackets are provided, but water will be circulated through the exhaust valve cage only. The cam-shaft is located within the crank-case of the engine and operates the valves through vertical side push rods. The lower extremities of the rods are guided in large roller guides, taking all side strain off the push rods.

One of the ingenious features of this engine is the possibility of control and reversal by means of a single hand lever which shifts the cam-shaft into the various positions, five in number. The control lever is situated at a point about the middle of the engine located inboard in the case of a twin screw installation. The control lever is provided with a five-notch quadrant, the central notch being the neutral or stop position, the next notch forward and astern being the starting position for forward and astern respectively, while the farthest notches forward and astern are the full speed or running position respectively. The inlet and exhaust cams are somewhat different in construction from the usual type on such motors, insofar as each cam is really a sleeve on which are turned the four profiles for starting and full speed, ahead and astern. The ignitors are of the make and break type, two being provided for each cylinder. They are driven from a multiple eccentric mounted on the cam-shaft which is designed to give both retarded and advanced ignition for both ahead and astern rotation. The air starting valve is driven by means of cams, two of which are provided for each starting valve, one each for the ahead and astern, starting. The ignitor and starting valves are also operated by means of push rods fitted with roller guides at their lower extremity. The sides of all cams and eccentrics have been turned to a flat angle which will allow the roller guides to climb when shifting the cam-shaft from one position to the other.

The method of starting the engine, assuming it to be standing still with the control lever in the stop position, is as follows: The control lever is advanced to the first notch ahead which shifts the cam-shaft into the proper position to bring the retarded spark eccentrics under the push rod rollers and at the same time shifts the forward starting cams under the starting valve rollers. This permits air from a manifold to enter at least one of the cylinders which will start rotation in the proper direction, the others following in proper sequence. At the same time the inlet and exhaust valve cams are shifted under their proper push rod rollers. In this position, however, an additional compression relief cam holds the exhaust valves open at a certain point in the cycle, permitting of a somewhat lower than standard compression. After one or two revolutions on air, the motor starts on her own power and the control handle is shifted to the extreme forward notch. In this position the ignition is full advanced, while the air valves are entirely cut out, as is also the compression relief. It is assumed in starting that the multiple disk clutch mounted astern the main cylinders will be disengaged, throwing as little drag as possible on the engine in starting and maneuvering. To stop the engine it is simply necessary to throw the control handle to the center notch in the quadrant, thereby preventing the ignitors from tripping and naturally stopping the engine. To reverse the engine, it is only necessary to bring the control handle to the center notch, allowing the engine to slow down, or completely stop, after which the process just described is repeated on the astern side of the quadrant. This makes one of the simplest controls possible. The cam-shaft is shifted by means of yoke with brass shoes and the leverage to the control lever is multiplied so that the manipulation of the engine may be accomplished without a great deal of effort and with one hand. In a twin screw installation, the two control levers are easily within the reach of one man, making one of the simplest and most easily controlled installations possible. Speed control is by means of a balanced throttle valve controlled through the governor by varying the tension on the governor spring. This tension is varied by turning a small hand-wheel conveniently located at the control station. The governor is of the centrifugal fly-ball type and so arranged that for various positions of the governor weights there is a fixed position for the throttle valve. The speed control hand-wheel is so arranged that by turning it to the right the engine speed is reduced much the same as closing an ordinary valve. This arrangement should avoid difficulty when placed in the hands of Oriental operators. An emergency handle for quickly closing the throttle valve is also provided, as well as adjustments for varying the portion of gas and air mixtures. Within easy reach of the operator, and located on the engine, is a large hand-wheel for operating the clutch through a rack and pinion.

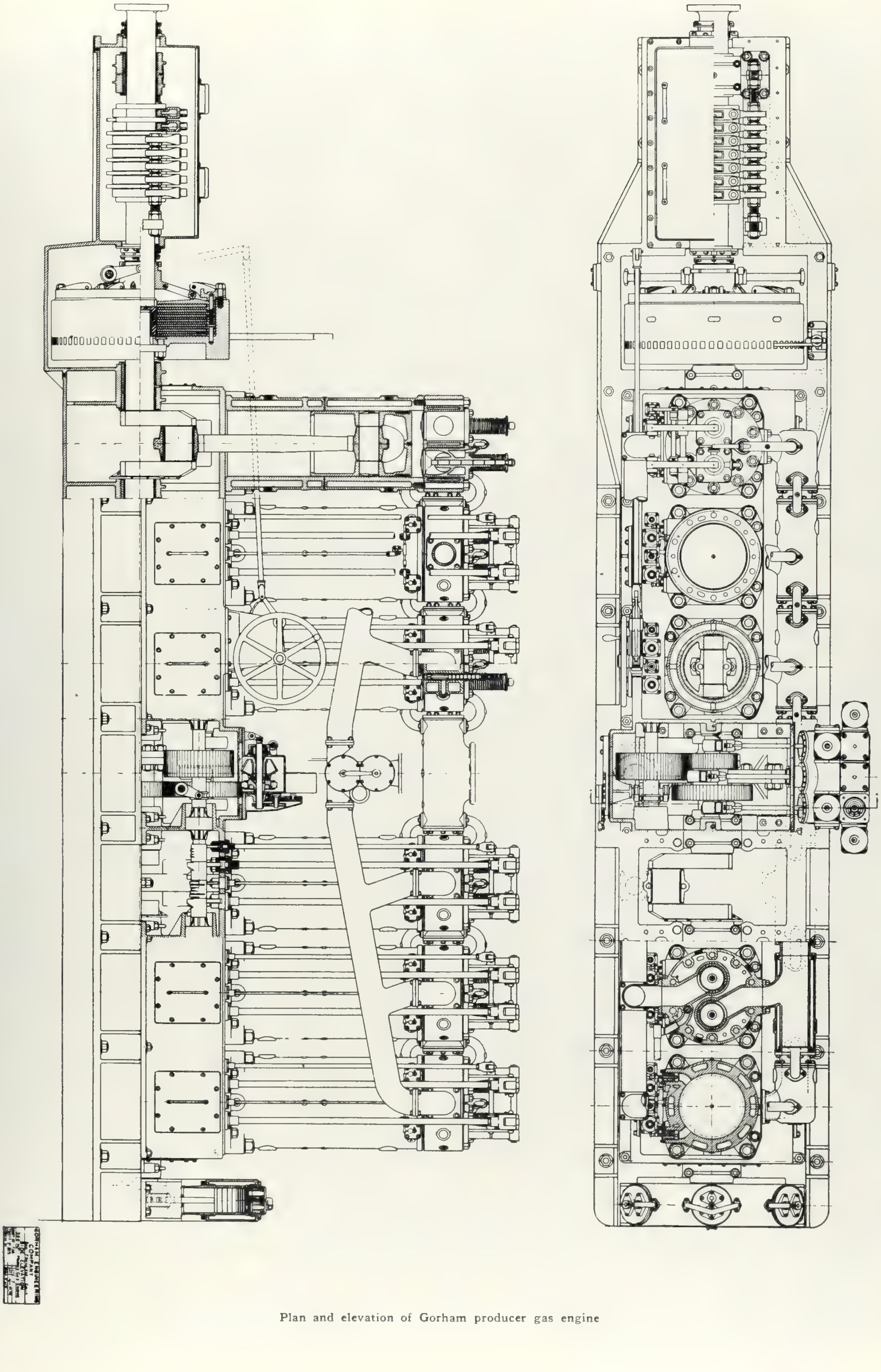

Sectional elevation of Gorham producer gas engine, showing water pump and gearing for camshaft


End elevation of Gorham producer gas engine and half section through air compressor

The muffler or exhaust pipe is entirely water cooled and mounted on the outboard side of the motor. The circulating water from the cylinders, heads and exhaust valves passes through the muffler jacket before going overboard.

By a novel arrangement the fly-wheel is utilized as a housing for the multiple disk clutch and at the same time the weight of the various clutch parts becomes part of the fly-wheel when in operation. The clutch consists of a number of cast-iron disks emerged in oil, half of which are fastened to the fly-wheel, while the other half form the driving plates for the thrust shaft. The thrust bearing mounted aft of the clutch is of the regulation horseshoe marine type, entirely water cooled and emerged in an oil-tight case.

The main pistons are of the trunk type, well ribbed and provided with five snap rings. Crankshafts, connecting rods and thrust shafts show an exceedingly high grade of workmanship, being made from the open hearth steel. The crankcase entirely encloses the rotating elements of the mo-



Plan and elevation of Gorham producer gas engine tor, permitting of a combination of splash and pressure lubrication. The main bearings supporting the crankshaft are so designed that the lower half or shell may be rolled out without removing the crankshaft after the cap has been removed. The connecting rod bearings are bronze castings, the top end being a special bronze mixture for bearing on the mild steel case-hardened piston pin, while the lower ends are of the same material; this same metal being used in main bearings also, but lined with John Finn Diesel metal. All bearings throughout the engine that require adjustments are fitted with laminum shims. Two lubricator feeds are provided for each piston and one for each piston pin. The lubrication to the crank pins is from a force feed lubricator, feeding the pins from a centrifugal oil ring on the side of the crank-web. The main bearings are provided with an individual feed to each bearing.

The Gorham engine is not new to the Oriental trade, as the Gorham Engineering Company have shipped many kerosene engines into that territory during the last ten of twelve years. Recently arrangements were made with the Kiangnan Dock & Engineering Works at Shanghai for the manufacture of the entire Gorham line of kerosene distillate and producer gas engines, that company having been furnished with drawings, patterns and a superintending engineer from the Gorham staff. Kiangnan Dock & Engineering Company at the present time are manufacturing many sizes of these motors.

CHANGE IN WHEELER CONDENSER ORGANIZATION

AT a meeting of the Board of Directors of the Wheeler Condenser & Engineering Company, Carteret, New Jersey, on July 8, Mr. J. J. Brown, formerly vice-president and general manager, was elected president, succeeding Charles W. Wheeler, recently deceased. Mr. H. S. Brown of 50 Congress Street, Boston, was elected vice-president. No other changes were made in the officers.

Mr. H. S. Brown has been associated with the Power Specialty Company, 111 Broadway, New York City, for the past fifteen years, the greater part of the time as New England manager for that company. During the war he was active with their government work with headquarters at Washington and Philadelphia. He is also president of the Brown-Ferries Company of Philadelphia.

The business of the Wheeler Condenser & Engineering Company has more than quadrupled during the past ten years under the management of Mr. J. J. Brown, and the manufacturing capacity of the plant has been correspondingly increased. One important addition has been the construction of a large tube mill for the manufacture of seamless drawn tubing of brass, copper and special mixture. In this mill the record output of nearly one million pounds of condenser tubing in one month was recently made. This tubing is used not only in Wheeler condensers, evaporators, reboilers, etc., but it is also made in large quantities to customer's specifications for American trade and for exporting.

At this writing, in the condenser department, sixteen condensers of approximately 50,000 square feet cooling surface are being made.

LLOYDS' REGISTER OF AMERICAN YACHTS, 1919

TAKING into consideration the effect of five years of war upon all lines of sport, and especially upon sporting publications, it must be admitted that Lloyd's Register of American Yachts has carried on through a prolonged period of depression in a way that is both creditable to its publishers and indicative of the spirit of this greatest of all our national sports. Owing to the impossibility of securing the same grade of paper, the book is a trifle thinner than last year, but there is practically no diminution in the amount of the contents. As in 1918, the Flag Plates have been omitted, as the cost of this class of color-printing is simply prohibitive under existing conditions, but the number of yachts, a total of 3471, is only nineteen less than last year in spite of the loss of many yachts in naval service and the sale of others for commercial uses.

The compilation of the 1918 Register was a matter of much difficulty, all information as to yachts in Government service being rigidly withheld; while, with their yachts laid up and probably on the sale list and their minds centered on the war and business, yachtsmen were but little concerned with volunteering information or answering inquiries. This year the difficulties were even greater, as the ban on the Government yachts still holds, and of the yachts under private ownership a large number changed hands in April and May, while the Register was in course of printing. Instead of diminishing, the incidental difficulties, the scarcity of both labor and paper, were even worse than last year, and the costs much higher. In spite of these obstacles the Register gives a very correct list of yachts as owned down to the date of actual printing, early in June.

According to the most reliable information obtainable from unofficial sources, the Navy Department owns about 175 yachts (in addition to those lost in service) and these are entered in the Register. Many of them have been offered for sale, and some have already found their way back to private ownership and the club lists. The number of yachts added to the list this year is ninety-two, of which just one-third are new, practically all of them power vessels; half a dozen large cruisers, of 70 to 80 feet, as many of 40 to 50 feet, and the rest small craft.

The number of clubs listed is but 494, a decrease of thirty from last year and seventy-five less than in 1915. This on the face of it is not promising, but all yacht clubs, especially those of Canada, have suffered severely from various causes incident to the war. The younger members have gone into service leaving to the older men the task of keeping up the clubs under heavy expenses and with a limited membership, the dues of all members in service being remitted by the clubs. Yachtsmen have been hopeful of a marked revival in the sport with the return to pre-war conditions and the release of hosts of young men accustomed to outdoor life both afloat and ashore and many of them habituated to the water. If these expectations are to be realized, there must be some speedy relief from the severe restrictions and excessive taxes placed on yachting by the government.

FREIGHT REPORT

SINCE our last circular Strauss & Company chartered the United States Shipping Board vessel Arapahoe, steel sailer, for barley to the United Kingdom at $34, and G. W. McNear, Inc., have made an innovation by chartering an American tank steamer of the Shipping Board for a round trip to Europe, which it is said on the street, they are to load with barley in bulk. Possibly they will load a cargo of creosote on the return voyage from England to the United States.

Barley freights we can quote today as being not over $33 or $34 a ton, by steamer, to the United Kingdom. This is a heavy decline seeing that very few vessels are open for charter for barley, and the only reason that can be ascribed is the terrific and continuous drop in exchange, which today is quoted at $4.10 to the pound. The exchange market is quite demoralizing to shipping interests, and it is feared the end is not yet, and the above, coupled with the serious political situation all over the world, is affecting all business.

The Robert Dollar Company still have faith, apparently, in the future of shipping, as their late purchase of the British steamer War Melody, which was bought on very favorable terms to them, has been followed by their purchase of the steamer War King this week, on private terms. She is a new steamer of about 13,700 tons deadweight with a speed of about 11 to 12 knots. Both these steamers will be used in their Oriental trade from Vancouver.

Comyn, Mackall & Company chartered the motorboat Semmeltind at $59 a thousand from Columbia River to Bombay.

Grace & Company immediately after chartered the steamer Doyleton from the Pacific Mail Steamship Company at $60 to Bombay. This week the motorboat Babina was also chartered in the same direction at $60, and the charterers are reported to be the Pacific Export Lumber Company. G. W. McNear chartered their schooner Georgette to the Pacific Export Lumber Company at $70 for lumber from Columbia River to Alexandria. The Far East seems to have come into the market for lumber, as there are further inquiries for Alexandria and ports in Persia.

G. W. McNear chartered the schooner Narwhal at $20,000 from San Francisco to Auckland and return via a South Sea Island port, and the Esther Buhne also obtained a round charter to Apia and return here for $20,000.

The only charter for lumber for the United Kingdom or France lately has been the new schooner Washington on private terms, from Puget Sound to a French Atlantic port, the charterer's name not being given as yet.

Copra freights are lower owing to the scarcity of copra, and the consequent high price, the latest charters having been made on the basis of $20 a ton of 2240 pounds gross weight, delivered.

J. J. Moore & Company have chartered the motorboat Malahat on a lump sum basis, from San Francisco to Sydney or Melbourne. The same firm chartered the schooners John A. Campbell, Lottie Bennett and William H. Smith from Eureka to Sydney at $35 a thousand, on the vessel's fir capacity.

The United States Shipping Board have chartered three of their steel steamers from the North with lumber to China on the basis of $35 a thousand, for two ports of discharge, one having been taken by the Robert Dollar Company, and two by Dant & Russell of Portland.

Freights to Australia have advanced during the last week. The British Columbia Mills Timber & Trading Company chartered the Golden Shore at $37.50 from Vancouver to Sydney; Hind, Rolph & Company chartered the Hawaii at $37.50, to Sydney from Puget Sound or Columbia River, with options of Melbourne or Adelaide, presumably about $41.50, and it is also reported with the option of Africa at $55.

Nothing has been chartered to the West Coast of South America, but we quote the rates today in that direction at $37.50 a thousand to a direct port. Two or three vessels have been offered at $40 a thousand feet, but have not succeeded in getting that figure.

The Shell Oil Company and the Standard Oil Company have taken the United States Shipping Board tankers Devolente and Derby Line, respectively, for one year at $6.50 a ton on time charter for their Oriental requirements.

The motorboat Sierra was chartered by Grace & Company to load lumber fro mColumbia River to Balboa on private terms. She has just arrived with nitrate at Honolulu, and she is chartered to bring over a cargo of canned pineapples at about $6.50 to San Francisco. The pineapple business has been very beneficial to vessels not able to get sugar to this port.

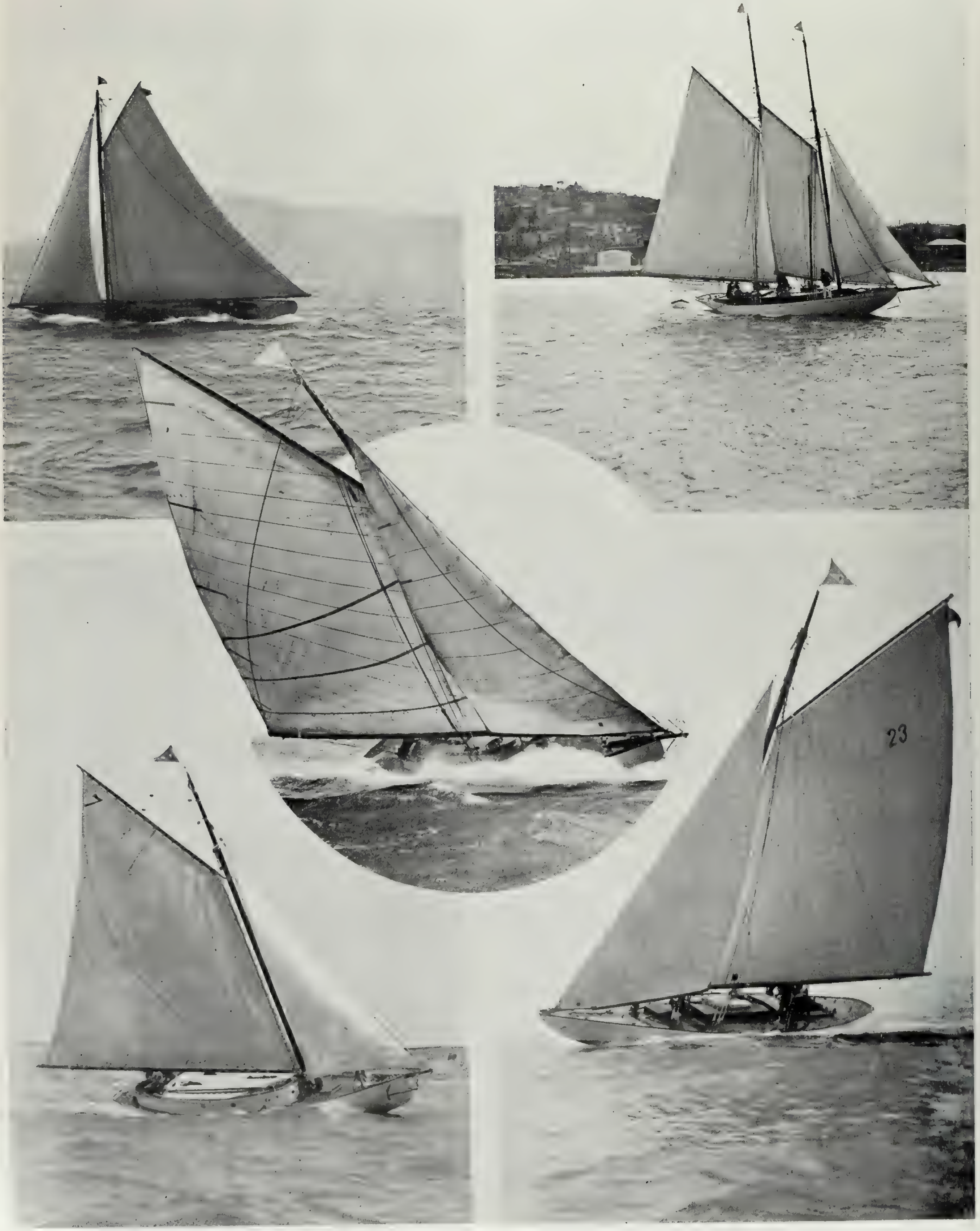
PAGE BROTHERS.

I. & E. INSURANCE COMPANY

Mr. C. D. West, one of the managers of the Marine Department of the Importers and Exporters Insurance Company, is making an extended trip to the Pacific Coast where he expects to remain for several weeks to complete arrangements for establishing marine underwriting agencies of his company in San Francisco, Portland and Seattle. Mr. West states that he expects the importers and exporters will be writing marine risks through the West Coast agencies. The names of these agencies will be announced at a later date.

The Importers and Exporters Insurance Company announce that the plans for their new building at 47-49 Beaver Street, have been approved by their Board of Directors.

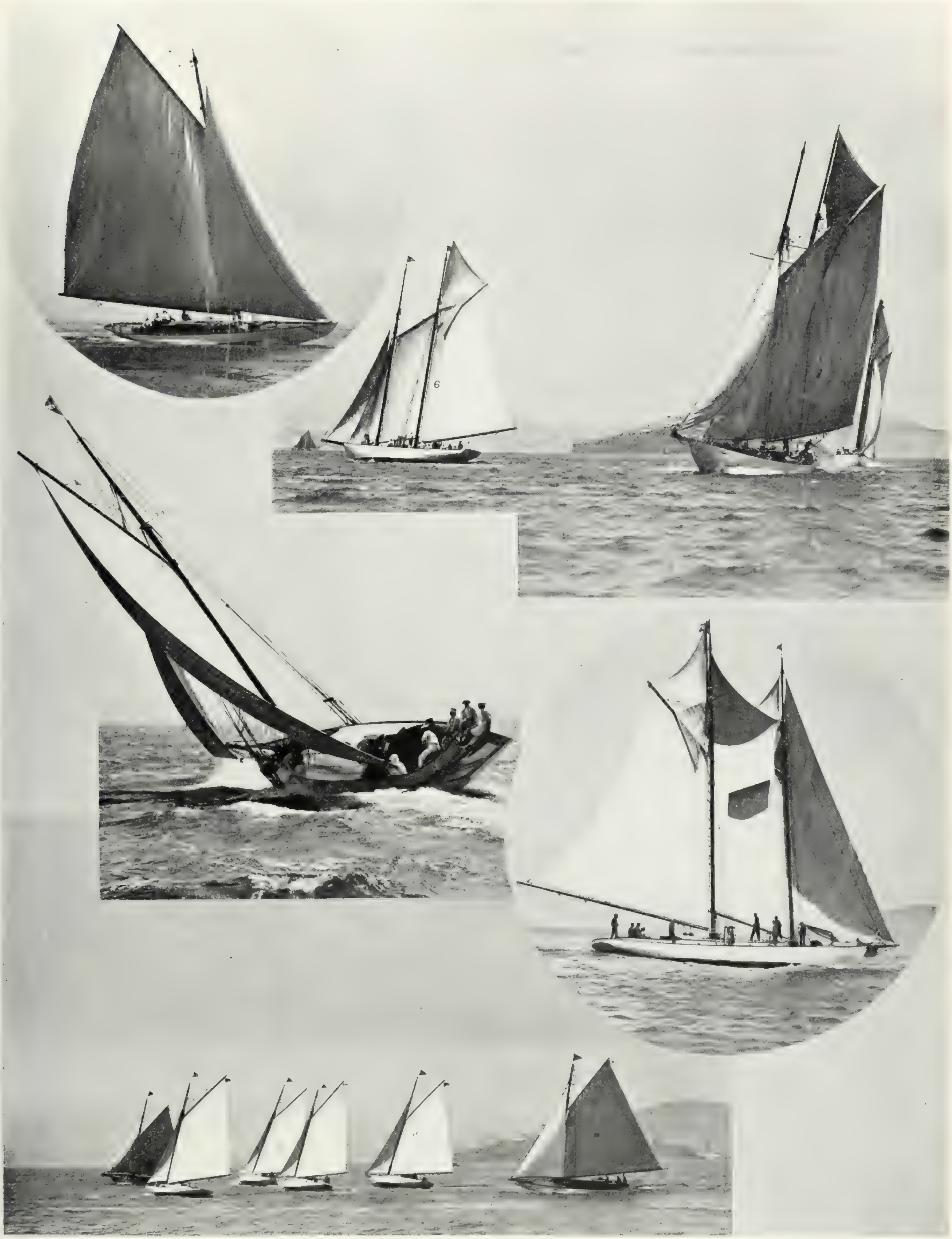
Yacht Racing on San Francisco Bay



Photos by Walter A. Scott

Upper left: Sloop Pronto, built and owned by Lester F. Stone. Upper right: Auxiliary schooner Clarinda, owned by J. W. Pew, built by W. F. Stone & Son, with Union gas engine auxiliary. Center: Sloop Presto, owned by Stuart F. Hynes and designed and built by W. F. Stone & Son. This sloop has won more races than any other yacht on San Francisco Bay. Lower left: The sloop Alert, owned by Thomas Degen, commodore of the Corinthian yacht Club. Lower right: Sloop Mah-pe, owned by H. A. W. Dinning of the San Francisco Yacht Club, designed by Gardner.

Yacht Racing on San Francisco Bay



Photos by Walter A. Scott

Upper left: Sloop Westward, owned by J. R. Hanify, San Francisco Yacht Club, designed by Gardner and built by W. F. Stone & Son. Note the strong resemblance between this sloop and the Mah-pe. The Westward is considered by many yachtsmen the fastest sloop on San Francisco Bay. Upper right: The start of a schooner race in 1914—schooners Marian, Seafarer and Caprice, taken from the schooner Martha. Center left: Sloop Fulton G., owned by A. F. Rousseau and built by Anderson & Madden. This boat was named for Fulton G. Berry, one of the most popular of the old-time yachting enthusiasts and owner of the well known Nixie. Center right: Isidor Zellerbach's schooner Lady Ada. Lower: Six sloops in the start of the Lipton Cup Race. Eastern readers will be interested in noting the comparatively short, sturdy spars and small sail area used on these yachts. The gentle trade zephyrs of San Francisco's summer season average thirty-five to forty miles an hour.

An Open Letter to San Francisco Chamber of Commerce

By A. C. Worthington

Vice-President and General Manager, Maritime Navigation Company

I herewith submit a plan for the organization of a steamship concern, the success of which can only be assured through the active co-operation of the local organization of which I have the honor of being a member, similar chambers throughout the State of California, and the business interests of the entire territory served by the port of San Francisco.

As a prelude to the plan, I wish to say that in my humble opinion we must all agree with John H. Rosseter and the San Francisco Chronicle. In a recent issue of the morning newspaper the director of operations was quoted as saying: "If this community will enter into the spirit of the ship business with the same degree of enthusiasm that it did in the last Liberty Loan drive, enough millions can be raised here to provide all the ships needed to make this city what it should be—the greatest seaport and shipping center on the Pacific."

The average person is fully content to leave the future of the American merchant marine in the hands of the government, when as a matter of fact the future disposition of our great and growing fleet of vessels is in his own hands and not in those of the government. At best the work of the United States Shipping Board is only temporary; it is serving a present need, but it will be but a comparatively short time before public opinion will demand the shifting of the work onto the broad shoulders of the private citizen. In other words, the time is fast approaching when some sort of program must be arranged for private individuals or concerns to take over the ownership and operation of the merchant marine.

The work of the officials of the Shipping Board is at best a thankless one. In a way the board is compelled to function nearly along the lines of a political organization. One might say that the assignment of ships to this or that seaport is similar to Congress alloting certain sums of money from the public treasury for the purpose of building postoffices or other public buildings. Everybody wants a ship and there are not enough to go around.

While the Shipping Board is in existence there will be a fair division of the vessels, assigned to this or that port or concern, predicated upon the needs of the port and its commerce. But it may be different when the government decides to turn the ships over to the private operators. The port needing the greatest number of ships may not be prepared to assume the responsibility; in other words, the necessary preparations to take over the needed tonnage may not have been made.

After all, it is going to take a lot of money to buy a fair number of Uncle Sam's vessels, or to construct others, especially passenger ships, which will be needed for the American merchant marine in the future quite as urgently as freight carriers. It is going to be largely a matter of finance and at this time the American people have not advanced a single step toward financing the ownership and operation of a fleet as it should be done. It is true that there are numerous men and concerns of large means who are prepared—if the returns seem promising—to come forth and pay for numerous ships. The average layman is probably under the impression that this is all that is required and he can lie back and watch the wheels go around and everything will be well with the American merchant marine.

In my most humble opinion, this is wrong. The worst thing that can happen to our future shipping is to have the ownership and operation of the mammoth fleet tied up in a few hands. No nation can achieve great maritime glory and accomplishment unless the average citizen not only knows something about the ships flying the flag of his country, but also has a personal interest. And it must be an interest of merit if it is backed up by the ownership of a block of stock.

At present the people who live away from the seaboard are never interested in things of the sea unless it is to make an occasional pilgrimage to the dancing waves to recuperate and spend a holiday. Each proudly spreads his chest when he reads or speaks of the happy days when Uncle Sam was a great person afloat. He is proud to be a citizen of a country that at one time owned and operated the fastest and smartest clippers of the seven seas. He believes that the Yankees are just naturally bound to come to the front and be the premier maritime nation again—but he has never even considered the most essential of facts—that this can never be unless he does his bit to help.

When we entered the war we were told that we had to supply a lot of money to win; that the Hun could never be subdued unless we just dug down and paid the bill. And we were offered bonds as a matter of patriotism and investment. The American citizen cheerfully subscribed to the billions and we won the war. As a matter of fact, the average person—and that includes the person who is now shouting loudly for the assignment of ships to his home port — subscribed for bonds largely because he knew that we had to win the war if he was to be permitted to continue in business and remain at the old comfortable job of chasing American dollars.

The same man cheerfully admits that this country cannot remain a leader of nations unless we develop our overseas commerce and that this cannot be done right without utilizing a vast fleet flying the dear old flag. He is willing, however, that some fellow with the millions should go ahead and supply the means to buy and operate the ships, it never having entered his calculations that it may be necessary for him to take just as active an interest in ships as he did in bonds.

It required the active co-operation of all of the American people to insure the financing of the war. It is going to require the active co-operation of all the people—or a large percentage of them—to make it possible for this country to win out on the right kind of a maritime program. In other words, the time has come when the people must be educated up to the fact that it is to their interest to go into the ship business as they did the bond business. The recent Rosseter expression brought expressions of approval from all sides. In fact, there was nothing but approval with a few minor exceptions. It is evident that with so many pessimists in the world, one cannot expect any verdict to be unanimous.

Now this approval should be crystallized into something more than mere words. Words alone did not win the war or provide the means to carry it on. It required work and co-operation, and this is needed in the ship business. This is true because no seaport will be prepared to take its proper place in the maritime world unless the citizens in that community have got together and are prepared to take over the tonnage needed when the government goes out of the ship business. And there are always two ways to do a thing. One is the right and the other is—well, if not wrong, it is at least not the best way.

The time has come when the people of San Francisco and of the State of California ought to go into the ship business with the same degree of enthusiasm as they did the Liberty Bond business. The big loans would never have been successful if Uncle Sam had expected to get all the money he needed from the bankers and wealthy financiers. He went to the masses and was not disappointed. It will now be necessary to go to the masses to secure the capital needed to finance America's future maritime program. And the necessary millions will be secured with ease—if the right spirit is exhibited.

William H. Crocker said that his check-book was open to the limit and that the same was true with other bankers. This is well, but only a portion of the money needed to purchase ships should come from the deposits of the wealthy. It is better that the odd corners of the country be raked in an effort to secure small stockholders in addition to the big. Every man and woman in the State should be given an opportunity to subscribe for an interest in the ship business. The stock should not come in higher denominations than ten dollars each. The clerk, mechanic, farm hand and all others should be accorded an opportunity to become associated with the business which is to extend our foreign markets and incidentally do its part toward retaining for the country the prosperity now enjoyed.

I suggest that a big ship concern be organized in this seaport and that the entire territory served by San Francisco be asked to give its financial support. If $100,000,000 was the amount decided upon as necessary to insure the purchase of a sufficient fleet of vessels, I would issue the stock in denominations of not to exceed $10 each. I would organize the entire district and by means of publicity would arouse a spirit akin to that existing when the big Liberty Loan drives were on. I would have every merchant, worker and business man take off his coat and go forth and battle for the cause. And by utilizing the same methods that were so successful in the other drives, I would secure all the millions needed.

And there would be more than 1,000,000 stockholders. The control would not be in the hands of a few men. It would be the most democratic of corporations and every stockholder would be a booster. After the directors had been chosen and organized, they would employ the most efficient ship operator to be found. Every time one of the stockholders made a trip abroad, he would travel on his own ship. Every bit of produce exported would be carried in bottoms owned by the producers of California. Every California boy who chose seafaring life as a profession could work on a ship in which he had a personal financial interest. And every stockholder, whether he held one share or 100 shares, would be a booster for business for the company.

It is a big proposition and well worth considering. The matter is being considered by many of our best citizens. I have discussed its possibilities with numerous associates in the shipping business and all agree that the proposed plan will meet all requirements. I suggested to several that it might be well to get somebody to come forth and father the scheme, but there was a bit of reluctance exhibited. I concluded, therefore, to bring the matter to your attention and respectfully request that the Chamber of Commerce proceed immediately to take action to bring together the vast interests of the State as represented by the chambers of the different counties.

A NEW RIVET FORGE

THE invention of a new type of rivet forge by one of the employes of the Pacific Coast Shipbuilding Company is described in Full Speed Ahead, the paper published at the company's plant on Suisun Bay, thirty-five miles airline east of San Francisco. The account says:

An improved oil forge for heating rivets has been devised by J. T. Shepherd, plant plumber. Several of the forges are already at work. One of their most commendable features is the avoidance of backfire.

Higher vaporization of the oil is secured through the use of the new invention.

The main features are a valve on the air line and a needle valve on the oil supply, with a mixing chamber. The latter is formed of a 1¼-inch T with a 1¼-inch nipple and a bell reducer reducing to ⅜. Above this is a second mixing chamber, formed of a 1-inch ell, the oil being carried thence through a 1½-inch T with a ⅜-inch nipple, forming an injector. Free oxygen is taken in with the vapor.

There is a ¼-inch vent on the tank, to make filling quicker, the vent forming a suction on the funnel.

It is not necessary for the boy to go to the manifold to turn the air off. This is done right at the furnace.

Another advantage is that the new forge needs no leader to connect the hose. A male hose connection is used, obviating two couplings.

The piping on the end where the valves are controlled is protected with a stay plate, reducing the danger of damage to the forge. The danger of backfire is eliminated by fire clay sealing.

The forges are also equipped with bleed valves, making it possible to clean out the tanks easily. Not only can water be bled from the oil, but the bottom of the tank can be blown clean.

Shepherd, who has been working on the forge design for some time, gave it to the company as a contribution to the yard's productivity.

Mr. Charles R. Page has been made a chevalier of the Legion of Honor by the French government for exceptional services rendered by him while a member of the United States Shipping Board. Mr. Page before his appointment to the Shipping Board had been general auditor of the Fireman's Fund Insurance Company.

Marine Insurance

RECENT DEVELOPMENTS IN MARINE INSURANCE

By Charles F. Howell

THE outstanding feature of interest in marine underwriting during the last month has been the completion of the organization of the new combination for the writing of cotton. It is to be known as "The Cotton Underwriters," and will be composed of a group of strong companies, among which the following will play a leading role: American, of Newark; American Eagle; Continental; Fidelity-Phenix; Firemen's, of Newark; Glens Falls; Globe & Rutgers; and the Hanover. The total assets represented by this combination exceeds $150,000,000. The old "pool," as it is commonly called, is made up largely of English companies, and the inland risk of the cotton they insure is regularly underwritten by reinsurance in a group of fire companies known as the "Cotton Reinsurance Association." The new pool will carry their own fire risk. The entrance of the new bidders for a part of the great American cotton insurance is a circumstance of real interest and importance. Many cotton shippers have been doing business with companies in the old pool for the last twenty or thirty years, and critics of the new group are disposed to anticipate a cut in rates if business is to be shifted; anything of the sort, however, is emphatically scouted by the latter. The marine rates on cotton have, for a decade or two, been the nearest thing to standard of any of the regular quotations on American commodities. The premium volume has been in the neighborhood of some $10,000,000 per annum, but, even so, the margin of profit to the underwriters has been small. The coverage is comprehensive. It provides for indemnity against losses by land and sea, and the policy attaches when so desired, even from the field where the cotton is grown, and right through to the mills at the furthermost point of destination. Shipments are centered in two or three prominent "concentration ports"—Galveston, New Orleans and Savannah being the chief. Inspectors are stationed at each of these points in order to trace the shipments and keep the companies advised of the location and condition of their holdings. This has invariably and inevitably resulted in an immense concentration of values at these ports in the shipping season, such values amounting at times to as much as $30,000,000 at one point. The coverage is usually by railroad and/or iron and/or steel steamers and/or connecting conveyances, including risk of craft, and/or lighter to and from the vessel, but excluding all risk by river steamers or by conveyances on the Great Lakes. Cotton on steamers is covered under deck, unless otherwise specifically agreed. Shipments by sailing vessels or barges are rarely written. The right is usually reserved, upon notice to the assured, to exclude from a policy shipments by steamers not approved by the insurance companies interested. The coverage is against perils of damage or destruction by fire, tidal waves, or overflowing rivers, while the cotton is in process of and/or awaiting shipment or sale, in warehouses, compresses, yards and/or on wharves, levees or elsewhere on land in the United States. Explosion, directly or indirectly, causing loss on land, is not written against, unless fire ensues, and in that event the coverage is for damage by fire only (if otherwise recoverable under the policy), provided that such explosion and/or fire were not due to hostilities, insurrections or other risks excluded by the terms of the policy. Particular average is payable on each ten bales as if separately insured, if amounting to three per cent, unless otherwise agreed; and on shipments to Europe sea damage pickings claims are payable, without reference to series or amount. One of the more interesting coverages is that of "country damage" on shipments to Europe, Japan, China, India, or Manila, subject to settlement at the destination named; but no claim for loss of, or damage to, cotton picked or reconditioned in the United States, nor any expense connected with such pickings or reconditioning, is recoverable. "Country damage" is the injury that comes to the cotton from the action of the elements and from soil and stain incurred during its handling and transportation. It is the consequence of poor baling, and if the shippers and consignees had to bear this loss, instead of the underwriters, there would doubtless be much less of it. This inferior baling is a conspicuous reflection upon American business methods. Some slight improvement has been secured through the offer of the underwriters to return part of the premium charged for country damage if claims on this account are reduced below a certain percentage of the premium. The extent of the cotton insurance market of the world may be realized when it is remembered that nine-tenths of all clothing is made from this staple, and that an average annual world production is about 17,000,000 bales of 500 pounds net; of this production the United States yields 64 per cent.

Hull Market Demoralized

As forecast in these columns, the suspension of advisory ratings on ocean hulls by the American Hull Underwriters' Association, as the consequence of continued quiet rate-cutting by one or two members of that organization, has led to a widespread and most regrettable demoralization in that important branch of American marine insurance. Things are going from bad to worse, until more than one conservative office has reached the point of declining this class of business altogether at prevailing quotations. Brokers and foreign operators are driving the tariff down further and further, and it is apparent that unless this mad struggle is stayed and some measure of co-operation restored, the bulk of the coverage on American hulls will go abroad. At the present moment everything is wide open. The understanding between the A. H. U. A. and the Institute of London Underwriters with regard to fleets was terminated some time ago, and the reason, in the opinion of Americans, was because the latter were getting too strong a hold on their country's hull business. It is a matter of record that American underwriters had developed from a pre-war capacity of only $300,000 to at least $1,500,000, as a result of a splendid expansion of home facilities. The Germans' reinsurance capacity has been successfully replaced by our own, and we were in a fair way to make ourselves independent of any foreign assistance. The British marine underwriters have long been complaining about the cheapness of hull rates in this country, and they are said to feel somewhat dubious about putting much more of this class of business on their books at present quotations, particularly when acceptances have to read "less three per cent tax." However, any material decline in their takings is not noticeable just now. If American underwriters are to hope for their proportionate share in the protection of the world's trade, they will have to get together at once and in a spirit of loyalty and enthusiasm.

Builders' Risks

It is coming more and more home to marine insurance men that the coverage they so readily sell on shipyards is not the source of easy money it has long been held to be, and that more rate must be forthcoming. Fire in a yard of wooden construction, and accidents in launchings, quickly convert apparent profits into substantial losses. Prior to the elaborate scale of ship production inaugurated by this company under stress of war necessity, all builders' risks were, whether of steel or wood, covered under a form entitled "Institute Clauses for Builders' Risk." One of the bad features of this plan was the permission it gave builders to increase the value from time to time; and another was the provision that in the event of a loss the sum insured should be regarded as the insured value. When the government started in to produce ships it secured the benefit of the advice of experts from the American Hull Underwriters' Association, and one of the first things these gentlemen set straight was this discrepancy in the old form. They have brought about a great reform in this matter, and now the value of the vessel insured is to be at all times the completed contract price of the vessel and the whole amount is to be insured from the date of the laying of the keel. The old clauses got into the policies for the following reasons: Where insurance is placed in installments the average liability under a policy is increased. The larger the number of installments the more nearly the average liability approaches the actual amount of the policy, bringing the real to an approximation of the apparent rate; the real rate being the actual rate on the liability assumed, and the apparent rate being the rate at which the policy is written. The chief reason why brokers and the assured have always favored the installment plan is because it reduces the rate which had already been agreed upon. It is objectionable to value the vessel insured at the amount of valid insurance in force at any given time, for the reason that an insurance company would never know just what proportion of any loss it would be called upon to pay; or its ratio of liability. This is why this clause worked a great hardship on the underwriters and was eminently unfair to them.

Governmental Aid Proposed

If the plans now being matured at Washington accomplish what is expected of them, American marine insurance should, in the near future, find itself in a much stronger position than at present. A subcommittee of the House committee on merchant marine—of which subcommittee Representative Lehlbach, of New Jersey, is chairman—has begun an investigation into the status of marine insurance in this country, with the purpose of effecting legislation of a nature to enable American ship owners and shippers to secure all the insurance they need from their own countrymen. Says Mr. Lehlbach: "It is to the interest of the American merchant marine and to American commerce to have this result brought about. If American ship owners and shippers have to rely upon foreign underwriters to obtain insurance for their vessels and cargoes, it may result in discrimination of some kind against American shipping and American trade." One of the last actions of Chairman Hurley, of the Shipping Board, before his resignation, was to appear before this committee and offer the suggestion that it would be wise for the government to continue to insure the merchant vessels now owned and building for the government until they have all been sold to private persons or corporations. He doubts the ability of American underwriters to handle all these hulls and cargoes at present, and thinks the government should take care of at least a part of this insurance, as otherwise it would have to go to foreign companies. Profiting by the mistake we made in letting valuable information get into German hands through their large participation in marine insurance here, he thinks it most wise to keep our merchant marine as independent as possible of foreign insurance companies. As fast as government-owned ships are sold to private parties, the insurance on them should go to private companies. His recommendation is that where partial payments are made on vessels, the government through the Shipping Board should continue to insure that part of the vessels for which payment has not actually been made, the balance going to private insurers. It is proposed by the subcommittee to go thoroughly into the whole question, to avoid hasty legislation, and to arrive at a plan by which the government may help with the insurance until the private companies can carry it all.

Overlapping Returns

Serious discussion has been going on in England among the marine brokers and underwriters anent the uncertainty in adjusting overlapping returns on time policies, and at last the agreement has been definitely arrived at that the correct adjustment is that the period should commence from the first day on which the vessel was laid up in port. Thus: If a vessel is insured from the 1st of January to the 31st of December each year, and is laid up from December 22 to January 30, say forty days, the return would be claimable from December 22 to January 20, which would be adjusted by 10/30ths being paid on the first policy and 20/30ths on the next policy.

Theft and Pilferage

Claims for theft and pilferage continue to pour in, especially on account of South American shipments. It is now evident that better rates will have to be had if any profit at all is to be realized from this source. Unless shippers improve their

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packing they must reconcile themselves to a long continuance of losses of this character. It is suggested that packages of valuable merchandise be always declared to the carriers at their full value, in view of the fact that the latter are liable only for an amount commensurate with the freight paid. Another bugbear that ought to be abated is the custom of marking the outside of a packing case with the character of its contents; this is known to directly encourage pilfering. It is also suggested that marks on packages, of a class of goods shown by experience to be particularly subject to depredations of this nature, be altered from time to time. Shippers and underwriters are often at loggerheads over theft and pilferage cover; the former being of the opinion that they ought not to be charged for it at all, and the latter being more than indifferent to it at the price now asked.

Losses On Auxiliaries

According to the latest reports, salvage will be impossible for the Santa Cristina, the motor schooner of the W. R. Grace Line, which was lost through a fire that resulted from boiler explosion on the 8th ultimo, fifty miles north of Havana. She was bound from Barranquilla for New York with a full cargo of coffee and hides. The water where she was lost is too deep for salvage work. The Esperanca, a motor schooner that took fire recently at Singapore, and was totally destroyed above deck from the mizzen mast aft and had to be flooded, is now reported to be in such shape that she may be abandoned to the underwriters as a constructive total loss. Her insured value was about $350,000. She lies in Singapore harbor with her cargo of bean oil on board. The latter was uninjured by the fire, and only slightly by the water. Most of the insurance was on the hull, and placed in this market. The surveyors state that they are unable to commence work on her until the cargo has been discharged, and her agents still await instructions from her owners. Some underwriters feel that the boiler explosion on the Santa Cristina is an accident likely to befall any vessel and that auxiliaries ought not to be scouted as undesirable carriers of perishable cargoes on that account; but others look upon these two losses as further examples of the folly of underwriting this class at all.

Marine Insurance in the Treaty

The way the leading statesmen of the world regard marine insurance may be seen in the clauses of the Peace Treaty with Germany bearing on the subject. They make interesting reading. Thus:

16. Contracts of marine insurance, including time policies and voyage policies entered into between an insurer and a person who subsequently became an enemy, shall be deemed to have been dissolved on his becoming an enemy, except in cases where the risk undertaken in the contract had attached before he became an enemy.

Where the risk had not attached, money paid by way of premiums or otherwise shall be recoverable from the insurer.

Where the risk had attached effect shall be given to the contract notwithstanding the party becoming an enemy, and sums due under the contract either by way of premiums or in respect of losses shall be recoverable after the coming into force of the present treaty.

In the event of any agreement being come to for the payment of interest on sums due before the war to or by the nationals of states which have been at war and recovered after the war, such interest shall in the case of losses recoverable under contracts of marine insurance run from the expiration of a period of one year from the date of the loss.

17. No contract of marine insurance with an insured person who subsequently became an enemy shall be deemed to cover losses due to belligerent action by the power of which the insurer was a national or by the allies or associates of such power.

18. Where it is shown that a person who had before the war entered into a contract of marine insurance with an insurer who subsequently became an enemy, entered after the outbreak of war into a new contract covering the same risk with an insurer who was not an enemy, the new contract shall be deemed to be substituted for the original contract as from the date when it was entered into, and the premiums payable shall be adjusted on the basis of the original insurer having remained liable on the contract only up till the time when the new contract was entered into.

19. Contracts of insurance entered into before the war between an insurer and a person who subsequently became an enemy other than contracts dealt with in paragraphs 9 to 18 shall be treated in all respects on the same footing as contracts of fire insurance between the same persons would be dealt with under the said paragraphs.

20. All treaties of reinsurance with a person who became an enemy shall be regarded as having been abrogated by the person becoming an enemy, but without prejudice in the case of life or marine risks which had attached before the war to the

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right to recover payment after the war for sums due in respect of such risks.

Nevertheless if, owing to invasion, it has been impossible for the reinsured to find another reinsurer, the treaty shall remain in force until three months after the coming into force of the present treaty.

Where a reinsurance treaty becomes void under this paragraph, there shall be an adjustment of accounts between the parties in respect both of premiums paid and payable and of liabilities for losses in respect of life or marine risks which had attached before the war. In the case of risks other than those mentioned in paragraphs 11 to 18 the adjustment of accounts shall be made as at the date of the parties becoming enemies without regard to claims for losses which may have occurred since that date.

21. The provisions of the preceding paragraph will extend equally to reinsurance existing at the date of the parties becoming enemies of particular risks undertaken by the insurer in a contract of insurance against any risks other than life or marine risks.

W. W. Tomlinson. Mr. Tomlinson has just incorporated under the name of Tomlinson & Company, a marine insurance brokerage firm which is making a strong bid for Pacific Coast marine business.

22. Reinsurance of life risks effected by particular contracts and not under any general treaty remain in force.

The provisions of paragraph 12 apply to treaties of reinsurance of life insurance contracts in which enemy companies are the reinsurers.

23. In case of a reinsurance effected before the war of a contract of marine insurance, the cession of a risk which had been ceded to the reinsurer shall, if it had attached before the outbreak of war, remain valid and effect be given to the contract notwithstanding the outbreak of war; sums due under the contract of reinsurance in respect either of premiums or of losses shall be recoverable after the war.

24. The provisions of paragraphs 17 and 18 and the last part of paragraph 16 shall apply to contracts for the insurance of marine risks.

AN INTERESTING TOWING FEAT

When S. S. Alcona was preparing to leave Balboa for Antofagasta recently her chief engineer, Mr. Esmeraldo, was asked by an official of the United States Shipping Board whether he could tow to that port a French bark loaded with 3000 tons of coal.

This was a serious proposal, for several reasons. In the first place, the Alcona was already deeply loaded. Secondly, the only hawser available was but 200 fathoms long, which would bring the bark within the backwater of the steamer and thus make towing difficult. Thirdly, the screw of the Alcona was not proportioned for towing work; and finally, Mr. Esmeraldo had no information as to how the ship's Westinghouse gear turbines would stand up under such a test. However, he had the greatest confidence in the Alcona, her equipment, and her crew and undertook the job.

The tow started, and fourteen and a half days later the Alcona and her charge finished the 2000 nautical mile voyage without the slightest hitch. The machinery performed splendidly, without groaning or laboring and with no undue heating at any point. The average speed was 6.3 knots and only a slight increase in the daily fuel consumption was noted.

CHICAGO PNEUMATIC ERECTING NEW GENERAL OFFICE HEADQUARTERS IN NEW YORK

THE Chicago Pneumatic Tool Company plans moving its general offices from Chicago to New York and toward this end is erecting an office building at 6-8 East 44th Street, New York City.

The structure, which is being built by the Westinghouse Church Kerr Company, is of combination steel, brick and limestone, and will comprise initially ten stories, all to be occupied by the company. The ground floor is to be an attractively designed permanent exhibition room and will contain an interesting display of the many "Chicago Pneumatic" products, including "Boyer" Pneumatic Hammers, "Little Giant" Pneumatic and Electric Tools, Rock and Coal Drills, "Giant" Oil and Gas Engines, Air Compressors, etc., some of which will be shown in operation. In conjunction, a completely equipped service station will be maintained.

The new building is to be ready for occupancy early in 1920, at which time the transfer will be effected.

NEW DRYDOCK CONSTRUCTION

Construction will shortly commence on the 4000-ton railway drydock for the Colonna Marine Railway Corporation, Norfolk, Virginia. This will be a marked increase in the dry docking facilities of the Port of Norfolk, increasing the dry docking capacity 40 per cent and doubling the tonnage of vessels which may be docked. The dock is being designed and constructed by The Crandall Engineering Company, dry dock engineers, of East Boston, Massachusetts.

SAILORS INVITED TO CLUBHOUSES ON THE ISTHMUS

The clubhouses operated by the Panama Canal primarily for its employees offer their facilities to the officers and crews of merchant and naval vessels passing through the Canal or calling at the terminal ports. The clubhouses have free reading and writing rooms, libraries of fiction and reference works and current periodicals, and the charges for the use of the pool tables and bowling alleys are 40 cents an hour for the tables and 10 cents per game per person for the alleys. Lunches and refreshments are sold at a small profit. Moving pictures or other entertainments are given in the evenings. Clubhouses are operated at Cristobal, Gatun, Pedro Miguel, Ancon and Balboa. Clubhouses for colored men are at Cristobal and La Boca, adjoining Balboa.

The house of the Salvation Army at Cristobal is especially for seamen. A Salvation Army seamen's home is being built at Balboa, near the land end of pier 18. The Salvation Army provides meals and lodging, and facilities for table games, reading and writing.

Sailors of the Navy are invited to use, in addition to the above, the service clubhouse conducted by the Y. M. C. A. at Cristobal, France Field, Coco Solo, Fort Randolph, Fort Sherman, Gatun, Culebra, Empire, Corozal and Balboa, and the halls of the Knights of Columbus in the cities of Colon and Panama.

DEGREE IN COMMERCE AT UNIVERSITY OF LONDON

The plan of the University of London to grant degrees in commerce is attracting much attention. Under this scheme it is proposed to grant the degree of bachelor of commerce to candidates who pass the necessary examinations after a three years' course of study. Those who so desire may later proceed to the degree of master of commerce, after a minimum of two years' practical experience in the particular trade or industry taken up.

There will be three examinations: First, a matriculation examination or some test recognized as its equivalent; this is intended simply as a proof of the candidate's general education. Second, an intermediate examination, which includes five compulsory and one optional subject. The compulsory subjects are (a) elementary economics; (b) banking, currency, trade, transport and finance; (c) geography; (d) accounting or world history, and (e) an approved modern language. The third is the final examination. The first year's course comprises the compulsory subjects of (a) organization of industry, banking, trade and transport; (b) modern economic development of the British Empire and of the chief foreign countries; (c) elementary commercial law; and (d) statistical method. The second and final year will be devoted to specialization.

The foundation and maintenance of this new course of study is expected to involve an annual expenditure of $108,750, necessitating the provision of a capital of $2,175,000.

PACIFIC MACHINERY

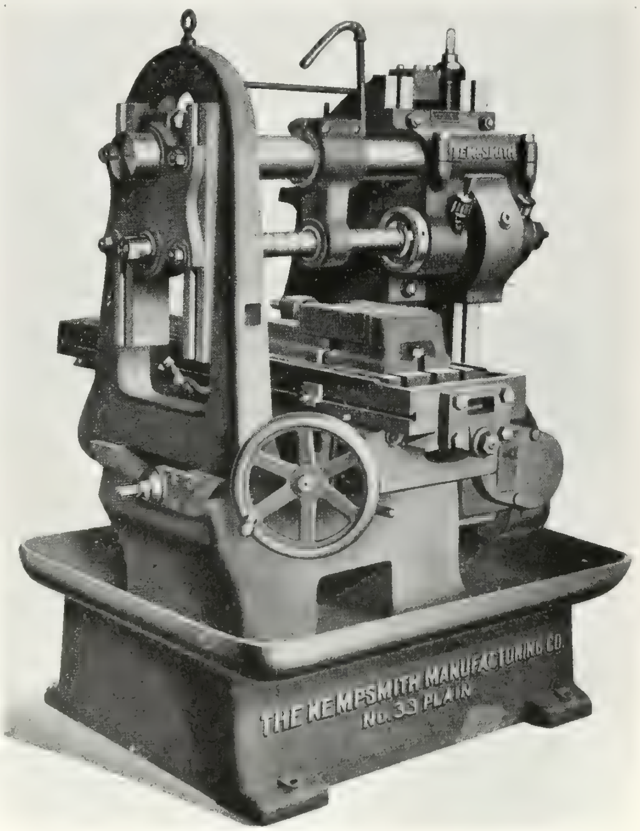
KEMPSMITH MILLING MACHINES

ILLUSTRATED in the accompanying photograph is the result of many years' development in the milling art. The Kempsmith No. 33 plane milling machine is especially adapted for the rapid production of duplicate parts by means of heavy gangs of formed milling cutters. The manufacturers of this machine recommend it particularly for operations requiring infrequent adjustment of the vertical distance between the cutter arbor and the surface of the table. It is by the elimination of this table adjustment that great rigidity and accuracy are obtained in this machine, and while it is possible to vary this distance, it is not done in the usual manner, but by the movement of the arbor head and guide. In this way it is possible to rigidly support the table and ways directly upon the base frame of the machine. This machine has been designed and constructed not with the idea of great flexibility of adjustment, as this has been considered of minor importance but special attention has been paid to developing great rigidity, a smooth acting powerful drive for both table and cutter, and maximum convenience of operation. Another feature of great importance in the maintenance of this machine is the system of construction adopted, called by the manufacturers "Unit Construction." This system has been used throughout. Every detail of the operating mechanism forms a part of one of these units and each unit is entirely independent and can be readily removed for purposes of inspection. For instance the arbor driving mechanism can be readily removed from the frame without in any way interfering with and disturbing any of the driving mechanism for the table; also the outer supports for the arbor and the over-arm can be removed quickly without interference with other parts of the machine.

Bed.—A great deal of time and thought is represented in the design and construction of the bed frame which is a massive solid casting in one piece. The bed constitutes a solid and rigid foundation for the operating units of the machine, and herein can be found the reason for the great rigidity and accuracy of the work produced by this miller.

Saddle and Table.—The most modern and approved design is embodied in every detail. The saddle is gibbed to the bed by means of a special solid adjustable type of gib and when locked this gib virtually forms a solid part of the saddle, at the same time permitting a perfect freedom of movement on the bed without interposing any loose pieces. The saddle is of unusual length compared with the total length of table travel, another feature tending to maintain the accuracy and rigidity of the machine. The table is of deep cross section with three T slots and large oil channels for the return of cutter cooling compound. A gear driven compound circulating pump fitted to the machine forces the compound through a system of pipes and channels to the cutter points. A series of channels guide the compound to a catch basin in the base carrying the compound away from the slides and bearing surfaces. The table gib is of the taper adjustable type with adjustments locked so that the operator has no temptation to tamper with them.

Headstock.—The headstock is a massive iron casting carrying the spindle and driving gears and supporting the inner end of the over arm. It is provided with a large flat face for guiding on the head frame and when clamped by means of the bolts—in T slots in the head frame—it becomes in effect a solid piece with that member. The vertical adjustment of the headstock is by means of a vertical screw furnished with a dial graduated to one-thousandths of an inch. The method of clamping the over-arm in the headstock is by means of a split clamp locked by special locking screws.



The Kempsmith Milling Machine No. 33

It will be noticed, however, that the slots are in the ends only of the clamp, the center section acting as a non-adjustable guide and support. The clamping action comes on the ends of the guides only, and in this way it is impossible to dislocate the over-arm.

The Over-Arm.—The over-arm is a solid steel bar of large diameter carrying an outer and intermediate pendant for supporting the arbor. The outer pendant is bolted firmly to the outboard harness brace. Thus in making vertical adjustment of the arbor its alignment with the top of the table is preserved at all times. The whole arrangement of sliding headstock, over-arm, pendants and outboard of harness brace is designed to give ample support and backing to the cutter, and insures freedom from chatter and consequently longer life to the cutter and greater accuracy to the machine.

Drive.—The drive is of the constant high-speed single-pulley type and may be belted direct to the line shaft without the use of an intermediate or counter shaft. The pulley diameter and speed is so chosen that it can be conveniently belted to line shafts running the average speeds. As the pulley operates at all times, it is mounted on heavy ball bearings and capable of continuous operation. The pulley connects to the drive shaft of the machine through a flat plate friction type clutch. The arrangement is very ingenious, of powerful design and very compact and yet the friction surfaces are not sacrificed in favor of compactness. The design of the toggle lever arrangement is such as to give the required pressure on the plates with very little effort on the operating handle. It is really remarkable how silently and quickly and with what ease the clutch will pick up and transmit the full load of the machine with absolutely no slippage; at the same time it will disengage instantly when required without any danger of dragging, and the adjustment to compensate for the wear of the clutch plates can be accomplished without dismantling the unit.

Feeds and Speeds.—The flexibility of the Kempsmith Plane Milling Machine can be readily imagined by noting the speed and feed changes. Six changes of spindle speed are regularly furnished with the machine ranging from 25 to 152 r.p.m. being obtained by the use of six change gears enclosed in the speed change gear box in the rear of the machine. The standard equipment gives six changes of table feed ranging from one inch to eight inches a minute. Special gears can be furnished, however, to increase the range to as high as 16¾ inches a minute, at the same time the machine can be specially equipped to give feeds as low as 7/32 of an inch a minute, reducing, however, the maximum high rate of speed in proportion. The simplicity of the drive mechanism for both spindle and table is really remarkable, drives in both cases being direct, short and very powerful. Both mechanisms incorporate multiple thread worm wheel at points very close to the spindle and table, respectively. The spindle wheel is mounted directly on the spindle itself, having thirty-one teeth of one inch circular pitch. The worm wheel for the table feed drive is mounted on the feed screw nut and by means of the special construction adopted, it is not necessary to drop out the worm at any time, it being permanently meshed with the worm wheel.

Operating Control.—The operation of the machine is extremely simple. All movements are controlled by only two levers. These levers are placed where most convenient for the operator. The starting lever above the overhanging arm controls the starting and stopping of the spindle, and the power quick traverse. When thrown in extreme right hand position it engages the spindle drive and table feed mechanism. When thrown back to intermediate position it disengages these movements. When thrown and held in extreme left hand position it engages power quick traverse mechanism. Engagement and direction of feed and power quick traverse of the table is controlled by the feed lever in the saddle at the front of the table. Thus with starting lever in right hand position, table feed is engaged, stopped or reversed by means of this feed lever. In like manner, with starting lever in extreme left hand position, the power quick traverse of the table is likewise controlled by the feed lever. In the case of either feed or power quick traverse the direction of the table movement is indicated by the direction in which this feed lever is thrown.

Power Quick Traverse.—Power quick traverse is available for both directions of table travel at the rate of 100 inches a minute. The power quick traverse is engaged by throwing the starting lever in extreme left hand position and holding it there until the table travel is completed. The direction of travel is indicated by the feed engaging lever at the front of the table. Since the spindle always stops when quick traverse is in operation, there is no tendency for the cutter to mark the work when returning the table.

Safety Devices.—All operating parts of the machine are fully protected to keep out dust and to prevent accidents to careless operators. The pulley is entirely covered by a housing, having openings only for the belt. This housing is adjustable to accommodate the necessary angle of the driving belt. A safety lock is provided which should always be applied in changing the speed gears or feed gears. This safety lock positively prevents the turning of any part in the machine except the driving pulley.

Cutter Cooling.—A geared type pump of large capacity is furnished with this machine for delivering cooling compound to the cutter when the nature of the work requires it. When not required it is disconnected by a simple clutch on the pump drive shaft. All cutter cooling fluid passes through a fine screen and then through a settling tank before being returned to the reservoir. This tank can be lifted off for cleaning.

Lubrication.—A system of centralized oiling for all operating parts has been incorporated. The entire mechanism of the machine is oiled from seven stations, distributed on the various units as follows: clutch unit reservoir, gear box unit reservoir, saddle and table unit reservoir, sight feed spindle oilers, oilers at base of vertical drive shaft, spindle worm wheel.

One of these machines, a 60-inch, is now in operation at the Holt plant in Stockton, and Mr. Hubert, superintendent, cannot too highly praise this machine. As a quantity producer of great accuracy and simplicity, it occupies a position among the foremost machine tools of the country.

Cutting on a Turret Lathe

A RATHER interesting machine operation being performed at the shops of the Skandia Pacific Oil Engine Co. is that of turning the outside diameter and forming the fuel injector cam on their large Diesel engines. The cam in position for performing the operation is clearly shown in figures 1 and 2, where it will be noted that the cam is in two parts tongued together. The reason for parting the cam is because of the method adopted for assembling the cam on the cam shaft. It so happens that these cams must be occasionally removed and adjusted, and for this reason the construction shown was adopted to simplify this operation in the maintenance of these machines. The cam when assembled on the engine surrounds the cam shaft, but is fastened thereto indirectly by three studs which project through the cam in slotted holes allowing for a slight angular adjustment. These holes are quite conveniently used for holding the cams to the fixture as will be noted from the cuts. A register ring on one face of the cam is also utilized for the same purpose. The flat strip, with the two set screws shown in the cuts is used to rigidly clamp the work in place and to prevent dislocation during the machining operation.

The method used in forming these cams is quite evident. By inspection of the cuts it will be noted that a duplex tool holder is mounted on the cross feed turret, each tool holder is rigidly clamped in place and each tool holder is provided with a roller and a single pointed tool. The one for roughing, the other for a finishing cut. The cross feed slide screw nut is released and a stiff spring is provided to hold this cam-turning attachment in its proper position for forming the cams. After the photographs were made, however, better results were obtained by means of weights supported by means of a wire cable over a sheave fastened to the back of the lathes. The holding fixture consists of a flat plate with a register ring located on the standard face plate of the lathe. This fixture projects a sufficient distance to allow for the master cam which is made extra wide to avoid the possibility of wear. As the master cam is of cast iron and subject to more or less wear, the greatest precaution has been taken to reduce inaccuracies to the smallest amount.

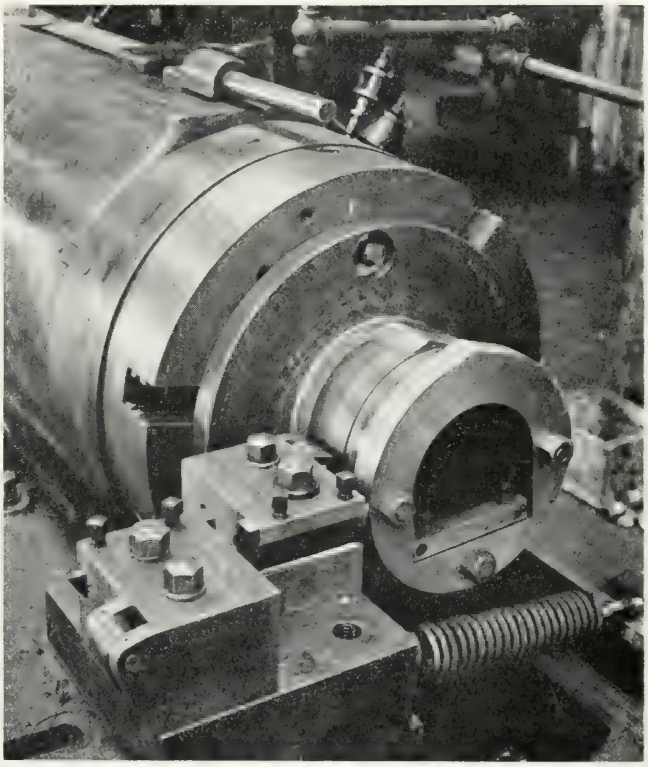


Figure 1. Cam forming on a Steinle turret lathe, showing turret tools

The material from which the cams are turned is mild-steel and the outside diameter is 8 inches. On the roughing cut from ⅛ to 3/16 of an inch of metal is removed, leaving 1/16 for the finished cut. A feed of ⅜ of an inch is used, and the work is rotated at 14 r.p.m. corresponding to a cutting speed of about thirty feet per minute. On the finishing cut about 1/16 of an inch is removed under the same conditions of feed and speed. By the method here described it is possible to complete this operation on these cams in about twenty minutes each. While it is possible to equal or even exceed these results by form milling, the necessary milling machines were not available and it became necessary for Mr. A. L. Little, in charge of the screw machine department, to devise this method of producing cams on the turret lathe.

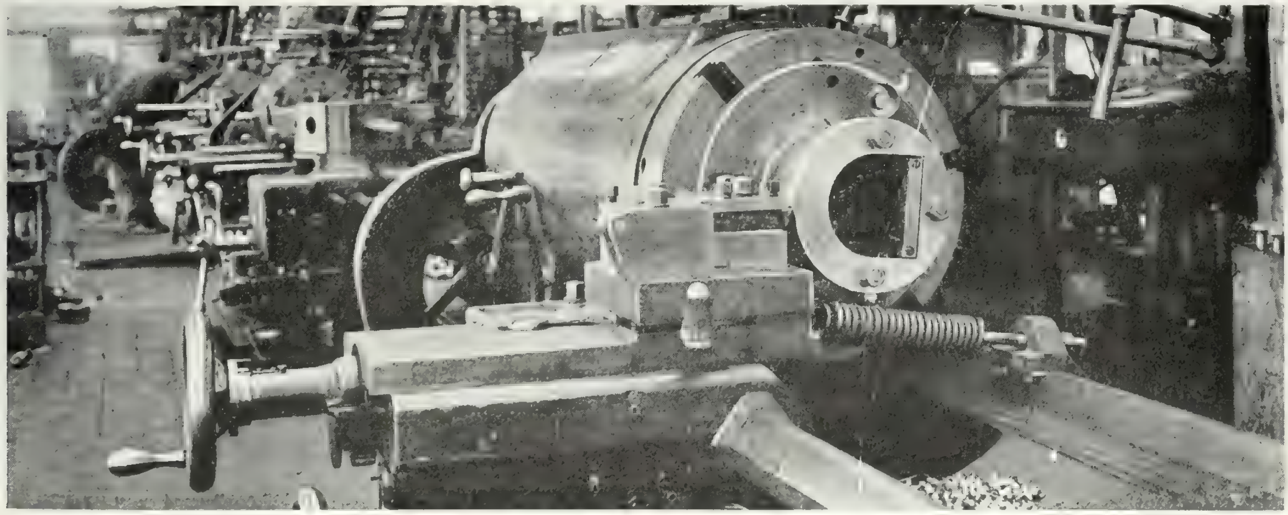


Figure 2. Cam forming on a Steinle turret lathe

Industrial Lighting Improvements

POPULAR conception attributes to the war, among other things, a widespread improvement with respect to the industrial lighting situation. Some improvement is there, most assuredly, but do not mistake the phrase "widespread improvement" as descriptive of anything more than a start in the right direction. A comparatively small number of plants have been affected, and the deplorable conditions of pre-war days still exist so generally that a thorough investigation of the plants in any locality will dispel any optimistic views of the approaching millenium in good lighting.

Let us suppose that you contemplate the use of photographs in selling good lighting and that you make an inspectional survey of the industrial plants in your local territory, or in any territory that you imagine will contain installations of such a nature that you would be repaid in securing pictures of their lighting.

In the course of some ten evenings' work, your net results may be figured as a liberal education in the status of actual conditions. Any notion you may have had of widespread improvement will have undergone a material change. Perhaps you will have found one or two commendable installations, but even in these you could suggest changes for the better.

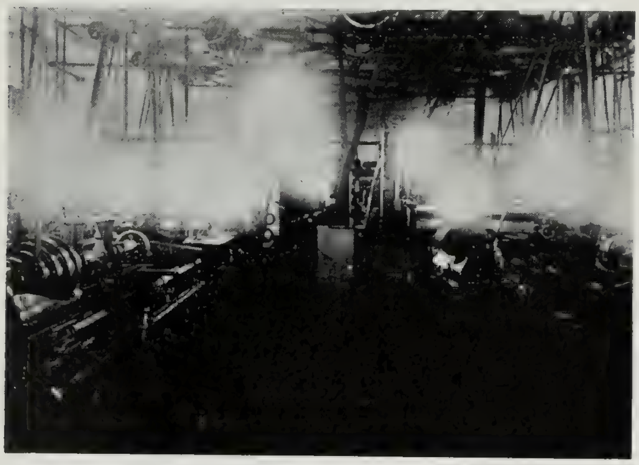


Figure 1

Actual experience in more than one investigation recalls several typical points of interest. A certain machine shop was recommended by the man who had installed the lighting as being "among the best." After a number of extra lamps had been secured to fill the empty sockets, the shop looked something like Figure 1. Carbon lamps and clean glassware, suspended at a low level on long drop cords, were constantly in danger of catching in the belting and incidentally were very annoying from the standpoint of glare. The intensity was far too low.

Now glance at the installation in Figure 2. The bare lamps in the background produce so low an intensity of general lighting that care must be exercised lest you trip over some obstruction on the floor. The workman cannot and is not expected to do his work under such conditions, so he has been provided with a Mazda C lamp in a dome reflector—an excellent unit, had it been mounted ten feet over his head instead of two. The glare annoyed him so that he tied his newspaper around the unit to convert it as best he could into a deep bowl unit, making it rather difficult to distinguish in the picture. The improvement is a small one, for the glare is still intensely annoying, and the shadows are hard black. The unit, by the way, is suspended over his work from a piece of board which is temporarily attached to the nearest machine. Some of the other workmen in the same shop, not shown in the photograph, have removed the reflector and are using the lamp bare. Are such conditions ideal?

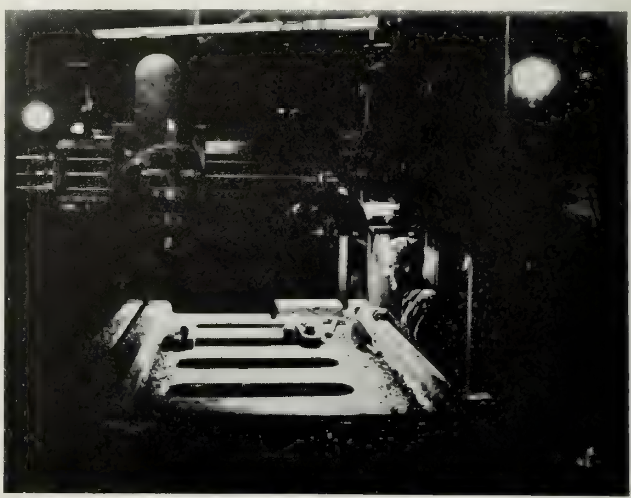


Figure 2

And so it goes. Bare lamps, poor reflecting equipment, improper spacing and mounting heights, glare, bad shadows and low intensity are almost everywhere. If you question this broad assertion, you can easily convince yourself that it is only too true, by making a sufficiently comprehensive inspectional survey in any locality you may choose. If you are fortunate, you may encounter in your travels a plant such as the one illustrated in Figure 3. This is really good lighting, but plants where the lighting compares favorably with this one are the exception. A recent survey of more than twenty carefully selected plants—selected because the lighting had been recommended as excellent—revealed three in which it was worth while to take photographs. To be sure, the lighting in the majority was of sufficient intensity, but good lighting cannot be judged by intensity alone.

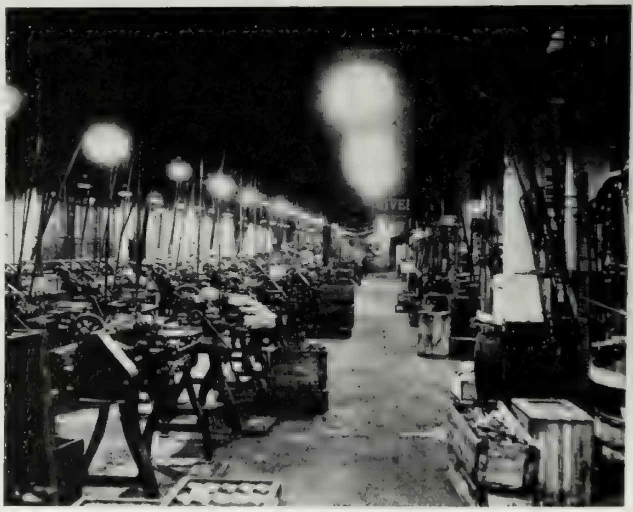
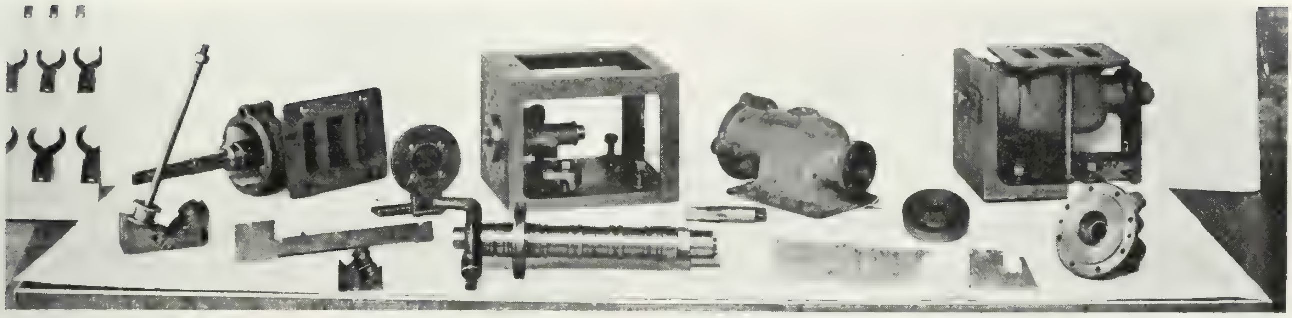


Figure 3

A Modern Manufacturing Plant

By Charles Shattuck
Mechanical Engineer, C. F. Braun & Co.



Pump valve jigs and gauges. C. F. Braun & Company

FOR many years the opinion prevailed throughout the manufacturing centers of this country that any attempt to manufacture on the Western Slope of this continent would be absolute folly. The East proclaimed that it would be an impossible undertaking, owing to our remoteness from essential materials, our lack of manufacturing knowledge and experience coupled with the light demand in this section. To compete with old-time, well-established manufacturers would, according to this propaganda, only spell ruin and failure.

Those responsible for this opinion had failed to take into consideration such fundamental factors as the fighting spirit of the West, Western enthusiasm and Western resourcefulness. The spirit of the Forty-niners, the spirit that drove our forefathers to the new lands, overcoming almost impassable difficulties, still existed only awaiting the founding of organizations with initiative engineering training and stable financial backing which could so educate the consumer as to create a demand for home industry.

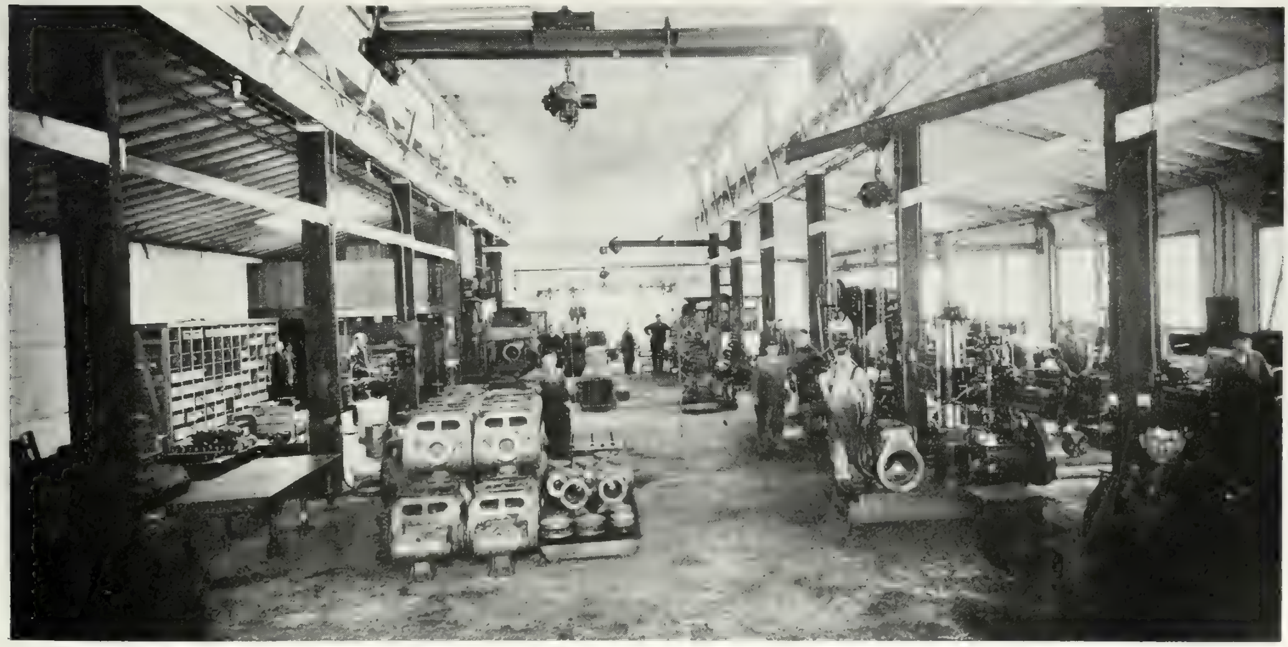
What has been accomplished in the last few years is now a matter of history. Industries have sprung up over night. Mere swamps have grown into manufacturing centers. Young and old have risen to power in the community.

C. F. Braun & Company, the subjects of the present sketch, had, prior to several years ago, manufactured a small but comprehensive and well established line of auxiliary steam apparatus, the work being carried out in numerous shops and foundries under the careful supervision of a competent engineering force.

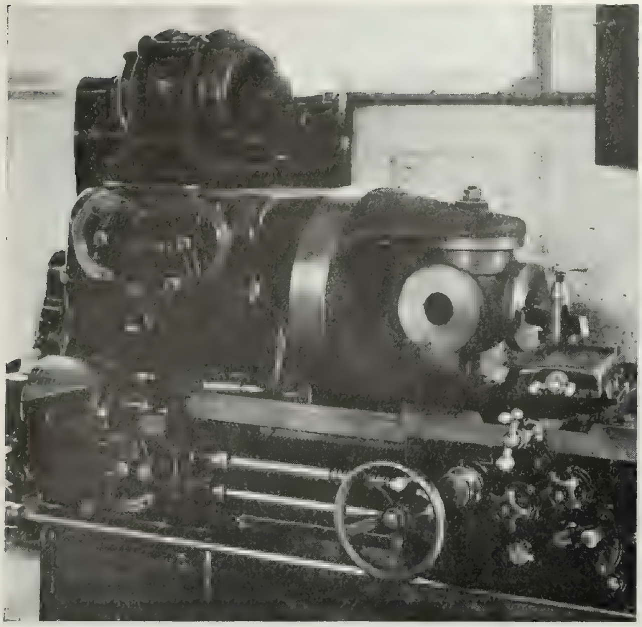
When the market opened and production on a large scale was warranted, the company officials were absolutely convinced that production could be undertaken along the same efficient lines and on as large a scale as in the great manufacturing centers.

That they were wise in this decision and that they had the necessary energy, enthusiasm and ability to carry out their plan is shown conclusively by the splendidly equipped and efficiently organized manufacturing plant which they have built up and are now operating. The various types of apparatus manufactured include condensers, heaters, coolers, evaporators, distillers, centrifugal and reciprocating pumps, cooling towers, special valves, strainers, grease extractors, expansion joints, sand filters and water softeners.

The personnel of this company is typically Western throughout, all the officials having been educated and developed in California. Carl F. Braun, president and general manager, is a gradu-



Machine shop, C. F. Braun & Company. Note clear floor spaces, tote box rack at left, and heavy work on portable platforms in center



Special chuck for machinery bodies of 2½-inch to 6-inch valves

ate of Stanford University in mechanical engineering, and has followed this line from his undergraduate days. Through his careful study and inventive genius Braun machinery has been made possible. All types are covered by United States patents or patents pending.

Harry H. Houghton, general superintendent of production, is also a technical graduate of Stanford University, and has specialized in this character of work for the last six years. By careful study of manufacturing and labor conditions Mr. Houghton has gained for the plant a reputation known all over the Coast.

The administrative, engineering, publicity and sales work are handled by J. F. Miller, C. T. Keefer and C. H. Shattuck, the latter two having resumed their duties several months ago after service in the United States Army.

The machine shop, foundry and pattern shop are in charge respectively of A. Hood, A. S. Landgren and J. A. Marchant, all men of experience in their several lines.

The plant, located in the heart of the industrial district of San Francisco, consists of machine, erecting and pattern shops, iron and brass foundries, copper and structural steel department, engineering and administration offices, and is one of the most complete of its character on the Pacific Coast. The layout of the buildings is so arranged as to enable economical and efficient handling of materials, machine operations and finished product. Ample provision for increased facilities has been made throughout all of the departments and additional equipment can be so tied into the present scheme as not to hamper the general sequence of operation.

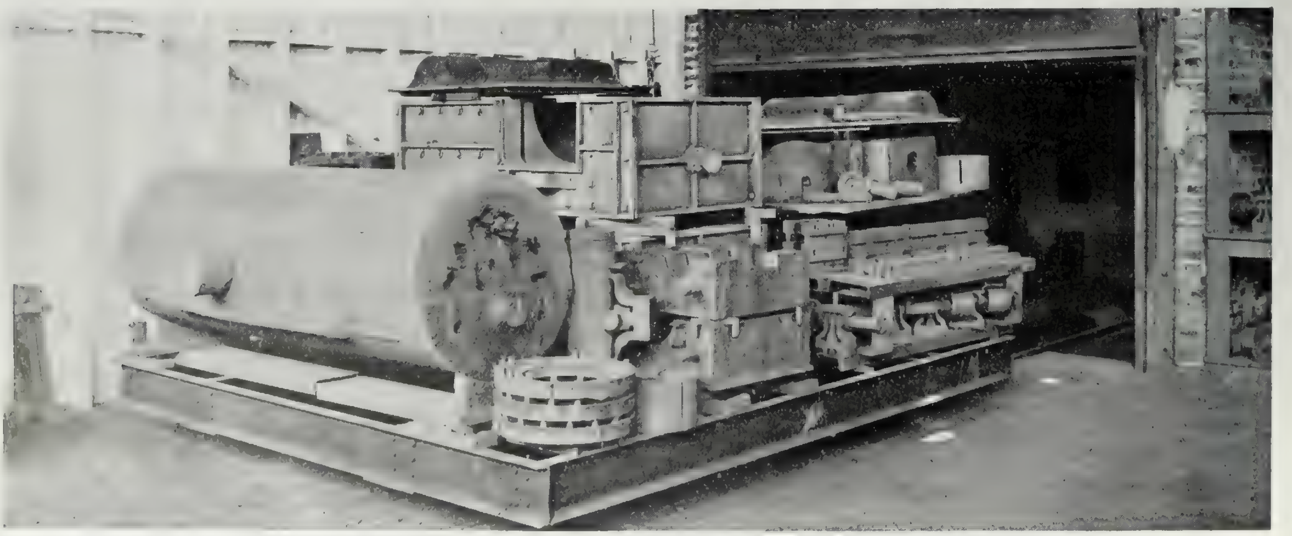
Erecting floor, C. F. Braun & Company, showing characteristic apparatus in production

The pattern shop, situated on the second floor of the north side of the foundry building, is light, breezy and roomy, with all machines, benches and tables placed so as to afford efficient working conditions. The usual planers, joiners, lathes, band saw and sander are installed, each equipped with direct motor drive.

No expense has been spared in building up durable and rugged patterns made of the best materials and so constructed as to simplify moulding and core work in the foundry.

A comprehensive system has been worked out in the storage of all patterns and core boxes, each separate piece having a record card bearing its classification as to condition when last used and probable date of replacement on account of minor injuries and depreciation.

The main part of this building embodies the iron foundry with its general moulding floor, small flask and moulding machine space and core making department. This latter department is fitted with ovens, featuring the latest design in modern



Car loaded with molds and cores. Core oven in the background. C. F. Braun & Company foundry practice. All moving parts, such as doors and cars, are ball bearing throughout; all floors suitably vented to allow the escape of damp vapors, and each oven so constructed as to afford an even heat distribution throughout. A sand mixing machine is available to insure thoroughly homogeneous mixtures.

As a high percentage of the castings required many complicated cores of various sizes and shapes, a careful study of core making was carried out by the engineering force with the idea of eliminating unnecessary time and material, and at the same time insuring smooth metal surfaces. By the extensive use of skilfully constructed arbors and plates an enormous saving has been realized in this phase of the work. The use of core sand has been practically eliminated in larger castings, the forms being made up of ordinary moulding sand and coke.

In order to facilitate handling raw materials in the yard and finished castings to the machine shop, an industrial railway has been installed with the necessary turntables, and rolling stock that may be easily manipulated by hand.

The brass foundry, located in a separate building, is equipped with two crucible furnaces having a total capacity of about 300 pounds of brass castings a day. As the majority of brass castings in Braun apparatus are very light in weight, this shop is called upon to handle quantity production of small work only.

The main machine shop is housed in a one-story concrete building, covering a floor space of approximately 7000 square feet. The main layout is such that areas are set aside for future expansion and still maintain a liberal clearance in the proximity of each tool.

In the grouping of machines two factors entered into the problem which required careful consideration and study. The first was that of character grouping of lathes of one size to be placed together as a unit, and the second problem, a method of grouping, bearing in mind the sequence of operation performed on all work in process. For apparatus such as that manufactured by this company it was found advisable to adopt the former method, thus forming a basis for all contemplated extensions.

The main equipment of this shop consists of the usual planer, engine and turret lathes, radial and sliding head drills, arbor press, grinders and numerous small tools found in all shops of this character.

To facilitate handling all rough and finished materials a system has been worked out whereby only work in operation is placed on the machining floor. All small rough parts are racked into boxes and only withdrawn when the pieces are to be placed in operation. Heavy parts are arranged on portable platforms in specified areas and transported to the tools by light lift trucks. By employing these methods the floor spaces are kept entirely free from congestion of unnecessary parts, thereby materially increasing the efficiency of the plant.

This system of order tends to promote a far reaching moral effect on all concerned and reflects favorably on the character of work performed. Men enjoy their work in such an atmosphere, taking pride in the care and up-keep of their machines and the accuracy of operations performed. Half of their waking hours are spent in the plant and the environment should be healthful and agreeable.

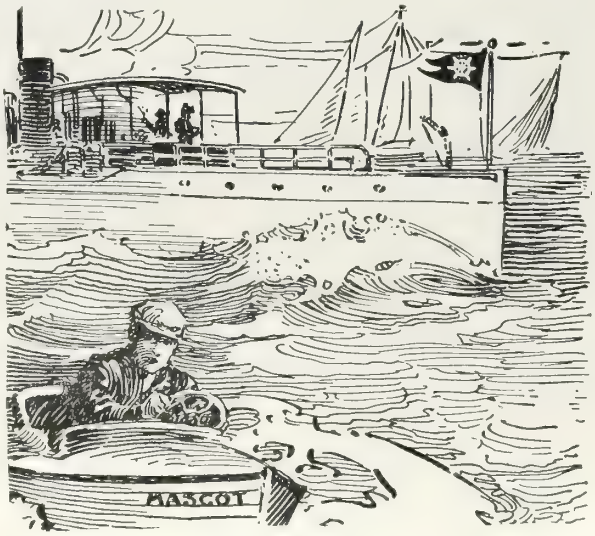
Adjacent to the machine shop is the finished parts and transient stock room, fitted out with bins, racks and shelves, suitable for parts of various sizes, all catalogued with an individual perpetual inventory card system. A fire-proof concrete vault contains all inflammable oils used throughout the plant.

South of and connecting with the machine shop is the erecting department, a building divided off in areas adapted to the assembly of work of various characters. For example: Surface plates, racks and pit are installed for tubing, expanding, packing and assembling of heat transfer machinery; steel tables and benches for pumps and special benches and devices for the erecting of valves and similar articles. All air lines and high pressure water lines are located so as to enable testing to be carried out in these unit areas.

The tool room is found in the north wing of the erecting shop embracing all tool and jig racks, lathe, annealing furnace, precision grinder and necessary drill presses. As the fundamental principle underlying the methods of manufacturing parts is based upon the use of jigs and precision instruments, this department is carefully operated under the close supervision of skilled engineers and tool makers. Before placing new or revised apparatus into production a sample of each is put through the plant and all jigs planned and made before quantity work is started. This method guarantees our proceeding with the manufacture of a great number of parts in well defined and smooth running order.

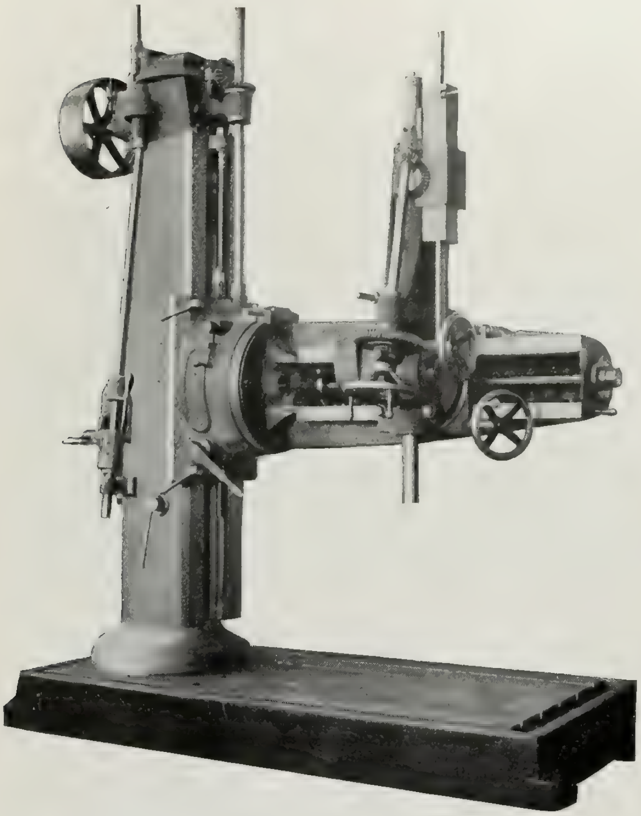
The warehouse and storage yard is a separate building situated just east of the erecting shop. All surplus stocks are racked, stored and listed in one section of the main floor, the remaining space being devoted to structural steel and brass tube work. The upper floor is laid out for the storage of electrical equipment, obsolete patterns and miscellaneous goods, not used in every day procedure. All oxy-acetylene welding is carried out in one section of the storage yard.

Pending the construction of an office building in connection with the works, which will more closely co-ordinate all branches and departments of the industry, the administrative and engineering offices are now located up town in the Cunard Building.



Yacht Reyance

The Western Low Hung Drive Universal Radial Drill



Western low-hung-drive Universal radial drill

THE Western Machine Tool Works of Holland, Michigan, have just placed on the market the Western Low Hung Drive Full Universal Drills in three sizes, 4, 5 and 6 feet. This machine incorporates all of the best features that modern practice and twenty years of experience in manufacturing radial drills have proved necessary and desirable in a machine which must stand continuously under the tremendous stress created by the modern methods of drilling. The Western Universal Radial Drill is an exceptionally powerful and rigid machine. It is particularly qualified as a rapid drilling and tapping machine.

The principle of the "low hung drive" on the lower end of the drill spindle is mechanically correct and much superior to the method of spindle drive used on many other makes of radial drills.

All hand levers are conveniently located and are within easy reach of the operator.

Gear Box.—The gear box on top of the column is of very simple construction. It is provided with eight changes of speed through a sliding cone and tumbler gear. There are only nine gears in all and none are in mesh excepting those transmitting the power.

The tumbler gear yokes are massive castings and they form a rigid support, close to the application of pressure, on each side of the tumbler gears whic hare bushed with bronze. The gears and bearings inside of the box are submerged in oil which reduces friction at these points to a minimum.

The main bearings are bushed with bronze and are lubricated by sight feed oilers. These positively assure the adequate oiling of each bearing.

Saddle.—The saddle is of extra heavy design and is well proportioned. It is provided with an adjustable gibb for taking up all the wear on the edges of the column. The extra long bearing on the column practically eliminates the tendency of the arm to lift under load.

The saddle clamps are furnished with binding handles for clamping the saddle securely in position on the column.

Elevating Mechanism.—The elevating mechanism is located in the arm saddle and is controlled by a conveniently located lever on its front side. The reverse motion for raising or lowering the arm is transmitted through a pair of powerful adjustable friction clutches. There is positively no shock to any of the mechanism when operating this device. The elevating nut screw is made of high-grade bronze and is of extra length in order to distribute the pressure over a large thread area, and to insure long life.

Arm.—The arm is of "C" section and is heavily ribbed on the inside. The superior design of this arm enables it to hold the ways in practically perfect alignment. The fact of the upper and lower way or guide of the arm being tied together for its full length forstalls its tendency to twist or wind out of line, or to bulge either inwardly or outwardly.

The inner end is graduated in degrees and it may be swiveled through a complete circle. It is rotated by a worm and worm gear. The worm gear teeth are cut integral on the largest diameter. This distributes the wear over a large number of teeth and prevents excessive wear and lost motion.

The inner end is recessed into the saddle. Four "T" bolts are provided for binding it firmly to the saddle and a dowel locates its zero position.

Tapping Attachment.—The tapping attachment is regularly furnished. This is obtained through a pair of bevel friction gears on the vertical drive shaft in the saddle.

Internal expanding ring frictions with adjustments for wear which are capable of pulling the full load capacity of the machine are provided for controlling the forward and backward motion of the spindle. Being mounted on the highest speed shaft, they work at their maximum efficiency.

Head.—The design of the head is such that the center of the spindle is nearly in line with the center of the column. This construction reduces the torsional strain to a minimum. All main bearings are provided with high-grade bronze bushings which are grooved with generous oil channels.

It may be swiveled 45 degrees each side of the perpendicular by means of a segment gear and pinion, or through a full circle when operated by hand beyond 45 degrees. Suitable means are provided for locking it in place and a dowel locates it at the zero or vertical position. Swiveling of the head is entirely independent of the saddle moving mechanism and it cannot sag while being adjusted as it is recessed into the saddle. The spindle drive gear bearing in the head is of generous proportions and is bronze bushed.

Spindle Drive.—The "Low Hung Drive" of the Western Universal Radial is one of its most distinctive and valuable features. The spindle of this machine is driven by a pair of powerful reduction gears at its lower end, close to the drill or cutter being used. This design makes it possible to drill, bore, tap, spotface and mill with the minimum possibility of the tool chattering.

The large bevel gear being suitably connected to the spindle at its largest diameter, and bottom end, by means of two long heavy keys, offers such a tremendous resistance to the torsional strains, that it not only increases the power of the machine, but it practically eliminates the possibility of twisting the spindle under the heaviest cuts.

Drive Gearing.—All the gears are made of steel and the gear teeth are generated on a Fellows Gear Shaper which insures a smooth, quiet-running drive. All gears are entirely enclosed.

Back Gears.—The back gears are located at the inner end of the arm, close to the saddle and are operated by means of a lever within easy reach of the operator. They are of wide face and coarse pitch and the circumferential velocities are low.

Drill Feeds.—The positive gear feeds, of which there are four changes, are obtained through eight wide-faced, coarse-pitched steel gears. The bores of these feed gears are ground concentric with the pitch circle after hardening. They are wholly enclosed. The shafting is ground to size and all bearings are bushed with high-grade bronze. The feed changes are controlled by means of a plunger carrying a slip key.

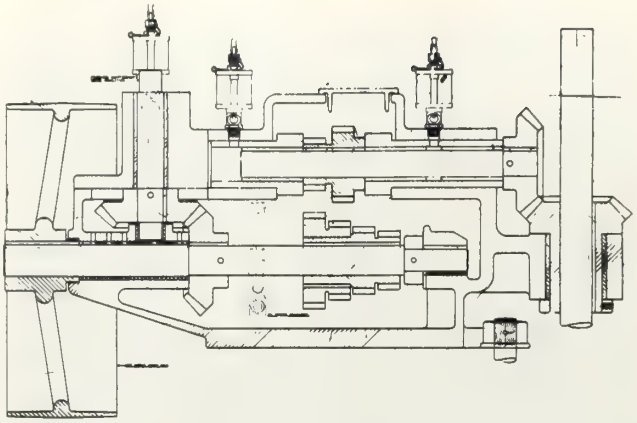
The range of the feeds is great enough to take care of all of the various sizes of drills which may be used. The rack pinion is made from a solid bar of crucible steel and is strong enough to withstand several times the maximum pressure necessary to feed the largest drill which the machine is capable of driving.

The "Low Hung Drive" of this machine makes it possible to use very large ball thrust races containing extra large balls under the feed quill. This is a valuable feature as this thrust bearing is under a very heavy stress when the machine is driving the larger-sized drills.

Friction Feed Release.—With an improved type of feed release, the worm remains constantly in mesh with the worm gear. This construction permits the wear on the gear teeth to be uniformly distributed. The feed may be disengaged instantly by hand or by the automatic depth gauge which can be set to trip at any point desired. The power feed is tripped when the spindle reaches its limit of travel in either direction, while a small hand wheel located at the right hand side of the head furnishes means for feeding by hand when desired.

The friction clutch ring is large in diameter and has a wide face. The ring is expanded by means of a pair of adjustable fulcrum friction fingers, which are operated by a handle with an extra long leverage. This gives an extremely powerful grip with ease of operation. When the friction is disengaged, either by the automatic trip, or by hand, the spindle may be raised or lowered by means of the handwheel.

Spindle Counter Weight.—The spindle counterweight is adjacent to the spindle and is operated by the rack pinion. This improved device balances the spindle perfectly regardless of its angle of inclination.



Section through gear box of Western low-hung-drive Universal radial drill

Constant Speed Drive.—The driving pulley on the gear box runs at a constant speed. The advantage of this type of drive over the cone pulley is at once apparent. High and uniform belt velocity provides a constant horsepower at the drill spindle, regardless of its speed; in other words, the power delivered to a large slow-running drill is just the same as it is for a small fast-running drill. Maximum production can be obtained in either case.

The accompanying line drawing of the gear box at the top of column shows the construction of this unit and also shows a rather novel manner in which the drill is driven from a line shaft. The pulley is used for motor drive only when the motor is bolted to a pad on the back of the column. As it would be impossible to drive through this gear box by means of a belt in such instances a counter shaft is provided which is driven from a line shaft in the usual manner. The counter shaft is provided with a set of beveled gears and a protruding shaft similar to that shown on the left hand side of the cut herewith. These two sub ends are connected by means of a pair of universal joints and a rigid shaft. With this drive it is possible to swing the arm to any position around the column wthout interfering in any way with the drive.

CATALOGS DESIRED FOR RIO DE JANEIRO CONSULATE GENERAL

The consulate general for Rio de Janeiro would be pleased to receive from firms in the United States catalogs, etc., for its library of commercial catalogs. This library is available to Brazilian merchants, and frequently visitors are interested in placing orders for American goods, in case the catalogs are up-to-date and contain price lists, etc., intelligible to the local commercial public. The file is lacking in up-to-date catalogs of the following items:

> Agricultural implements and tractors. Athletic goods, including gymnasium supplies. Automobiles and accessories. Chemicals: [These catalogs should not only contain the prices but also minute information concerning each chemical for the assistance of the Brazilian chemist. This was the German method of introducing this class of goods and made the German article a proverb among the local trade]. Colleges. Material for the manufacture of elastic goods, such as suspenders. Office furniture, wooden as well as steel. Paper. Glassware. Iron and steel products. Railway equipment. Machinery in general.

Enterprise Heavy Duty Marine Gas Engines

THE San Francisco Bay District is noted the world over for its efficient gasoline tug boat service. Possibly because of a particular type of prime motor developed in this district carrying the heavy duty marine gas engine, a number of which are produced in factories surrounding San Francisco Bay.

One of the latest to be offered to the public is the Enterprise, built by the Enterprise Foundry of San Francisco. For over twenty-five years the Enterprise Foundry Company have been furnishing the gas engine trade with castings that have stood the test of time.

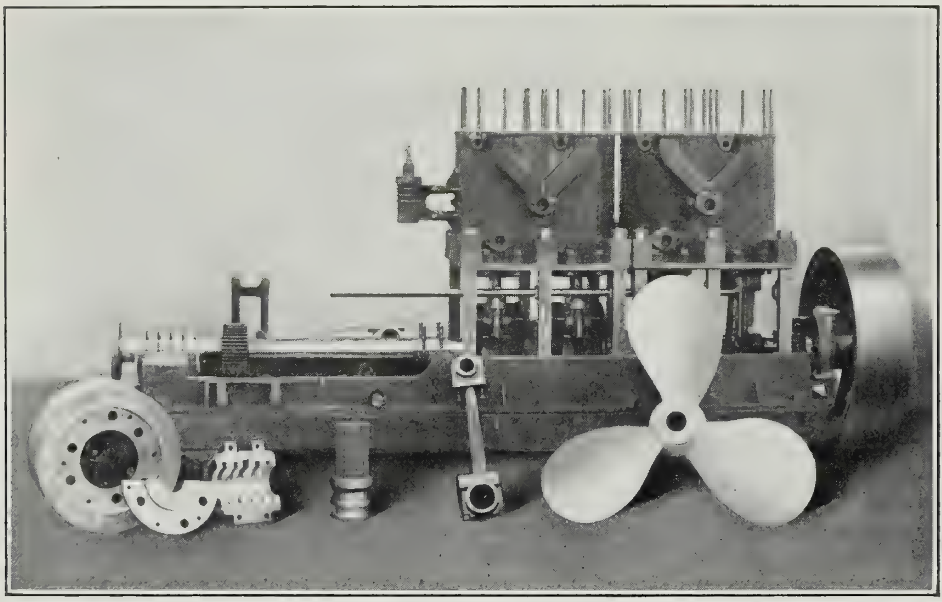
A few years ago a decision was made by the officials of this company to embark upon the manufacturing complete of a simple, rugged, heavy duty marine and stationary motor. The personnel of the organization in charge of the development of this end of the business consists of men with many years of experience in the marine heavy duty internal combustion game, and the Enterprise engine today ranks with the foremost in that line.

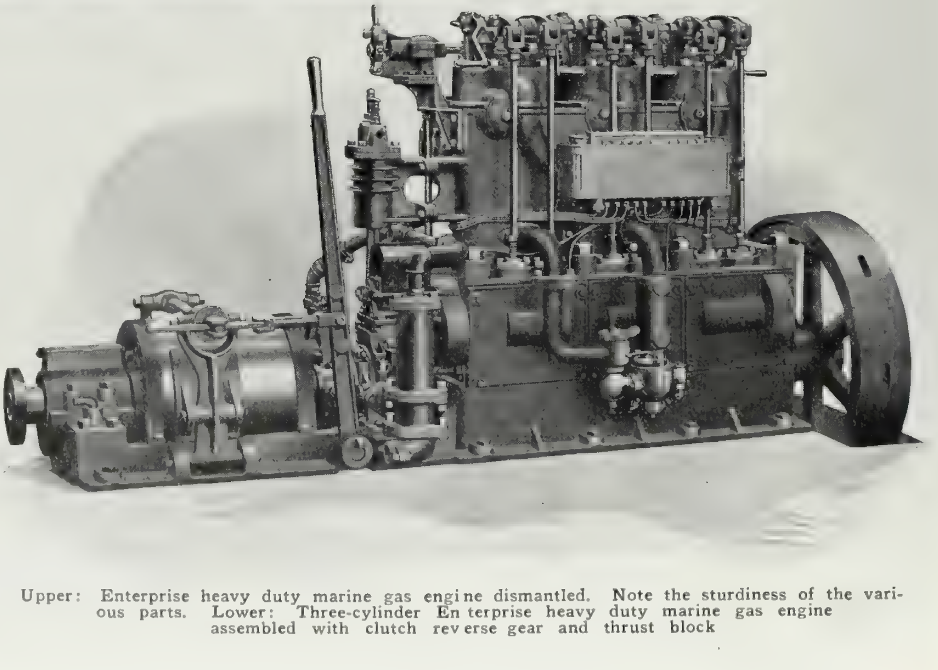
Acessibility is the keynote of their success. Weight is not sacrificed for a slight saving in cost. In fact, the California type of the heavy duty engine is considerably more costly than some of the high speed light engines built in other localities. It is because of this feature of construction adopted here that the engines described enjoy such popularity. California-built engines can be found in many ports, both in North and South America, as well as the Orient. This is not due to a low first cost, but rather because of the service rendered per dollar of investment.

Another valuable feature of the Enterprise engine is the slow-down attachment, operating directly on the valves, which in conjunction with a variable compression feature makes one of the most flexible engines that it is possible to place in a marine installation.

Lubrication, one of the all-important items in any piece of machinery, has received a great deal of attention. The pistons, cross head pins, crank pins and main bearings are lubricated by a combination of pressure feed and splash. The entire crank case of the engine is enclosed with light cast-iron plates readily removable. By means of pre-determined oil level in the bed, an oil mist is maintained which entirely covers all the reciprocating and rotating parts within the base, assuring adequate lubrication of all these important parts of the motor.

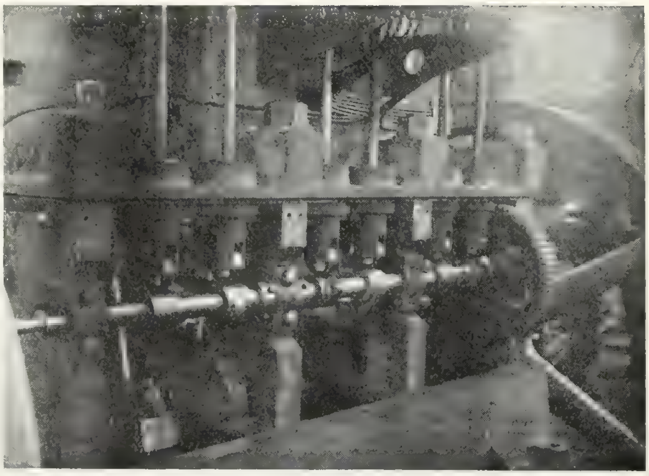
Ignition is regularly of the low tension, make-and-break sysem and use is made of an oscillating heavy duty magneto by means of which a maximum flow of current can be controlled to agree with any position of ignition of the charge within the cylinder. The highest class of workmanship and material is used throughout. Valves used for inlet and exhaust are interchangeable, a big feature to be considered when engines are in use far away from the source of supply of spare parts. Valve stems of high grade-steel are used, protected with a special heat resisting sleeve while the heads are cast-iron of a special mixture which has proved to give excellent service and long life. A very sensitive governor of the ball type positive driven through cut gears controls the speed of the engine by

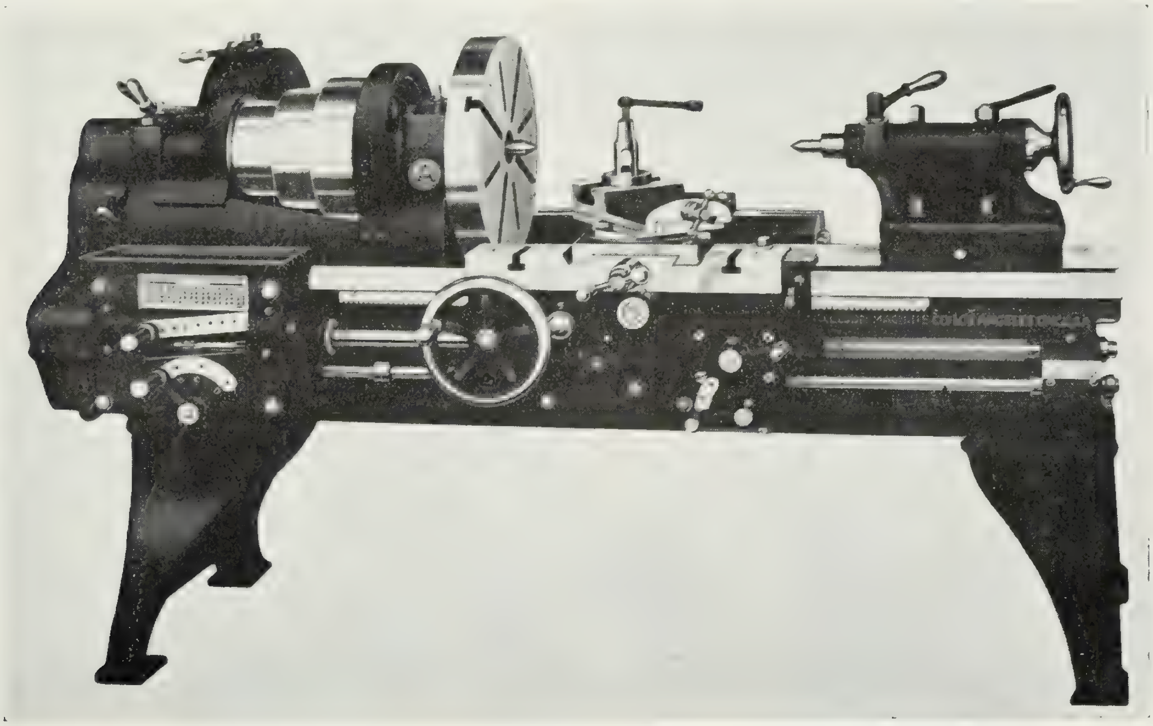




Upper: Enterprise heavy duty marine gas engine dismantled. Note the sturdiness of the various parts. Lower: Three-cylinder Enterprise heavy duty marine gas engine assembled with clutch reverse gear and thrust block means of a balance throttling valve situated directly over the carburetor, and by means of a special hand lever control the speed of the engine may be readily changed while the engine is in motion.

In order to avoid the complexity occasioned by the use of gearing to reverse the direction of the rotation of the engine, the Enterprise engine embodies the standard heavy duty planetary type of reverse gear pot with a multiple disk clutch. Through many years of hard strenuous service, this type of reverse gear has demonstrated its superiority and with the rugged design embodied it is gratifying to note that Enterprise engines are living up to the reputation created by earlier models in the field.


Enterprise cam shaft construction


Eighteen-inch Axelson heavy duty lathe as installed in the machine shops of Shipping Board freighters

AXELSON LATHES ON SHIPBOARD

AXELSON heavy duty engine lathes have been chosen by several Pacific Coast shipbuilders as standard equipment for the machine shop aboard the cargo vessels being built for the Emergency Fleet Corporation.

Our illustration shows an 18-inch Axelson heavy duty lathe installed aboard the S. S. West Aleta, an 8800-ton cargo carrier built by the Schaw-Batcher Company at South San Francisco. Among other shipbuilders who are installing Axelson lathe, may be mentioned the Southwestern Shipbuilding Company at East San Pedro, the Union Construction Company at Oakland, and the Long Beach Shipbuilding Company at Long Beach.

Many shipbuilders are using the Axelson lathe in the machine shops in their shipyards and have proved that this Pacific Coast product may be classed as a high grade machine tool built to a quality standard. The Axelson lathe is the result of many years of careful development in machine tool designing and it will be noted that this lathe has several characteristics which show that the manufacturers have made an exhaustive study as to the requirements of heavy duty engine lathes. One of the factors which make for exact precision on the Axelson lathe is the fact that every moving part operates in perfect balance.

The manufacturing plant of the Axelson Machine Company, which is located in Los Angeles, covers several acres of land and the modern fireproof buildings house complete facilities for manufacturing Axelson lathes. Operating their own pattern shop, iron foundry, machine shops, etc., the Axelson Machine Company have found that by making in their own establishment every part which goes into their lathes they are better able to control the high standard of production for which a reputation this company has earned so excellent a reputation.

Vital Instruments for Modern Navigation

THE A. Lietz Company of San Francisco, manufacturers of nautical instruments for over thirty years, have the largest factory on the Pacific Coast in this line of work, and instruments manufactured by them have enjoyed a reputation for great accuracy and splendid finish. During the stress of marine construction due to the late war, their plant has been considerably enlarged and they have manufactured among other articles over 900 binnacles, 3000 compasses, 300 peloruses and 300 sounding machines, partly for the United States Navy and partly for the United States Shipping Board. It should be a matter of great pride to the Pacific Coast and to the A. Lietz Company that a large part of these instruments were shipped to the Atlantic Coast for use on the ships building there.

Under government control the introduction of standardization made possible a greatly increased output while at the same time the conservative methods of inspection tended to increase the quality especially in those characteristics which are appreciated by the navigator. The benefits of interchangeability of magnets and adjusting appliances and the consequent ease of replacement after loss or injury will be of great benefit to the navigators of our Merchant Marine. We illustrate herewith and in the following paragraphs describe a few of the instruments made by the A. Lietz Company, and extend from them to our readers a hearty invitation to visit and inspect the factory and to advise with the experts there on the installation and design of any navigation instruments which may be in contemplation.

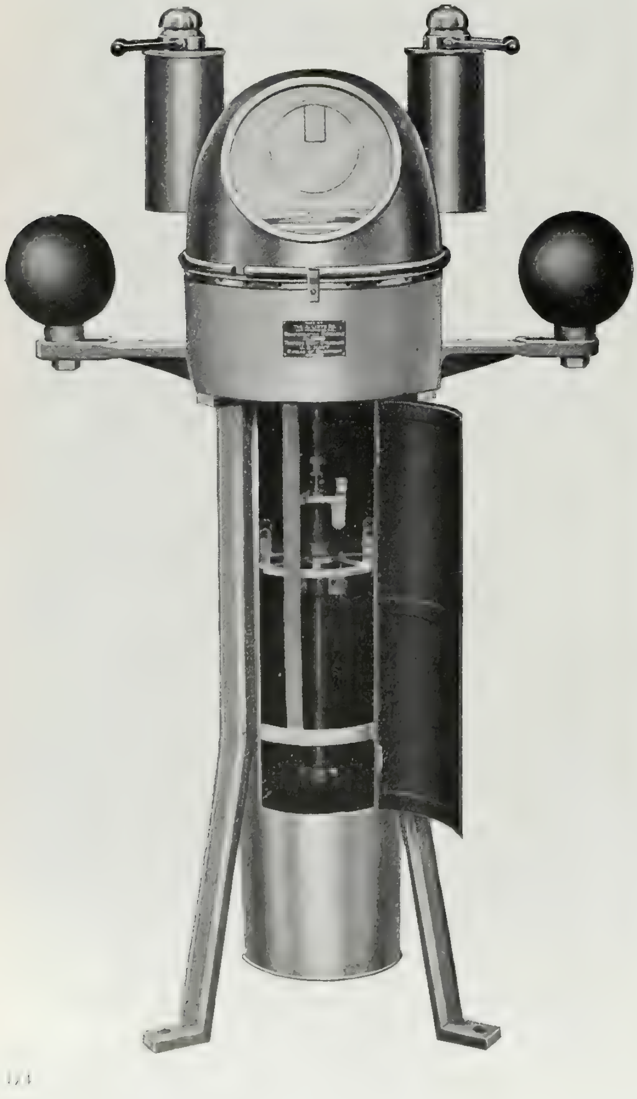
The A. Lietz Standard Binnacle No. 300 A is constructed entirely of metal which greatly increases its durability and rigidity, the pedestal being formed out of a one-piece bronze casting. The compensating trays are designed for a wide range of adjustment and can be set with great accuracy and fixed firmly in the adjusted position. A scale is supplied on which is indicated the final position of the magnet for future records of verification.

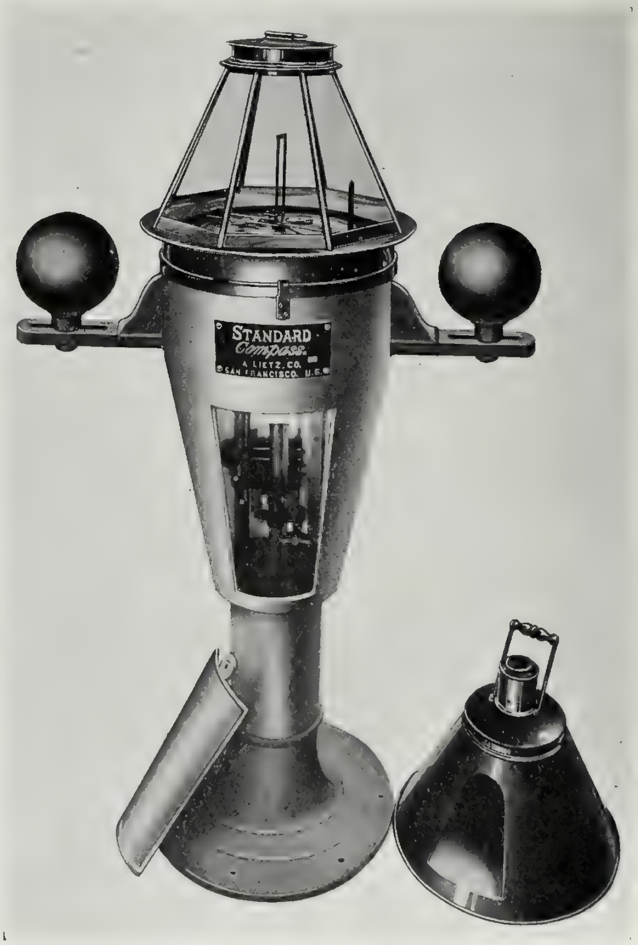
Every part of this binnacle has been developed and is manufactured in the A. Lietz factory and duplicate parts can be supplied on short notice.

A. Lietz Compass. The compass furnished with this type of binnacle is of the well known Lietz liquid type. The electric illumination is provided from underneath. The graduation of the compass on the degree ring reads from zero to 360 degrees which is the accepted modern method. Every part of the compass is tested separately before being assembled and the assembled instrument is subjected to a proper magnetic test in a non-magnetic station whose facilities for testing are second to none in this country. The records of these compasses in the past show that they have function properly under the most trying conditions, and as between the liquid and dry types of compasses the former type has shown itself to be much more efficient.

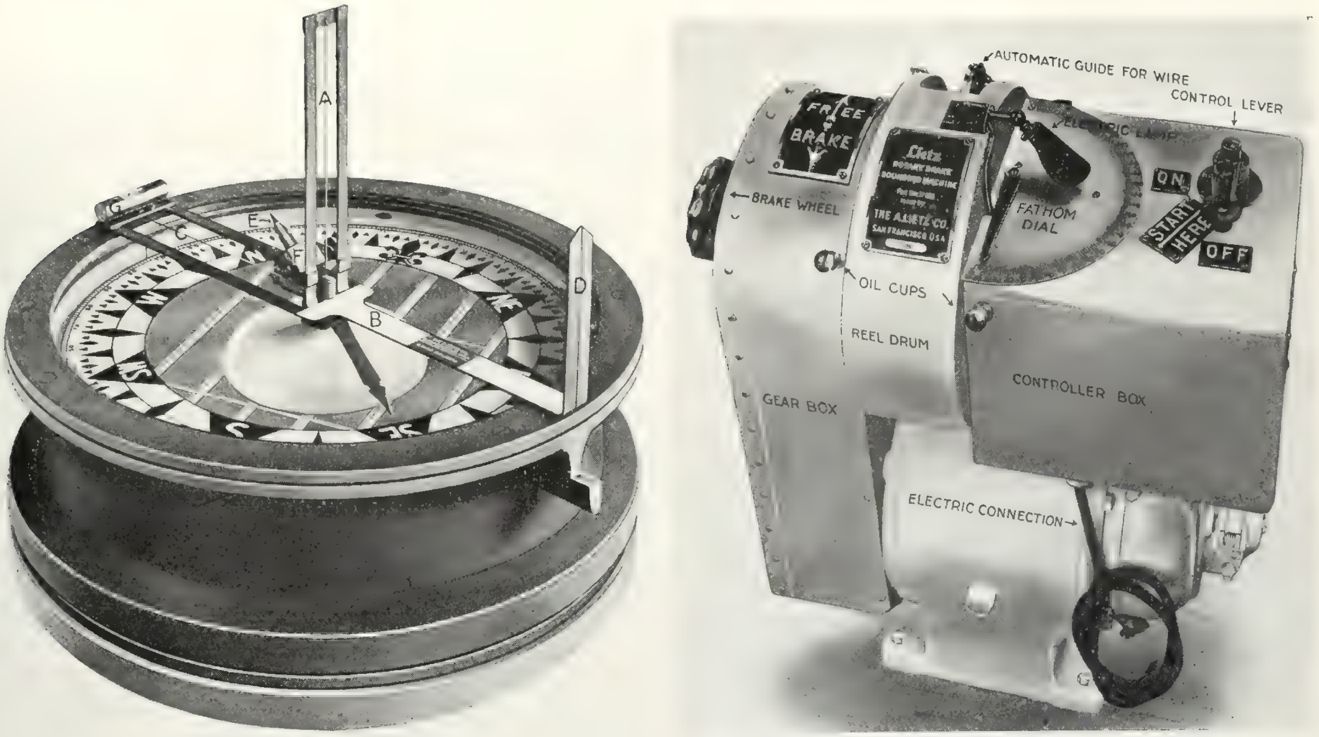
It is an old but true saying that "there is nothing new under the sun." This is illustrated very beautifully in the fact that the modern magnetic compass is returning to the liquid type as used originally by the first Chinese navigators, but of course constructed in a mechanical form to suit modern conditions.

Azimuth Instrument. The Azimuth instrument supplied as an auxiliary on the Lietz compass is of very simple design, but exceedingly effective within the limits of accuracy necessary for safe navigation. The accompanying illustration shows that it is very light with ample strength





Left: United States Shipping Board standard binnacle with compensating trays and full adjustment as built by A. Lietz Company. Right: Standard compass of the A. Lietz Company fitted with azimuth instrument as installed on the standard merchant freighters of the United States Shipping Board.



Left: The A. Lietz Company azimuth attachment for standard compasses. Right: The Lietz electric rotary brake sounding machine

and that the method of adjustment will not affect the balancing of the compass. An emergency or star mirror is supplied with this instrument when the sun is not bright enough to throw a shadow or when making observations of a star through the slit vein "D."

Sounding Machine. The safety of a vessel at sea is very often dependent upon the accuracy and facility with which soundings are made when approaching a coast or threading through a narrow channel. An efficient sounding machine is therefore of great value to the navigator. The Lietz electric rotary brake sounding machine has been designed with these points well in view and combines simplicity of operation, accuracy of measurement, and compactness. These machines have been in use over ten years under continuous service and are still giving great satisfaction. The machine control is so simple that almost anyone can operate it after a few minutes' instruction either in daylight or in the dark. It is so designed that it can be used as a hand machine without disconnecting the electric motor, the armature of which acts as a fly wheel when winding by hand. The electric motor adopted is of the well known General Electric type with high electrical constants and pleasing exterior appearance. The consumption of current is a minimum and the motor is absolutely water and vapor proof, but has hand holds provided with solid gasketed covers so that it can be easily inspected. The motor is of one horsepower which has been found amply sufficient for the work.

Expert Service. The experts of the A. Lietz Company are available at any time to its customers, or to those desiring information on nautical instruments both for inspection of instruments and for instruction in their use, and the company will be pleased at any time to have those parties who are interested visit and inspect its factory and confer with these experts on any work they may have in mind.

NOT A RESULT OF THE WAR

THE illustration on page 169 shows the yacht Reyance, the galley of which is fitted with a Thatcher "Mascot" Ship Range with all the latest improvements that the Thatcher "Mascot" provides for home cooking on board ship.

The Thatcher Furnace Company of New York and Chicago, have been leaders in the manufacture of heaters and cooking ranges since 1850.

During the war their large plants at Garwood and Newark, New Jersey, filled many orders from the government for ranges and heaters that were used for feeding and warming our fighting men in cantonments and at sea.

The increase in the sales of the Thatcher "Mascot" Ship Range on the Coast has been substantial during the past few years, and with the prospect of greater activity than ever before in the shipping industry, the Thatcher "Mascot" Ship Range is sure to hold **the first place.**

In addition to the many exclusive features to this range it has the qualities, so important for a ship range of strength and weight, to withstand the hard usage of the sea, extreme heat, and severe strain.

The "Mascot" is made in sizes to meet every requirement. The ovens and flues have the same proportions as the famous Thatcher Kitchen Range, which insure the greatest amount of heat with the least expense for fuel and have gained the reputation for being unequalled for cooking, roasting and baking.

"Mascot" Ship Ranges are stocked by or may be secured from ship chandlers or dealers in ship supplies at every port from coast to coast.

We will be glad to furnish the name and address to those interested, of the nearest dealer in Thatcher "Mascot" Ship Ranges.

"ALWAYS SOMETHING NEW AT DURKEE'S"

In line with their policy to be "right in the game," with the requirement for a line-throwing gun by certain classes of vessels, the Charles D. Durkee Company have just put one on the market which they manufacture at their Grasmere factory. This gun has been approved by the United States government and is constructed to give satisfaction under the most trying conditions. Tests were made that may never occur in actual use, but the users of the "Durkee line-throwing gun" will be none the less benefited by the efforts of the Durkee Company to have their gun A-1 before they began its manufacture. Orders are being filled without any delay. Send to C. D. Durkee & Company, New York City, for circular describing above.

Special Air Compressors: Rix Compressed Air & Drill Company have just issued their little booklet covering special marine designs of air compressors designed and built to fill the requirements of the modern motorship and auxiliary schooner. The machines shown and described are the result of the Rix Company's experience during the past few years in furnishing equipment for a large number of motorships built on the Pacific Coast.

Pacific Coast Shipbuilding Returns

Albatross Metal Furniture Company (Standard Vault & Metal Works)

Manufacturing steel cabinets and lockers for ships.

Albina Engine and Machine Works, Inc., Portland Ore.

Purchasing Agent, W. L. Deute.

Hulls Nos. 11 to 17, 300 by 44 by 21.5; engines 22-36-60, 1400-h. p.

Doylestown launched June 12.

Allen Shipbuilding Co., Seattle, Wash.

Purchasing Agent, G. E. Hunt.

Two Allen type vessels, 274.6 B. P. by 44.9 by 26.4.

American Concrete Pipe & Shipbuilding Co., Seattle, Wash.

One 7,500-ton concrete steamship.

One 150-foot steam concrete tugboat.

Two concrete scows, 120 feet long.

American Marine Iron Works, Portland, Oregon

Purchasing Agent, Carl R. Jones.

Contracts covering cast iron fittings for steel and wood yards of G. M. Standifer Construction Corporation, Vancouver, Wash.

Ames Shipbuilding and Dry Dock Co., Seattle, Wash.

Purchasing Agent, Mr. C. A. Barron.

Twenty-seven vessels under contract, mostly 8800- ton freighters.

West Islip launched June 24.

Anacortes Shipbuilding Co., Anacortes, Wash.

Purchasing Agent, Will W. Dunn.

Two wooden vessels, Ferris type, 281 by 46 by 23.6; engines 19-36-56; 1500-h. p. watertube boilers. Delivery August, 1919.

Leota launched May 28.

Anderson Shipbuilding Corporation, 602 Alaska Building, Seattle, Wash.

Purchasing Agent, W. G. Hall.

Nos. 8 and 9, full powered motorships, 260 by 46 by 26, 3250 deadweight tons, twin screws, 1000-h. p. engines.

Apex Manufacturing Company, Emeryville, Cal.

Purchasing Agent, A. Youngholm.

Several hundred metallic life boats for U. S. Shipping Board and shipyards.

Astoria Marine Iron Works, Astoria, Ore.

Purchasing Agent, Mr. J. A. Jackson.

Completely outfitting 27 Hough and Ferris type wooden vessels.

Contractors for United States and French governments.

Overhauling and repair of ships a specialty.

Marine railway under construction capable of handling ships up to 12,000 tons register. Fabricators of steel buildings, bridges, tanks and other structures.

Babare Bros., Old Town, Tacoma, Wash.

Purchasing Agent, Mr. Geo. Babare.

Four wooden freighters, Ferris type.

Imufka launched May 29.

Ballin Water Tube Boiler Co., Portland, Ore.

Sixteen Ballin type water-tube boilers for eight steamers. For the Supple & Ballin Shipbuilding Co.

Twelve Ballin type water-tube boilers for six steamers building at the G. M. Standifer Construction Corporation.

Barnes & Tibbitts, Alameda, Cal.

President: W. G. Tibbitts.
Vice-President: J. D. Barnes.
Secretary: J. J. Barnes.

General repair and dry-docking business.

Benicia Shipbuilding Corporation, Benicia, Cal.

Purchasing Agent, L. S. Jones, Alaska Commercial Bldg., San Francisco, Cal.

Building one Ferris type hull, 3500 d.w. capacity. July delivery.

Converting one Ferris type steam schooner to five-masted barkentine. October delivery.

Bethlehem Shipbuilding Corporation, Ltd. (Union Works Alameda Plant), San Francisco, Cal.

Purchasing Agent, Mr. O. W. Streett.

Alameda plant: Thirteen tankers, 10,100 dw.

Potrero works: Three freighters, 12,500 dw.

Fitting out two tankers, hulls Nos. 5259 and 5260.

Ralph J. Chandler Shipbuilding Co., Wilmington, Cal.

Six wooden vessels, Ferris type, 281 ft. 6 ins. by 46 ft. by 26; engines 19 by 32 by 56 by 3; 1400 h. p. Two tubular boilers. For U. S. Shipping Board.

Chilman's Shipyard, Hoquiam, Wash.

Purchasing Agent, Mr. Iver Chilman.

Two 3-mast auxiliary schooners 130 by 33 by 14. One 300-h. p. engine, for Belgian interests.

Coast Shipbuilding Company, Portland, Ore.

Columbia Engineering Works (Linnton), Portland, Ore.

Purchasing Agent. Mr. C. W. Steele.

No. 15, topsail schooner, 178 by 36 by 15. Delivery April, 1919.

Capacity of yard: 5 vessels at one time.

Prepared to build any type of wooden ship. Specialize in schooners of 1000 to 3000 tons deadweight.

Columbia River Shipbuilding Corp., Portland, Ore.

Purchasing Agent, J. C. Bowles.

Eight steel merchant ships, 8800 tons dw., General Electric and De Laval turbines, Scotch marine boilers. Deliveries 1919. Four of these now on ways.

West Henshaw launched June 25th.

Commercial Boiler Works, Seattle, Wash.

Purchasing Agent, Mr. J. H. Fox.

Contracts for:

[illegible] Scotch marine boilers, 14.9 inside dia. by 11 ft. long, H. S. 2695.5 sq. ft., W. P. 210 lbs., for vessels building on Pacific Coast. Delivery, twelve completed boilers per month.

Coos Bay Shipbuilding Company, Marshfield, Ore.

Manager, Mr. J. H. Polhemus.

Contracts for one Ferris type vessel. Length over all 281.6, 3500 dw. tons.

J. Coughlan & Sons, Vancouver, B. C.

Purchasing Agent, F. Brammall.

Four 8100-ton dw. freighters, 400 by 52 by 31, 3000-h. p., three Scotch marine boilers. For Dominion Government.

Two 8800-ton dw. freighters, 427 feet by 54 feet by 29 feet, 9 inches.

Crowley Launch & Tugboat Co., San Francisco, Cal.

Purchasing Agent, John L. Crowley.

Two 28-foot launches with 10-h. p. engines.

Two 38-foot launches with 30-h. p. engines.

Four 45-foot launches with 50-h. p. engines.

Eight covered barges, 125 by 40 by 12.

Derrick barge, 75-ton lifts, 125 by 50 by 12.

J. F. Duthie & Co., Shipbuilders & Engineers, Seattle, Wash.

Purchasing Agent, E. C. Gaumnitz.

Twelve 8800-ton cargo vessels, 2800-h. p., 425 feet by 54 feet by 29.9; Scotch boilers.

West Henshaw launched June 2, 1919.

Elliott Bay Dry Dock Company, Seattle, Wash.

Local repair work, cleaning, painting and overhauling.

Elliott Bay Shipbuilding Co., Seattle, Wash.

Purchasing Dept., C. A. Morrow.

Six vessels, 260 by 46 by 26.

Contracts for five 3500-ton carriers.

Elliott Bay Yacht & Engine Co., Seattle, Wash.

Large amount of repair work.

Feeney-Bremer Company, Tillamook, Ore.

Contracts for three wooden ships, Ferris type, 281.6 by 46 by 26.

Foundation Company of British Columbia, Ltd., Victoria, B. C.

Purchasing Agent, Mr. D. D. Long.

Twenty 3000-ton dw. twin screw wooden steamers, 293.2 by 47.6 by 23.6, two Scotch marine boilers.

Winnipeg, launched April 26.

Foundation Co., Portland, Ore.

Local Purchasing Agent, G. M. Raymond.

Foundation Co., Tacoma, Wash.

Purchasing Agent, Mr. Whiteside.

Seattle Office: Smith Building.

Fulton Shipbuilding Company, Wilmington, Cal.

Purchasing Agent, A. H. MacFarland.

Four Hough design wooden steamers.

Nine Ferris design wooden steamers, 3500-ton, engines 19 by 32 by 56, 1400-h. p., two tubular boilers.

Admete launched May 29.

Grant Smith-Porter Ship Company, Aberdeen Shipyard, Aberdeen, Wash.

Manager: Charles Albertson.
Superintendent: J. C. Langille.

The Grant-Smith-Porter Ship Co., Portland, Ore.

Purchasing Agent, Mr. P. S. Sinnock.

Contract for twenty-two Ferris type ships; length 286 feet, beam 46 feet, depth 28 feet; two standard E. F. C. boilers.

Grays Harbor Motorship Corporation, Aberdeen, Wash.

Purchasing Agent, Mr. H. L. Rich.

Twelve 4000-ton ships of Ward type. For Emergency Fleet Corporation. Deliveries about two a month.

Eight building slips, maximum length 350 feet.

Complete machine shop for installing machinery.

Agron launched June 1.

Heylla launched June 7.

Great Northern Concrete Shipbuilding Company, Vancouver, Wash.

Purchasing Agent, Mr. Pacquet.

Three concrete hulls, Nos. 4, 5 and 6, 100 by 25 by 12.6.

Hammond Lumber Co., Eureka, Cal.

Purchasing Agent, W. R. McMillan.

Two steamers, Ferris type.

Hanlon Dry Dock & Shipbuilding Company, Oakland, Cal.

Purchasing Agent, C. J. Foard.

Twelve cargo vessels, 320.9 by 46 by 26.9; three water-tube boilers. For Emergency Fleet Corporation.

Harrison & Lamond, South Vancouver, B. C.

One auxiliary schooner.

Helser Machine Works, Inc., Portland, Ore.

20 large size hawser reels for Pacific Coast Shipbuilding Co.
12 same as above for Pensacola Shipbuilding Co.
30 same as above for J. F. Duthie & Co.
44 same as above for The Columbia River Shipbuilding Co.
56 8¼ by 8 single geared winches, single gypsey.
28 8¼ by 8 single geared winches, double gypsey.
56 9 by 9 single geared winches, single gypsey.
All of above winches for Southwestern Shipbuilding Co.
180 cargo winches for Schaw-Batcher Shipbuilding Co.
200 9 by 9 cargo winches.
300 8¼ by 8 cargo winches.
80 9 by 9 cargo winches for Southwestern Shipbuilding Company.

Hesse-Martin Iron Works, Portland, Ore.

Purchasing Agent, **Mr. R. M. Hoffman.**

All auxiliary machinery for ten wooden steamers building by the G. M. Standifer Construction Co.

All auxiliary machinery for twenty-four wooden steamers building by the Grant-Smith-Porter Ship Co., at Aberdeen.

Anchor windlasses, cargo winches, steam capstans and steam steering gears for eight wooden steamers building by Supple & Ballin at Portland.

Forty steam cargo winches for ten steel steamers building by the Northwest Steel Company.

One hundred and thirty anchor windlasses, forty steam steering gears and fifty hand steering gears.

Herzog Electric & Engineering Company, San Francisco

Purchasing Agent, **H. C. Toumey.**

One Herzog double electric steering gear on M. S. "Katherine" at Hanlon Shipyard.

G. W. Kneass, San Francisco, Cal.

Purchasing Agent, **G. W. Kneass.**

Two tow boats, 60x15, 125-h. p. engine. For Peterson Tow Boat & Lighterage Company.

Three hundred metal life boats for Bethlehem Shipbuilding Corporation, Union Plant.

Kiernan & Kern Shipbuilding Co., Portland, Ore.

Four composite steamers of Ballin design.

Kruse & Banks, North Bend, Ore.

Purchasing Agent, **Robert Banks.**

Two steam schooners, 240 feet over all, 43 feet beam, 17 feet depth of hold, double end type. For J. R. Hanify Company.

One five-masted sailing schooner, with a carrying capacity of 1,750,000 feet of lumber. For private interests.

Three building ways.

Llewellyn Iron Works, Los Angeles, Calif.

Builders of Marine Engines, Boilers, Tanks, etc., for Emergency Fleet Corporation.

Present contracts include 1400-h. p. and 2800-h. p. marine engines with marine boilers for same, for most of the ships being built on the Pacific Coast.

Also reinforced concrete bars for concrete ships being built for the Emergency Fleet Corporation at the San Francisco Shipbuilding Company's yard in Oakland and at the Pacific Marine & Construction Company's yards in San Diego.

Long Beach Shipbuilding Company, Long Beach, Calif.

Purchasing Agent, **Frank Philpot.**

Ten steel vessels of 9000 tons.

Eight steel steamers, 8,800 deadweight tons each.

Eight steel steamers, 8800 tons dw., 2700 h. p., triple-Scotch boilers. For U. S. Shipping Board.

Los Angeles Shipbuilding & Dry Dock Co., Los Angeles, Cal.

Thirty 8800-ton dw. vessels, 410 by 54 by 29.9, 3500 I. H. P. three Foster water-tube boilers. For Emergency Fleet Corporation. Delivery 1919-1920.

Equipment ample to build passenger, freight and naval vessels of any size and type, including machinery and equipment.

West Hika launched May 12.

West Conox launched May 20.

The Wm. Lyall Shipbuilding Co., Ltd., North Vancouver, B. C.

Three auxiliary schooners, 235 W. L. by 44.6 by 20.6 moulded.

Two 200-h. p. Fairbanks Morse Semi-Diesel engines for these boats.

Eight full-powered steamers, 1500 tons deadweight. For Republic of France.

Main Iron Works, San Francisco, Cal.

Four ocean-going tugs; engines 17 by 25 by 42 by 30; complete for Emergency Fleet Corporation.

Machinery for two tugs for Rolph Shipbuilding Company.

Shafting for concrete ships for Emergency Fleet Corporation.

Installation of machinery for Emergency Fleet Corporation.

Repairs to vessels for Emergency Fleet Corporation.

Marine Pipe and Machine Works, Inc., Seattle, Wash.

Purchasing Agent, **Mr. E. A. Lamb.**

One 6-cylinder Sumner type heavy oil engine, 650-h. p. For Chilean Government.

Two 1200-h. p. triple exp. steam engines.

Special marine repair department.

Martinolich Shipbuilding Co., 306 California Bldg., Tacoma Wash.; Yard at Dockton, Wash.

Purchasing Agent, **Mr. Martinolich.**

Three wooden 4-masted auxiliary schooners, 250 by 43 by 21; twin 240-h. p. Skandia engines. For Norwegian interests.

Matthews Shipbuilding Company, Hoquiam, Wash.

Purchasing Agent, **G. F. Matthews.**

Lumber carrier for Hart-Wood Lumber Company, 250 ft. long, capacity 1,500,000 ft.

Two auxiliary 4-masted schooners, 250 by 43 by 21. Twin 240-h. p. Skandia engines. For M. Isaakson, Norway.

McAteer Shipbuilding Company, Seattle, Wash.

Purchasing Agent. **Mr. Ramm.**

One steel vessel, 160 by 30 by 16.

Two four-masted schooners, 250 by 44 by 21; Skandia engines.

McEachern Ship Co., Astoria, Ore.

Purchasing Agent, **Mr. O. E. Draper.**

Three steamers, 286 by 46 by 28; Hough design.

Aroturous launched May 27.

Meacham & Babcock Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **Mr. W. N. Voegtly, Jr.**

Ten hulls, Ferris type.

Corus launched June 12.

Moore Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **M. G. Waites.**

Fourteen 9400-ton dw. steel freighters, 402 feet by 6 inches by 53 feet by 34 feet 6 inches; 2800 h. p. For U. S. Shipping Board. Two keels yet to be laid.

Nine 10,000-ton dw. steel tankers, 425 feet by 57 feet by 33 feet; 2800 h. p. For U. S. Shipping Board. One keel yet to be laid.

Fitting out:

Hulls 1015 to 1022, inclusive, 1025 and 1026.

Motorship Construction Co., Vancouver, Wash.

President, **Merrill A. Reed.**

Purchasing Agent, **J. W. Dougherty.**

Builders of cannery tenders, tugs, barges, river steamers, power boats and concrete barges.

National Engineering Corporation, Wilmington, Calif.

Outfitting ships for Emergency Fleet Corporation.

New Westminster Construction & Engineering Co., New Westminster, B. C.

Purchasing Agent, **Mr. H. M. Fullerton.**

Four 2800 dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

Five 1500-ton dw. wooden freighters, 204 by 40.6 by 17, 550-h. p. twin engines, watertube boilers.

Nilson & Kelez, Seattle, Wash.

Purchasing Agent, **Mr. Kelez.**

Eight wooden hulls, Ferris type.

Northwest Steel Company, Portland, Ore.

Purchasing Agent, **Mr. W. C. Smith.**

Six freighters, 2500 I. H. P., 423 feet 9 inches by 54 feet by 29 feet 9 inches, 8800 tons dw., geared turbine drive, oil burners.

Four freighters, 2800 I. H. P., dimensions same as above; three Scotch marine boilers, oil burners.

Pacific American Fisheries, South Bellingham, Wash.

Purchasing Agent, **Mr. B. U. Slyster.**

Pacific Boat & Iron Works, Portland, Ore.

Metal lifeboats and life rafts for steel yard in this district.

Contract for Corser's one-man simultaneous releasing hooks on all lifeboats.

Capacity: Three boats a day.

Pacific Coast Shipbuilding Co., 317 First National Bank Bldg., San Francisco, Cal.; Plant, Bay Point, Cal.

Purchasing Agent, **Mr. J. M. Duke.**

Ten 9400 dw. steamers. Five launched.

Pacific Construction Co., Ltd., Coquitlam, B. C.

Purchasing Agent, **Mr. R. W. Holland.**

Two 2800-ton dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

No. 3, Wooden steamer, 250 by 43.6 by 25, 1000-h. p. watertube boilers.

No. 4, Same as No. 3.

Nos. 5 and 6, 1500-ton full-power barges, 204.8 by 39.8 by 17, 275 I. H. P. engines, 5 water-tube boilers.

Pacific Marine and Construction Company (Scofield Engineering Company) San Diego, Cal.

Contracts for two concrete ships of 7500 tons, 420 by 54, draft loaded 27 feet, light 17 feet, carrying capacity 58,000 barrels.

Thirty-four-acre yard. Two building ways for sidewise launching. Two other ways.

Pacific Marine Iron Works, Portland, Ore.

Purchasing Agent, **Mr. V. L. Hamlin.**

Contracts for four 1600-h. p. triple expansion engines.

Contracts for six 1400-h. p. triple expansion engines.

Patterson-MacDonald Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **W. J. Thomas.**

Ten wooden steamers, 281.6 by 46.10 by 27, twin screw, triple expansion engines, 1550-h. p. 30-15½-25½-42. Two Heine boilers.

Pacific Shipbuilding Corpn., Seattle, Wash.

Purchasing Agent, **C. H. Jones.**

Yard designed with six building ways.

Peninsula Shipbuilding Co., Portland, Ore.

Purchasing Agent, **Mr. H. H. Fisher.**

Seven steamers, 287 by 49.8 by 27.6. To be equipped with Westinghouse turbines.

Four sailing vessels.

Capacity of yard: Four ways, wood construction, installation wharf.

Puget Sound Boiler Works, Seattle, Wash.

One Scott Patent Water Tube Boiler, 200-h. p. pressure, for Anderson Shipbuilding Co.

Contracts for condensers, water feed tanks, boiler casings and smoke stacks.

Large amount of local marine repair work.

Puget Sound Bridge & Dredging Co., Seattle, Wash.

Purchasing Agent, **Mr. Moore.**

Complete installation of machinery for twenty-four wooden vessels.

Two wooden hulls, Grays Harbor Motorship type.

Six 5,000-ton wooden hulls.

Rolph Shipbuilding Company, Eureka, Cal.

Purchasing Agent, **John D. Stelling.**

Three barkentines, 3500 tons, Ferris type, 1000 h. p., two watertube boilers. For U. S. Shipping Board.

One steamer and one barge, same dimensions as above. For U. S. Shipping Board.

Two barkentines, two steam schooners and one tug boat. For Rolph Navigation & Coal Company.

Sanderson & Porter, Raymond, Wash.

Five-way yard. No plant equipment for outfitting of hulls.

San Diego Marine Construction Co., San Diego, Cal.

Purchasing Agent, **C. W. Stose.**

No. 136, Tow-boat "Pullet," 55 by 12 by 7.6; 100 h. p. Leary oil engines. Delivery April, 1919. For San Diego Tow Boat Company.

San Francisco Shipbuilding Co., 310 California St., San Francisco, Cal.

Purchasing Agent, **Mr. J. M. Cummins.**

Two 7500-ton dw. bulk oil steamers and one 7500-ton dw. freighter, reinforced concrete, at Government Island Plant, Oakland, Cal.

Palo Alto launched May 29.

Schaw-Batcher Company Ship Works, South San Francisco

Purchasing Agent, **K. I. Dazey.**

Ten single-screw freighters, 8800-ton dw., 427 by 54 by 29.9; 2800-i. h. p. reciprocating engines, 24½ by 41½ by 72 by 48; three Scotch boilers. Deliveries 1919.

Seaborn Shipyards Company, Tacoma, Wash.

Purchasing Agent, **P. J. Anderson.**

Four-way yard prepared for any kind of wood construction.

Seattle Machine Works, Inc., Seattle, Wash.

Purchasing Agents, **Frank H. Wheelon** and **D. Crause.**

Three 2700-h. p. triple-expansion engines for Skinner & Eddy Corporation.

Two 750-h. p. triple-expansion engines for Pacific American Fisheries.

One 500-h. p. triple expansion engine for McAteer Shipbuilding Co.

Two 2800 h. p. triple-expansion engines for Ames Shipbuilding & Dry Dock Company.

Seattle-North Pacific Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **F. H. Magune.**

Ten freighters, 402.5 by 53 by 34.5. Parson turbine, three Foster boilers. Deliveries 1919.

Askawake launched June 12.

Skandia Pacific Oil Engine Co., Oakland, Cal.

Purchasing Agent, **Mr. E. B. Brown.**

Twenty 825 B. H. P. Werkspoor Diesel engines for installation in 5600 tons steel fabricated motorships.

Four 240-h. p. and six 120-h. p. Skandia engines.

Additional engines of smaller capacity.

Skinner & Eddy Corporation, Seattle, Wash

Purchasing Agent, **Ray Anderson.**

Contracts for twenty 9600-ton dw. freighters for U. S. Shipping Board.

City of Spokane launched June 14.

Colorado Springs launched June 26.

Sloan Shipyards Corporation, Olympia, Wash.

Purchasing Agent, **Mr. L. P. Byrne.**

Sixteen freighters, 281.6 by 46 by 26, 19-32-56 by 36; 1400-h. p.

Smith & Watson Iron Works, Portland, Ore.

Purchasing Agent, **Mr. H. W. Bates.**

Contracts to furnish all castings, fittings, condensers and auxiliary machinery for thirty ships building by Columbia River Shipbuilding Corporation.

Somarstrom Shipbuilding Co., Columbia City, Ore.

Four wooden steamers, Hough design, 288 feet long.

Four wooden steamers, Ferris type.

Southwestern Shipbuilding Co., Los Angeles, Cal.

Twenty-three single screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2800 i. h. p. reciprocating engines; three Scotch boilers. For U. S. Shipping Board.

West Chetac launched May 14, 1919.

G. M. Standifer Construction Corp., North Portland, Ore., and Vancouver, Wash.

Purchasing Agent, **Mr. H. Luckett**, Vancouver, Wash.

Four wooden freighters, 281 by 46 by 26; 1700-h. p., Ferris type.

Five composite steamers, Ballin design, 4500 tons.

Fifteen steel steamers, 9500 tons. Delivery early in 1919.

Akanaquent, launched April 26.

Three shipyards, fifteen building berths.

Stephens Bros., Stockton, Cal.

Two wooden towboats, 50 by 13 by 8, for Island Transportation Co.

One 65 ft. by 14 ft. butcher boat, equipped with 6-cylinder Wisconsin motor. For Pollard Brothers.

One 40 ft. by 7½ ft. raised deck runabout cruiser, equipped with 6-cylinder Wisconsin motor. For Mr. W. Q. Wright, of the Bay & River Dredging Company.

St. Helens Shipbuilding Co., St. Helens, Ore.

Purchasing Agent, **Mr. A. F. Barnett.**

No. 49, steam schooner, 250 over all by 46 by 22, to the order of Charles R. McCormick & Co., San Francisco, Cal.

W. F. Stone Shipbuilding Co., Oakland, Cal.

Purchasing Agent, **Mr. Lester F. Stone....**

Four 150-foot wooden hulls for seagoing tugs, 30-foot molded beam by 17 ft. depth.

Miscellaneous repair work.

Supple-Ballin Shipbuilding Corporation, Portland, Ore.

Three 4500-ton steamers, Ballin design, 309 feet o. a. by 44 by 26, diagonal planked, steel reinforcing on top sides, single screw; 1600 h. p.

Nos. 2194-5-6.

Tacoma Shipbuilding Company, Tacoma, Wash.

Purchasing Agent, **Mr. D. D. McKay.**

Contracts for six Ferris type vessels. For U. S. Shipping Board.

Motorship Ambassador, 120 by 22 by 12 feet for W. H. Rust. Delivery August 1, 1919.

T. R. Trahey, Ballard, Wash.

One oil barge, 110 feet long and 32 feet wide, capacity 150,000 gallons. For General Petroleum Company

Tregoning Boat Co., Seattle, Wash.

Purchasing Agent, **Mr. C .Tregoning.**

A large number of lifeboats and ship power launches.

Todd Dry Dock & Shipbuilding Co., Tacoma, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

Eight cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 watertube boilers.

Twenty-four cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 S. E. S. boilers.

All of above for Emergency Fleet Corporation. Deliveries by January, 1920.

Todd DryDocks, Inc., Harbor Island, Seattle, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

General drydock and repair work.

Union Construction Company, Oakland, Cal.

President: **W. W. Johnson.**

Vice-President and General Manager: **H. G. Peake.**

Purchasing Agent, **Mr. Chas. L. Froding.**

Contracts for 10 steel ships of 9400 tons, Isherwood type, 402.5 by 53 by 34.5; three watertube boilers, 2800-h. p. turbines. For the U. S. Shipping Board.

City of Berkeley launched June 14.

Vancouver Shipyards & Engine Works, Ltd., Vancouver, B. C.

Contracts in hand for two wooden vessels.

Wallace Shipyards, Ltd., North Vancouver, B. C.

Purchasing Agent, **Mr. C. Wallace.**

Contracts for four 8,100 dw. steel vessels.

One steamer, 320 by 44 by 25, single screw, triple-expansion, reciprocating engines, 1800 h. p., 4300-ton dw. capacity.

Two steamers, 331 by 46 by 25, single screw, triple expansion, reciprocating engines, 2500 i. h.p., 5100-ton dw. capacity.

Western Canada Shipyards, Ltd., Vancouver, B. C.

Five 195 by 39.8 by 17 watertube boilers.

Willamette Iron & Steel Works, Portland, Ore.

Purchasing Agent, **S. F. Woodbury.**

Installing three Scotch marine boilers, with new topstakes and stack in Union Oil Company's tanker Oleum.

Nine 13 feet 9 inches diameter by 11 feet 9 inches long Scotch marine boilers for Todd Dry Dock & Construction Company, Tacoma, Washington.

Three 7 inches diameter by 18 feet long dry back marine boilers for ferry boat. Hunt, Mark & Company, engineers.

Fitting propellers, turning shafting and other miscellaneous marine work for North West Steel Company, Portland, Oregon.

Twenty 13-ft. 9-in. by 11-ft. 3½-in. Scotch marine boilers for Foundation Company, Victoria, B. C.

Sixty-three 3-furnace Scotch marine boilers for vessels building in Pacific Coast yards for Emergency Fleet Corporation.

Twelve 15-ft. 3-in. by 11-ft. 4-in. 3-furnace Scotch marine boilers, for Kiangnan Dry Dock & Engine Company, Shanghai, China.

Wilson Shipbuilding Company, Astoria, Ore.

Purchasing Agent, **W. G. Wray.**

Four wooden vessels, 281.6 by 46 by 26; Ferris type. For Emergency Fleet Corporation. Delivery March 1 to August 1, 1919.

Wright Shipyards, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. P. Wright.**

Two wooden steamers, "Elissa" and "Endymion," 3500 tons each, length 282 feet, beam 46, depth 26. For U. S. Shipping Board.

Yarrows, Ltd., Victoria, B. C.

Two slipways suitable for building vessels up to 350 feet in length.

Marine railway, 315 feet long, 3000 tons dw. capacity.

Graving dock, 480 feet long, 65-foot beam.

Makers of manganese bronze propellers and large marine engine castings.

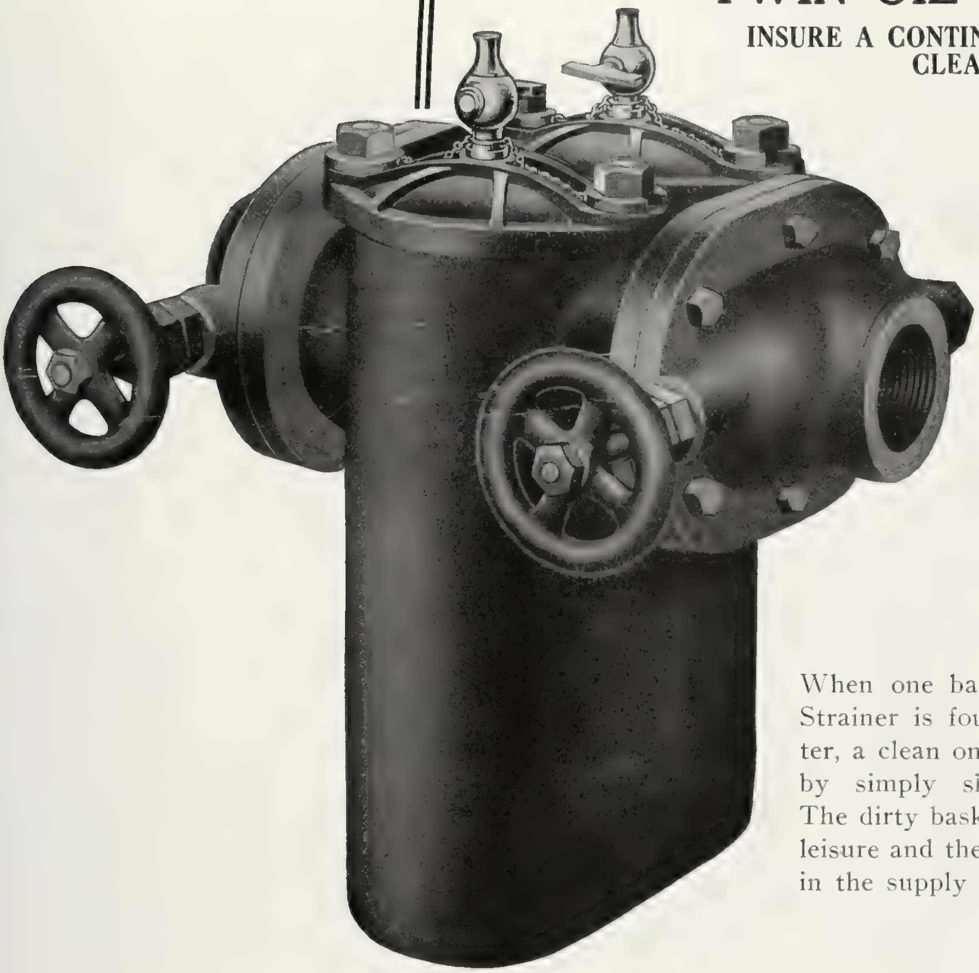
OTHER SHIPBUILDING COMPANIES

American Shipbuilding Company, Warrenton, Ore.
Ballard Marine Railway Company, Seattle, Wash.
Chico Shipbuilding Co., 4185 Arcade Building, Seattle, Wash.
Clapp & Reed Shipbuilding Company, Seattle, Wash.
Columbia River Shipbuilding Co., Vancouver, Wash.
Craig-Wilde Ship Company, Los Angeles, Cal.
Wm. Cryer & Son, Oakland, Cal. W. E. Cryer, Purchasing Agent.
Fellows & Stewart, Inc. V. B. Stewart, Purchasing Agent, Wilmington, Cal.
French-American Shipbuilding Corp., 418-420 Marsh-Strong Bldg., Los Angeles.
Halstrom Shipbuilding Co., Inc., Seattle, Wash.
International Shipbuilding Company, Columbia City, Ore.
King & Winge Shipbuilding Co., C. B. Winge, Purchasing Agent, Seattle, Wash.
Marine Iron Works, Seattle, Wash.
Mare Island Navy Yard, Mare Island, Cal.
Muller Shipbuilding Company, 410 I. N. Van Nuys Building, Los Angeles, Cal.
Oceanic Shipbuilding Co., Milwaukee, Ore.
John E. Price & Company, Hoge Building, Seattle, Wash.
Port Blakeley Shipyard, Port Blakeley, Wash.
Puget Sound Navy Yard, Bremerton, Wash.
T. B. Puck & Co., Honolulu, T. H.
Raymond Shipbuilding Co., Raymond, Wash.
Sehrs Shipyard, Port Townsend, Wash.
South Bend Shipbuilding Co., South Bend., Wash.
Southern California Shipbuilding Corporation, 405 Trust & Savings Bldg., Los Angeles, Cal.
H. D. Stewart Shipbuilding Company, American Bank Building, Seattle, Wash.
Union Timber & Products Co., O. L. Craven, Pres., Port Towsend, Wash.
United Shipbuilding Corporation, Hoge Bldg., Seattle, Wash.
U. S. Steel Shipbuilding Corp., Ltd., Los Angeles, Cal.
Varney Shipbuilding Corporation, Seattle, Wash.
Washington Shipbuilding Corp., C. E. McMasters, Pres., Burke Bldg., Seattle, Wash.
West Coast Shipbuilding Co., H. W. Hellman Bldg., Los Angeles, Cal.

USE TWIN OIL STRAINERS FOR EITHER FUEL OR LUBRICATING OIL

TWIN OIL STRAINERS

INSURE A CONTINUOUS SUPPLY OF CLEAN OIL



When one basket of a Twin Oil Strainer is fouled with solid matter, a clean one is put into service by simply shifting two valves. The dirty basket can be cleaned at leisure and there is no interruption in the supply of clean oil.

The Twin Oil Strainer

gives the same service as two Single Strainers, but it is more convenient to operate, requires less space for installation and does away with all the extra valves and piping necessary to connect up.

These are the features that led to its being used in Submarines and Destroyers now being built for the United States Navy and in Cargo Boats now being built for the United States Merchant Marine.

Sizes range from 1 to 5 inch. (2½ inch and larger sizes have flanged connection). Basket mesh 1/64 inch or larger.

For detail information ask for Bulletin AA.

ELLIOTT COMPANY

443 Grant St., Pittsburgh, Pa.

Book Reviews and Trade Literature

British Shipbuilding. Two hundred pages profusely illustrated, published by Syren & Shipping, Ltd., 91 Leadenhall Street, London, price five shillings net.

This attractive volume contains fifty-two pages on the Theory and Design of British Shipbuilding by Mr. A. L. Ayre, Honours Medallist the King's Prizeman in naval architecture and 126 pages of descriptive articles covering a great many of the more important shipbuilding and marine engineering plants of the United Kingdom. American shipbuilders should be very much interested in this book which sets forth the British war records in merchant shipbuilding more completely than anything we have yet seen in print. Special interest attaches to the ship repair section and the account of salvage work done in the various British Dry Docks. Syren & Shipping is certainly to be congratulated on having compiled this splendid record of British achievement. The leading article on the theory and design of shipbuilding is worth many times the price of the whole volume.

Naval Architects' Data. By J. Mitchell, A. M. I. N. A., shipyard manager and lecturer on naval architecture. Edited by Edward L. Attwood, O. B. E., M. I. N. A. published by Longmans Green & Company, $3.00 net.

This book principally consists of blank tables for the use of naval architects in compiling their own data as to the characteristics of various vessels. The tables allow space for the compilation of all characteristic lines, weights, rudder design, tonnage calculations, description of engines and boilers, description of ship auxiliaries, statistics, personnel of the complement, and practically every detail that could be desired. Each table is provided with two blank pages for any additional data that may be required. Convenient arrangement is made for an index and a few well chosen mathematical tables are included.

Simple Rules and Problems in Navigation. By Charles H. Cugle. 303 pages with numerous diagrams and tables. A third edition revised by Bradley Jones, published by E. P. Dutton & Company of New York, price $4.00 net.

The purpose of this book is to lay before the student the rules and problems of navigation found in everyday work at sea. In addition there are examples for practice with their answers, and an abstract from the American Nautical Almanac for 1919 covering various problems. The edition also includes the "International Rule of the Road at Sea"; "A Method of Preparing a Station Bill for Boat and Fire Drill"; and "New Methods of Finding Longitude and Latitude." This book entirely eliminates theory and puts navigation before the ordinary man in a series of practical problems worked out along the lines of the rules given in Bowditch, the American Azimuth Tables and the 1919 American Nautical Almanac.

Navigation and Nautical Astronomy. By Professor I. H. C. Kaufman; eleventh edition revised and enlarged by Elmer Cole, 16 chapters, 260 pages; published by the D. Van Nostrand Company, 25 Park Place, New York.

A standard work on this subject, originally prepared for, and used by the United States Naval Academy, at which school the author was professor of astronomy, navigation and surveying. This edition consists of a complete revision of the text and examples, bringing them down to the more modern methods now in use in practical navigation. Useful tables are added and the work as it now stands is a complete treatise on the subject.

The World Tomorrow: 84 pages, published by the Mechanics and Metals National Bank of New York, for free distribution.

An optimistic discussion in a thoughtful vein of the economic situation which now confronts the world. After a thorough treatment of the subject from geographical, historical and practical view points, the conclusion is reached that "mankind has advanced in a material way" notwithstanding the terrific destruction of property through war.

The Philadelphia Maritime Exchange, Annual 1919.

An attractive 100-page book containing the forty-fourth Annual Report of the Board of Directors; various statistics of the Port of Philadelphia, and certain rules and regulations affecting shipping there.

The Independent Pneumatic Tool Company of Chicago have just issued a leaflet describing their perfect hose coupling, a new Thor product. This new, accurately made fitting has heavy beveled jaws and locked shoulders, whose large bearing surfaces cannot bend, break, jar or work loose. On the hose end of each coupling a suitable shoulder is provided, so that the new Thor hose clamp can be used and the coupling is disconnected instantly by a straight pull backward on both the knurled sliding sleeves and is connected simply by a straight push and a 5/16 inch twist. The gasket used is made tight by the air pressure when connected, but has an L section and a bevel face, so that it cannot be blown out of the coupling when disconnected. Gaskets are interchangeable in ⅜, ½ and ¾-inch sizes; also between 1-inch and 1¼-inch sizes, and the entire coupling is absolutely interchangeable for all sizes and combinations up to ¾-inch, thus making a universal coupling which requires no reducers within case limits.

United States Crane Company of Chicago—Bulletin No. 190.

This bulletin describes the 20-30 ton locomotive crane of the United States Crane Company, a standardized machine of this type for industrial service with either grab bucket, hook block, or magnet. The bulletin is illustrated very completely both with cuts and with line drawings, and complete specifications and descriptions of every essential part of the mechanism are given with great clearness.

The Rich System for Detecting and Extinguishing Marine Fires. Published by Walter Kidde & Company, New York.

This very attractive little booklet describes the working of the Rich system which consists of a series of pipes radiating to all parts of the ship whereby air-samples are constantly sucked from every compartment to a central station case. Any smoke or smolder immediately reveals itself in the station case through the tube bearing the compartment number. By turning a valve beneath the tube vent from which the smoke is coming, the officer on watch can immediately flood the affected compartment with steam or carbon-dioxide. This system has been constantly improved through years of use and is in operation on many of the large passenger steamships in the world. Pipe diagram for cargo vessels and illustrations for the use of the system are given in the bulletin.

Privately Owned Marine Wireless Installations. The Haller-Cunningham Electric Company, San Francisco.

A very tastefully arranged booklet describing the advantages to vessel owners of privately owned wireless installations on shipboard, and setting forth particularly the Halcun marine type of wireless apparatus which is manufactured by this company. The bulletin contains a large amount of general information for users of wireless sets and should find a place on the desk of every man interested in radiotelegraphy.

Catalog C, Ross Heater & Manufacturing Company, Inc., Buffalo New York.

This bulletin describes the Ross condensing equipment and the steam jet air pump, known as the Croll-Reynolds evactor. It contains sixteen pages of well illustrated description of this standard line of steam apparatus and some useful tables of the properties of saturated steam.

Marine Glue, L. W. Ferdinand & Company, Boston, Massachusetts.

A very useful little booklet, chock full of information about methods of using glue in general and the

(Section continued on page 178d)

PARISH
SUPPLY
& MFG. CO.
CHICAGO

Close Fitting Sheaves

Reinforced Cheeks

Parish Malleable Iron Tackle Blocks are specially designed for severe and continuous usage. Built from tested materials on machines accurate to .002 of an inch, each block has a sturdy structure of great strength and endurance.

Parish Blocks Give Dependable Service

Our new catalog shows the construction of both Malleable Iron and Steel Shell Tackles and explains their enduring reliability.

Parish Supply & Mfg. Co., Factory and Offices: 2858 Quinn St., Chicago
Makers of Tackle Blocks and Shipyard Tools

virtues of Jeffery's Marine Glue in particular. Jeffery's glue has of course been standard in marine practice for many years. Boatbuilders will find much useful information in this carefully prepared book.

Application Circular 7375, Westinghouse Manufacturing Company, East Pittsburgh, Pennsylvania.

An exceedingly interesting book of twenty-three pages describing the electrical precipitation process for the recovery of valuable material from smoke and gases. Several plants following out this method have been installed in some of the larger mining properties of America, and notwithstanding the large initial expense have more than paid for themselves during the first year. As an example, it is stated that a copper smelter installed an electrical precipitation equipment at a cost of $13,900. The operating expense was $14,600 the first year, but the value of the copper dust collected at 12c a pound was $180,018 the first year. The theory of the process and the machinery for putting this theory into operation are described in detail and profusely illustrated.

Dew Valve. A leaflet published by the Dew Valve Company of New York describing their automatic relief valve for draining steam cylinders. This valve is of particular interest to cargo vessel owners in the saving of time in handling cargo on steam winches, as it automatically relieves the operator from the necessity of opening the drip cocks before starting the machine and insures the utilization of all the steam in the cylinder. It is claimed that considerable economy is obtained in the consumption of steam by the use of this valve, also that the valve prevents freezing in the cylinders. The device consists of a main brass casting having two inlets for receiving the drain pipes from each end of the cylinder and one outlet which carries the drainage from the condenser overboard. Inside this main casting are two brass valves so arranged that both valves cannot seat at the same time. The stems of these valves are hollow and a brass compression spring is inserted in them so as to open both sides of the cylinders to the exhaust when there is no pressure of steam on the valves.

"V. V." Fittings Company, Catalog No. 21, Philadelphia, Pennsylvania.

A very profusely illustrated book of 127 pages with an attractive stiff board cover describing the "V. V." water-tight, vapor-proof and weatherproof conduit fittings, also the "V. V." safety switches. Both of these lines are complete enough to cover all standard requirements and many of the fittings and switches are particularly adapted to marine practice. The catalog is very completely indexed and contains much useful information in the way of [illegible] on electrical standards and of the qualities of copper wire and the insulation thereof. "V. V." Fittings Company's representatives in San Francisco are the Baker-Joslyn Company, 183 First Street.

White Brothers Trade Bulletin No. 14, San Francisco, California.

A four-page leaflet describing the condition of the foreign and domestic hardwood market. At the present time the outstanding feature of the market as described by the bulletin is the extreme scarcity of all hardwoods especially in the first and second grades and the extremely high prices coupled with a very active demand from Europe. White Brothers can speak with authority on this question for the Pacific Coast, as they have seen forty-seven years of service in San Francisco and carry the largest stocks of hardwood in the West.

Kingsbury Thrust Bearings, Albert Kingsbury, Pittsburg, Pennsylvania.

A thirty-seven page booklet issued February, 1919, describing the principle of operation and the mechanical details of this well-known type of thrust bearing, which is used in many of the largest vertical turbine plants of the world, and in many of the main propellor shafts of our modern steamships. The various types of this thrust bearing are illustrated profusely with half tones and with working drawings giving dimensions and showing with the most minute detail all the mechanical features which make for the success of the bearing.

General Electric Company, New York. B-3505 and B-3506.

Two very interesting booklets describing Sprague Electric Ozonators. No. 3506 describes this apparatus as designed particularly for cold storage warehouses. "Ozone is the oxygen of the air changed into a highly active state by the action of the electric current in the ozonator. In this form ozone has a remarkable power for destroying by oxidation the odor-bearing particles of matter floating in the atmosphere. This results in the permanent removal of all odors without the necessity of introducing chemicals of any kind."

The ozonator is built in a number of sizes of capacity suitable for household and hospital use or in industrial uses of various kinds.

Application Circular No. 7149, Westinghouse Electric and Manufacturing Company.

A tastefully arranged and beautifully illustrated catalog of fifty pages describing electric arc welding, the field of its application and an explanation of modern welding practice. The book gives a very thorough discussion of the advantages of electric arc welding, its cost, ease of application, speed, reliability and safety, a brief statement of the theory of the electric arc processes and the method of effecting a weld thereby. The characteristics of electric arcs, the selection of electrodes, the quantities of the current to be used are thoroughly covered. There is a chapter on the preparation by pre-heating, a chapter on the manipulation of electric arcs and chapters on inspection and training the standard nomenclature adopted by the Welding Commtitee of the Emergency Fleet Corporation occupy twelve pages profusely illustrated by diagrams, while but seven pages are devoted to description of Westinghouse apparatus. This book should be on the desk of every executive who is interested in welding.

WANTED

A responsible position in the U. S. A. by a gentleman with twenty years' experience in a first class London Marine Insurance Company. (Atlantic coast preferred.)

Write "K" 5, Elmbourne Road, Balham, London, S. W. England.

MARINE OIL ENGINES

2-100 H. P. new Fairbanks-Morse oil engines complete.
4-350 H. P. Diesel engines.
2-550 H. P. Diesel engines.
2-3 inch and 2-4 inch centrifugal pumps, motor connected.
2-7½ KW generators.
1-½ ton refrigerating machine.
1-4 ton refrigerating machine.

INLAND NAVIGATION CO.
St. Louis, Mo.

Llewellyn Iron Works Marine Catalog.

One of the most artistic catalogs that has come to our notice during the year. This book gives the history of this well-known Los Angeles plant and describes in detail the facilities of the Llewellyn Iron Works for manufacturing modern marine steam engines. The proud claim is made that the Llewellyn Iron Works has facilities for manufacturing in its own plant practically everything which goes into the construction of a marine engine. "It is the only self-contained plant of its kind west of the Rocky Mountains." The company operates two distinct plants, located respectively at Los Angeles and Torrance, California. At Torrance are located the open hearth steel furnaces and rollin mills, the steel foundry, the grey iron foundry. The latter has an output of fifty tons a day. At the Los Angeles plant are the main offices and structural iron shop.

At the machine shops in Los Angeles the floor space is sufficient for the erection of six 2800-horsepower marine engines simultaneously and the organization is such that "only from four to six days are required to assemble, test, tear down and ship a marine engine." In addition to the marine engine they manufacture marine water tube cross-drum type marine boilers, anchor windlasses, cargo winches, deck capstans, fuel oil tanks, marine water tanks and all sorts of commercial and marine forgings and castings are produced in great quantities and of high uniform quality.

(Section continued on page 178g)

W. T. Cleverdon

Average Adjuster

FOR SALE

Salvage from the Passenger "S. S. Bear"

4500 H. P. Engines, Anchor and Cargo Winches, and General Equipment

Also numerous other Engines and Boilers (up to 1200 H. P.) from other vessels

Steamers and Tugs for Sale

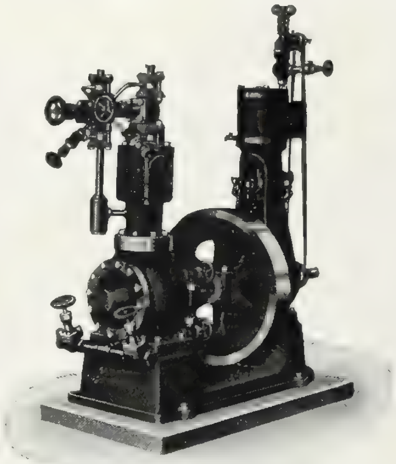
Nickel Steel Hull, 170x17x5′ 11″
Torpedo Boat "Rowan" and
3 Thornycroft Boilers, 3200 H. P.

FIFE BUILDING SAN FRANCISCO

ICE MACHINES

FOR SHIPS

"ON-TIME" DELIVERY



Approved by Shipping Board

BEDELL ENGINEERING CO.

LOS ANGELES

We offer our experience of many years as specialists in Marine Refrigeration.

An Interesting Set of Booklets

CUTTING THE COST OF LUMBER PRODUCTION
TRANSPORTATION via the P&H QUALITY SERVICE LINE
CLEARANCE AND SPEED TABLES
AVOID WASTE SAVE TIME
KEEP THIS TIME TABLE

The P & H Time Table: a folder giving complete clearance dimensions, speeds, and application of electric cranes, hoists, and monorail systems. This pamphlet will give shipbuilder, foundryman, and manufacturer a practical suggestion when deciding upon overhead conveying equipment.

The P & H Blue Book:—of Horizontal Drilling and Boring Machines. A booklet giving valuable information on the drilling and boring of bulky, difficult pieces. Of great interest to machine builder and manufacturer.

Cutting the Cost of Lumber Production: a profusely illustrated booklet on the P & H Monorail System for conveying lumber. The majority of installations described are those of the South, West, and Northwest. Every large lumber manufacturer should have this manual.

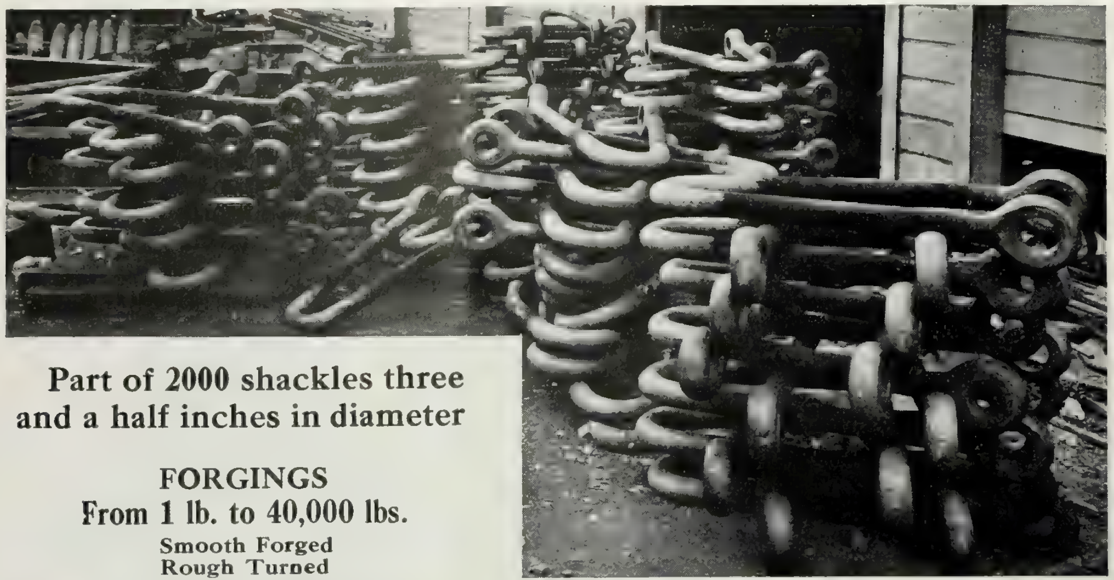
Any one or all three of these booklets can be had by addressing our Western offices.

Pawling & Harnischfeger Company
MILWAUKEE, WIS.

1104 Central Bldg..........Los Angeles, Cal.
821 Monadnock Bldg..........San Francisco, Cal.
Pittock Block..........Portland, Ore.

P & H Cranes — Hoists — Monorail Systems
Drilling and Boring Machines — Foundry Grab Buckets

FORREST QUALITY FORGINGS



Part of 2000 shackles three and a half inches in diameter

FORGINGS
From 1 lb. to 40,000 lbs.
Smooth Forged
Rough Turned
Finished Machined

Largest in the West ✲ FORGINGS ✲ Best Equipped in the West

Cam, Crank, Steamboat Shafting. Shipsmithing, Machine Forging, Blacksmithing

EDWIN FORREST FORGE COMPANY
129 FREMONT STREET SAN FRANCISCO, CALIFORNIA

Our new plant and 20 years of experience enable us to give real quality and prompt delivery on all classes of sheet metal work up to 3/8"

PUGET SOUND SHEET METAL WORKS

METAL LIFE BOATS, LIFE RAFTS, COWLS, TANKS

3631 EAST MARGINAL WAY SEATTLE, WASH.

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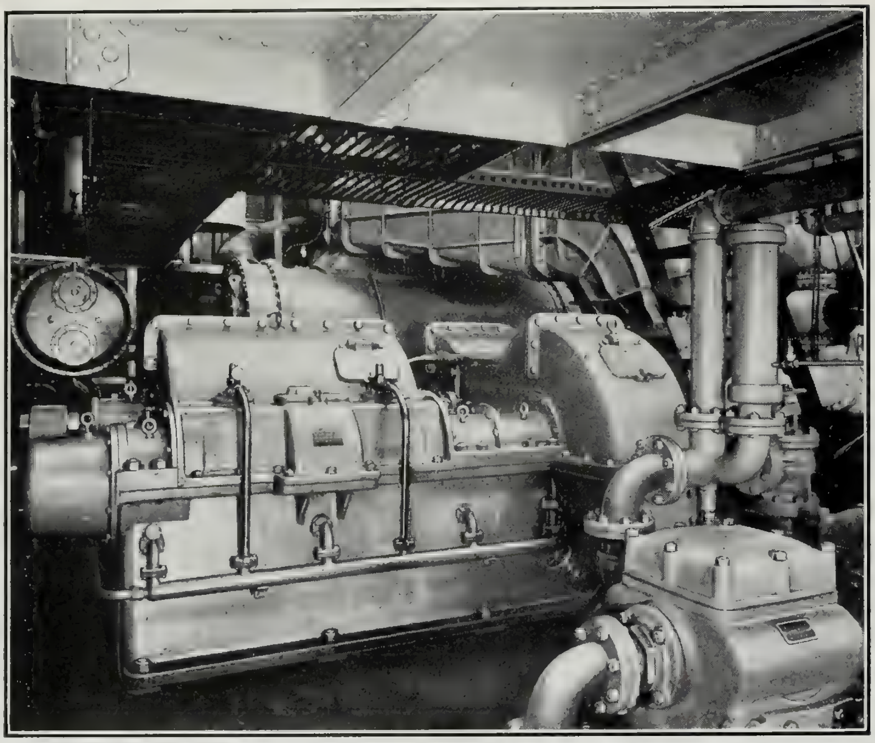

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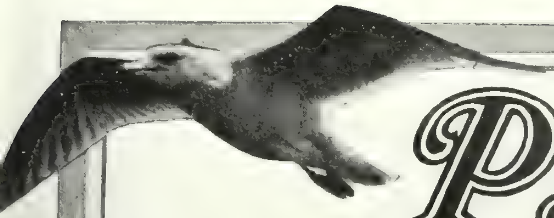

Pacific Marine Review

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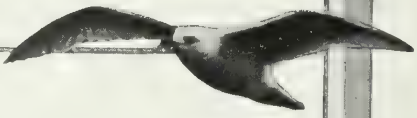

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October, 1919
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The Still Engine—Recent Developments of a Combined Steam and Internal Combustion Motor

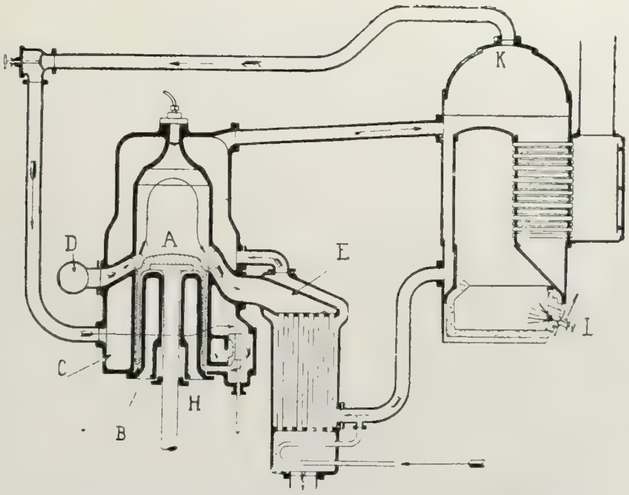
By A. P. Chalkley

VERY great interest has been aroused in Great Britain in the experimental work which has been proceeding on the Still engine for the last seven or eight years, and as the construction of this novel type of prime mover has now been taken up by some of the leading engineering firms in the country, practical development on a large scale may be anticipated within a comparatively short time. The main principles upon which the Still cycle operates are perhaps well known, but a brief description of the novelties of the system may be given. The chief feature lies in the recovery of a good proportion of the heat which is normally lost in the circulating water around the cylinder jackets of internal combustion motors, and also in the exhaust gases. For this purpose the circulating water is maintained at a temperature of from 350 to 380 degrees Fahrenheit, instead of 160 degrees Fahrenheit, and it circulates continuously through the jacket and also a boiler which thus forms a part of the circulating water system. The water is heated by the exhaust gases which fall in temperature from 900 to about 150 degrees Fahrenheit, and the steam which is given off in the boiler at a pressure of about 120 pounds a square inch (corresponding to a temperature of 350 degrees Fahrenheit) is led back to the cylinder of the engine. It acts upon the under side of the piston so that the cylinder thus becomes a combined internal combustion engine and a steam engine, acting as a combustion cylinder above the piston and a steam cylinder below.

The effect of this is to give increased power for a given size of cylinder, for the steam, in expanding, adds to the horsepower, while the combustion cycle is more efficient owing to the fact that the temperature of the cylinder remains more or less constant, while the final temperature of the exhaust gases is low. Actually it is claimed that the Still engine shows an efficiency 25 per cent higher than a corresponding Diesel engine, the thermal efficiency for a two-cycle motor being 41 per cent (as proved on trial) against 33 per cent for a Diesel engine of the two-cycle type operating on the ordinary cycle. On tests a consumption of 0.32 pound of oil per b. h. p. hour has been obtained with a two-cycle motor running on the Still system, the corresponding figure for a pure Diesel engine being about 0.42 pound per b. h. p. hour. Moreover, as a high temperature is always maintained around the cylinders, a very much lower compression pressure may be employed than with ordinary Diesel motors and it is found that 280 pounds a square inch is sufficient as compared with the normal 480 to 500 pounds a square inch. This naturally leads to a reduction in the scantlings of the motor, which is clearly advantageous for engines installed in ships.

Coming to the details of construction, it will be realized that it is necessary that the cylinder walls should be thin, so as to reduce the difference in temperature between the inner and outer surfaces to a minimum, and this is effected by having a cast iron cylinder liner with ribs cast on the cylinder and a steel strengthening sleeve pressed over them. Otherwise no specially unusual features are to be noted except for the provision of valves for the

Early experimental launch fitted with a Still engine



Diagrammatic sketch showing theoretical arrangement of Still engine

admission of steam to the working cylinder below the piston. A great advantage that is claimed with this system is that steam is always available and is used for starting up and maneuvering so that the starting air valves and gear used with ordinary Diesel engines are dispensed with. Moreover, if the boiler is provided with an oil burner which of course is put in operation when starting up, this can also be kept in service, and so provides more steam to the engine, giving additional power for over-loads when required. In ordinary work this is not needed, but for emergencies it is found that over-loads up to 100 per cent, or even more, can readily be attained.

During the experimental work which has been carried out for the last seven or eight years in London, when about a dozen engines have been built in sizes up to 500 horsepower, some of the most interesting trial engines have been of the opposed piston Diesel type. The principle of operating the Still cycle in this case is the same as with an ordinary single piston Diesel motor, except that the combustion cycle operates between the two pistons while the steam is supplied below the bottom piston and above the top piston. One of the experimental engines of this class is illustrated in Figure 1, which was intended to be one cylinder of an eight-cylinder submarine engine, developing about 2500 b. h. p. This engine has a cylinder diameter of 13½ inches and a combined piston stroke of 22 inches, and its normal rating when running at 360 r. p. m. is 330 b. h. p. The boiler is external, and it is not shown in the illustration, but the steam pipe leading from it can be seen. The valve gear for operating the valves on the steam engine sides can be noticed, but apart from this there are no valves other than the fuel inlet valve for the admission of fuel. The solid injection system is employed, and on starting up, steam is turned on and the engine fires within the course of two or three revolutions. During this operation the oil burner has of course to be working, but when the engine is running normally this is put out and the steam is supplied entirely from the circulating water. It may be added that this cylinder actually develops 540 b. h. p. for a short period when supplied with added steam raised by lighting the oil burner.

Figure 2 shows another experimental engine also of the opposed piston type, but running at slow speed, developing 250 b. h. p. and 150 r. p. m., the cylinder diameter being 16 inches and the combined piston stroke 32 inches. The steam engine which is seen driving on to the same crankshaft is not an integral part of the engine, but it was intended with a six-cylinder engine of this design to have some of the cylinders working as high-pressure, others as intermediate-pressure, and others as low-pressure steam engines, in order to obtain better steam efficiency. In the experiments,

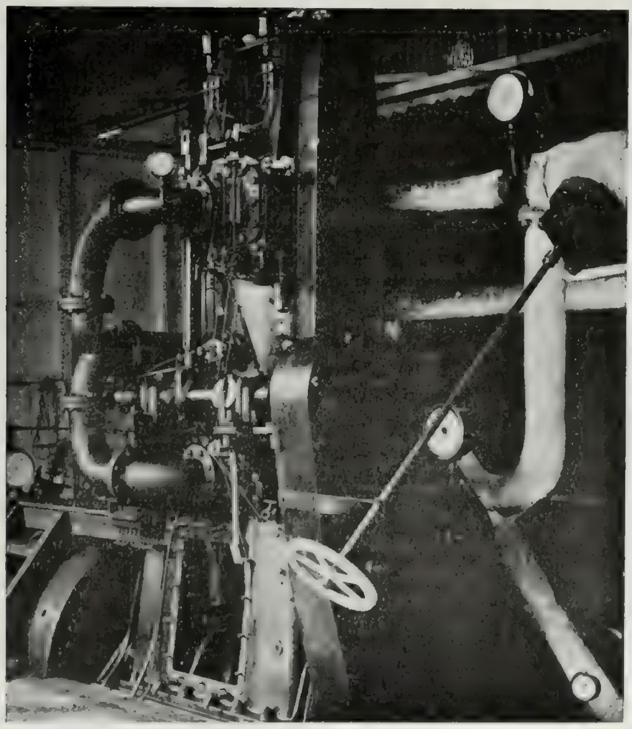


Figure 1. 330 B. H. P. experimental Still engine

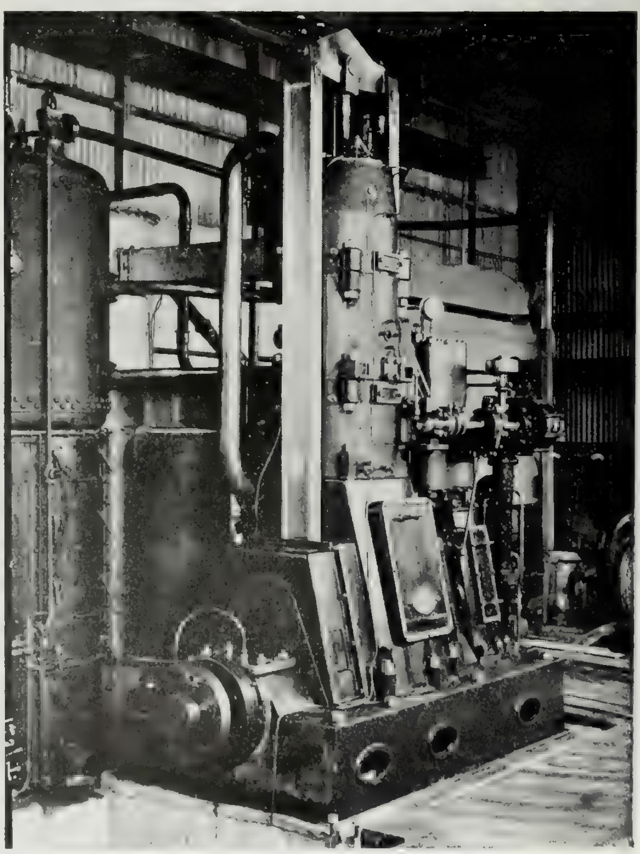


Figure 2. 250 B. H. P. Still engine

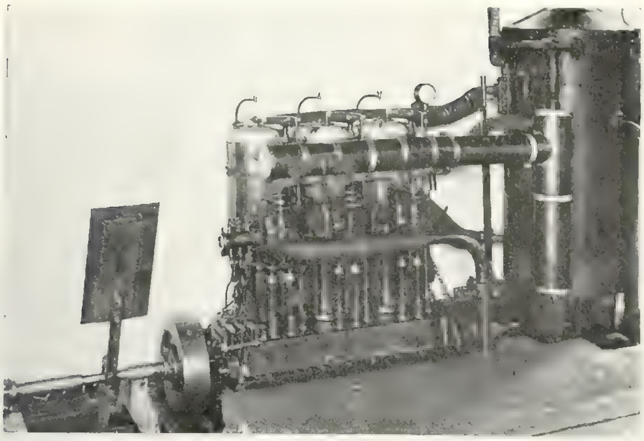


Figure 3. Still engine with electric ignition

therefore, separate high and intermediate pressure cylinders were provided, thus allowing the low pressure steam to enter the combustion cylinder and give results corresponding to those which could be obtained with a complete six-cylinder engine. Part of the boiler can be seen in this illustration. Experiments were also conducted with engines operated on electric ignition and a three-cylinder petrol motor is shown in Figure 3, adapted for the Still cycle. This was one of the early experimental sets and it is improbable that the arrangement will in the future be employed for motors of this class.

A few engines have already been built for commercial work; one of these is illustrated in Figure 4, which shows a four-cylinder opposed piston type, developing normally 125 b. h. p. at 235 r. p. m., the boiler being omitted from the photograph. The cylinders have diameters of 7¼ inches, while the strokes of the two pistons are respectively 8 inches and 7 inches. A camshaft is provided for actuating the valves for the admission of steam and solid injection of fuel is employed as before. When reversing, the camshaft is moved longitudinally, two valves being provided side by side, one for ahead and one for astern operation. Two of these engines have been installed in a twin-screw shallow-draught vessel which was recently built by Messrs. Denny Brothers of Dumbarton.

Some fishing boat engines operating on the Still principle have just been completed and, although these are of small size, developing only 100 b. h. p., they are of interesting type. They are not of the opposed piston design and have two cylinders with a bore of 6 inches and a stroke of 7 inches, each cylinder being a thin-ribbed liner round which is the steel sleeve, but these are open at the top and the whole is enclosed in a circular casing which also accommodates the exhaust heater, the boiler being part of the circulating water system as in the other engines. A scavenging pump for the provision of scavenging air (since the motor operates on the two-cycle principle) is driven from the crankshaft from which the fuel pump for the solid injection of fuel is also operated direct.

Among the more important developments which are now proceeding in connection with the Still engine is the construction of a single-cylinder of large size by Scotts Shipbuilding & Engineering Company, which has taken up a license for the motor. This cylinder is of the single piston type with solid injection, the diameter being 22 inches and the stroke 36 inches. The designed power is 400 b. h. p. at 120 r. p. m., and it is intended to run very complete tests on this cylinder and then to construct an engine of six cylinders of the same size developing 2400 b. h. p. One or two of these motors will then be fitted into a cargo vessel. It is thought that the Still engine will show to greater advantage with the ordinary single piston engine than with the opposed piston design and it is probable that the large engines to be built in the future will be of the former type. Although most of the experiments have been carried out with engines running on the system of solid injection of fuel, it is not essential that this arrangement should be adopted and some manufacturers may prefer to employ the more usual principle of admission by means of compressed air. In this case an air compressor would, of course, be necessary, but as the pressure of compression is only about 280 pounds a square inch, this compressor could be designed for a much lower pressure than with normal Diesel engine installations.

CONSOLIDATED LAUNCHES ANOTHER HARBOR TUG

The Drayman, third of the 100-foot wooden harbor tugs to have been launched at the plant of the Consolidated Shipbuilding Corporation, Morris Heights, New York City, went down the ways at 11 a. m., September 11, 1919. Mrs. C. G. Amory christened the ship.

The Foreman, the first of the harbor tugs to be launched by this company, is rapidly being fitted out and will have her trial run in the near future. She will be followed by the Dragoman, which is also nearing completion.

One other tug is now in the course of construction and the keel of the Helmsman will be laid at once.

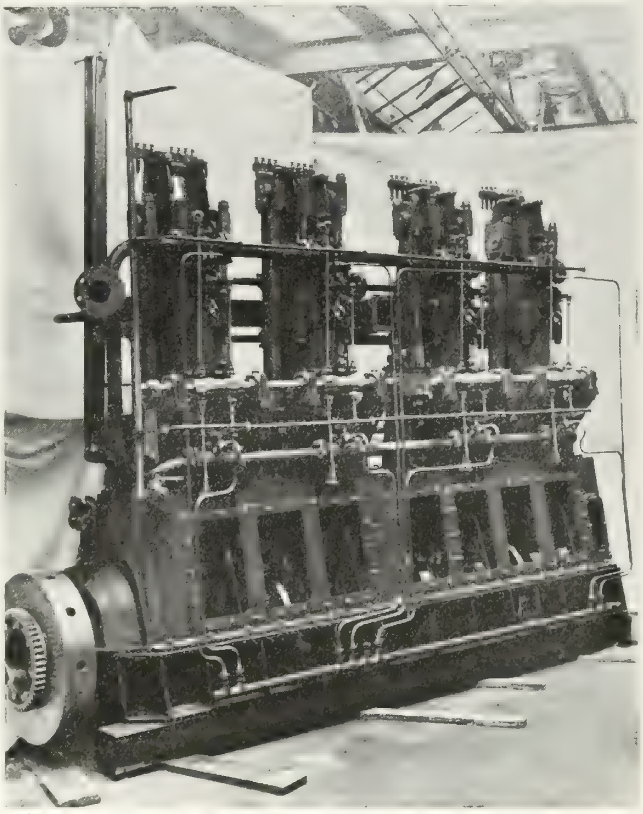


Figure 4. 125 B. H. P. Still engine, built for installation in the shallow draft vessel

The Diesel Engine in Marine Propulsion

THE original Diesel patents were taken out by Dr. Rudolph Diesel in Germany in 1892, but it was not until the St. Louis Exposition in 1904 that the engine bearing the name of Dr. Diesel was first brought to the attention of the American public.

The engine exhibited at St. Louis had been brought from Germany by the late Adolphus Busch, whose attention had been drawn to the economical performance of Diesel engines in Europe and who later acquired the American rights to manufacture and sell under the Diesel patents. Many of these engines of the Sulzer type were at that time built and installed in electric power generating plants in this country. Prior to that time various European firms had acquired similar rights to manufacture in England, France, Italy, Belgium, Germany and Switzerland and the Diesel engine was developed in these various countries taking a number of special forms with various mechanical modifications to suit the ideas of the different designers. The first installations of any very great significance commercially in the marine field were made by the Burmeister & Wain Shipbuilding & Engineering Works of Copenhagen and by Nobel in Russia.

The economy and endurance of these pioneer marine Diesel power plants, particularly those installed by Burmeister & Wain, have given a great impetus to this method of marine propulsion, and many Diesel engine manufacturers have entered the marine field, where some very notable successes have been made. During the war, a great amount of skill in designing has been directed toward the perfection of the Diesel engine in submarine propulsion and undoubtedly much has been learned from this work which will now be applied in marine engineering for commercial purposes.

In America the work on Diesel engines for marine propulsion has so far been confined to engines of rather small capacity and apparently the Shipping Board is just waking up to the importance of obtaining economical propulsion for vessels that are to enter into competition with the rest of the world in carriage of freight. There is no reason why America cannot produce as good a Diesel engine as is manufactured in Europe, and undoubtedly when the shipping business of the world reaches a more normal stage, American capital will be forthcoming for the construction of motorships.

In connection with the problem of designing marine Diesel power plants, it is significant that the Burmeister & Wain installations, which have been the most notably successful in this field, are the work of a shipbuilding and engineering firm which builds the vessel, the engines and all the auxiliaries complete in its own shops. This not only gives the manufacturers the opportunity of making a peculiarly suitable design for marine purposes, but it enables them to furnish to the power plant as it leaves their hands engineers, trained in their own shops, who are perfectly familiar with the machinery they are handling and competent at any time to effect repairs on the same. These facts have no doubt contributed in a very large measure to the unique position which this firm holds in the marine world as a manufacturer of motorships, and it would be well for American firms desiring to enter this field carefully to consider the advisability of having their installations followed up at sea by skilled machinists from the shops where the engines are manufactured.

One of the oldest and most conservative shipbuilding and engineering firms in the United States has the license to manufacture Burmeister & Wain marine Diesel engines, and has the marine engineering experience and skill necessary for that manufacture and for the installation of such power plants in passenger or cargo vessels, and there are other plants on both coasts of the United States holding licenses for European designs of Diesel engines that are also in a position to take care of the manufacture of marine power plants. We can therefore hope for a great expansion both in new motorships and in the direction of replacing steam engines with internal combustion fuel oil engines. The records made in economy of operation by properly designed motorships would seem to leave no room for doubt that some form of internal combustion fuel oil installation will finally supersede the steam engine as the power plant for carrying the world's freight on the seas.

A typical Burmeister & Wain motorship

Burmeister and Wain Marine Diesel Engines

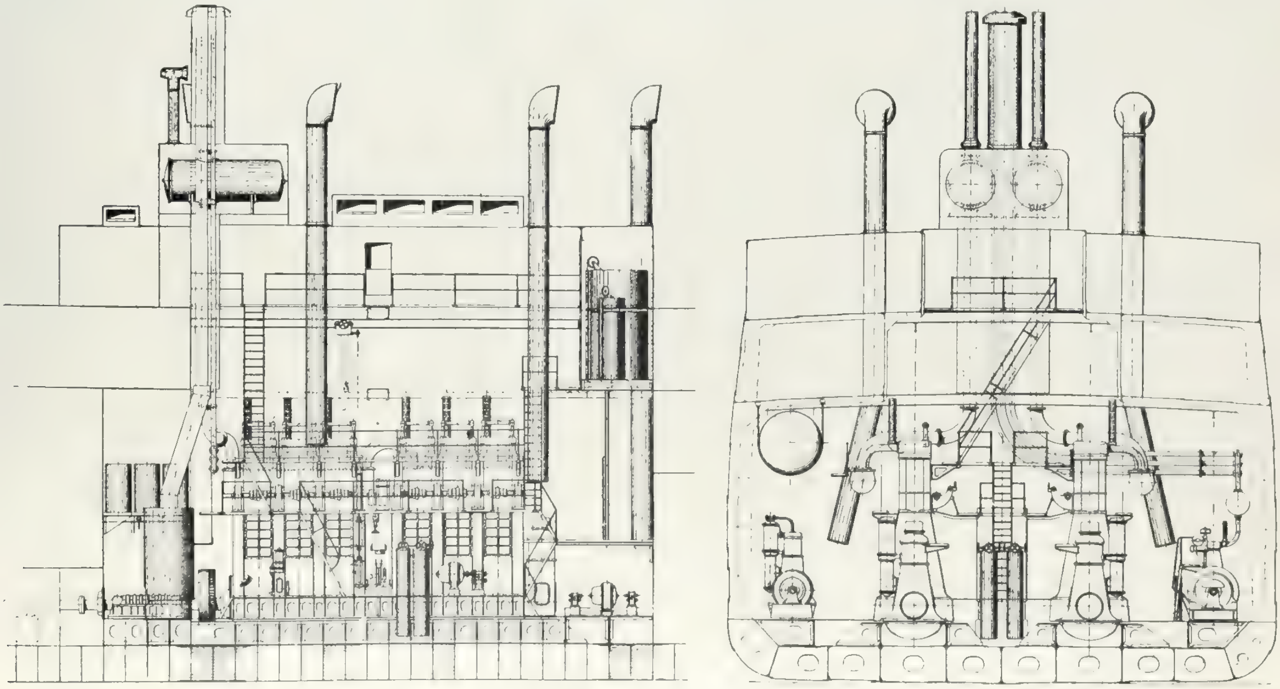
By J. C. Shaw

ALTHOUGH Burmeister & Wain commenced the building of Diesel engines for stationary purposes as early as 1904, it was not until 1911 that they started work on their first motorship. They were well qualified for this new undertaking, inasmuch as they were at that time one of the oldest and most experienced shipbuilders in their part of the Continent.

Their early success with the motorship is chiefly due to Mr. Anderson of the East Asiatic Company, whose initiative and foresight made possible the placing of the first order and subsequent orders, and to Mr. Kundsen, who possessed the engineering insight and genius to make it a success at the start.

While several other Continental builders spent much time experimenting with the two-cycle engine, these builders from the very beginning held steadfastly to the four-cycle principle, which they considered correct fundamentally and alone dependable for this class of service. Their early decision in favor of the four-cycle has of late years been confirmed by other makers, on the Continent in particular, who formerly built the two-cycle engine, but now are converts to the four-cycle.

The first vessel completed was the Selandia, which was turned over to her owners in February, 1912. She has been in almost continuous service and only a few minor changes have been made. The fuel pumps originally consisted of two per engine, each supplying four cylinders through needle valve control, but these were replaced by individual pumps per cylinder, which is now their standard practice. This vessel was followed by the original Fionia, a sister ship which was changed to Christian X when purchased by the Hamburg-American Line by direction of the ex-Kaiser after visiting the vessel at Kiel. With the purchase price, which was reported large for that time, the East Asiatic Com-



Arrangement of engine room for twin screw installation of Burmeister & Wain Diesel engines pany placed the order for the second Fionia, a semi-passenger vessel with nearly twice the power of the original vessel.

The accompanying table gives the vessels in order of completion with chief hull and engine particulars. During the last years of the war, unfortunately, the completion of vessels was much interfered with due to lack of hull material.

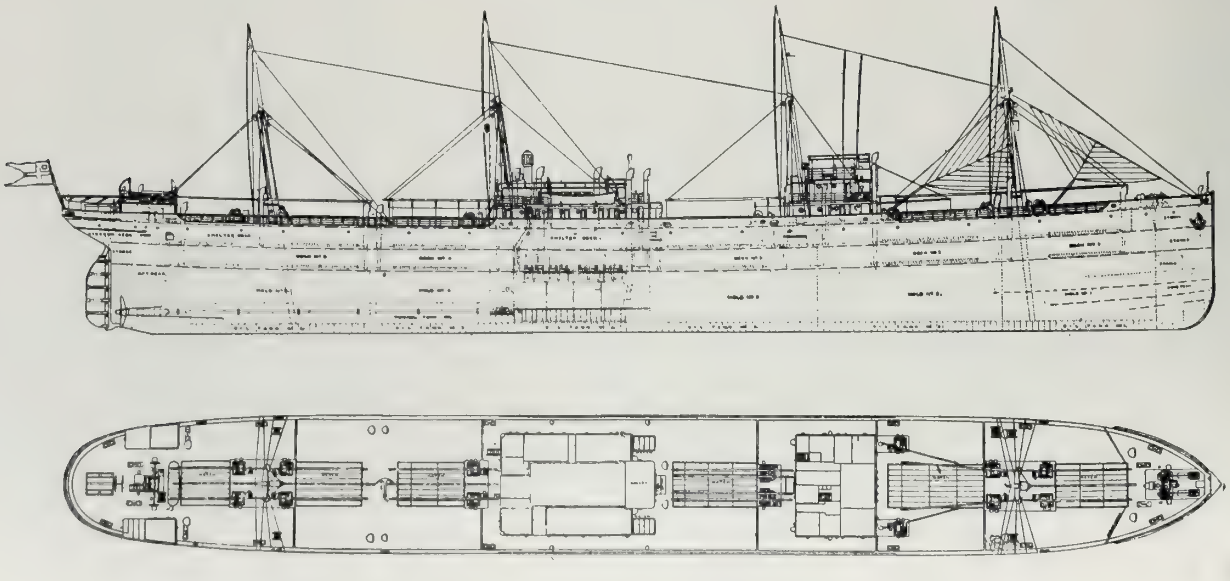
In the earlier ships it will be noticed the eight-cylinder engine was used, but was later superseded by the six, which latter was found to be cheaper to build and easier to maintain due to fewer parts. In the beginning the eight was thought best in keeping down the diameter of cylinders, which had not been tried out then in large sizes, and also was thought would give better starting characteristics than the six.

The Fionia was the first vessel to have independent compressors, directly driven from main engines, installed, which were originally of Reval design, but changed later to three-stage of the builder's own make.

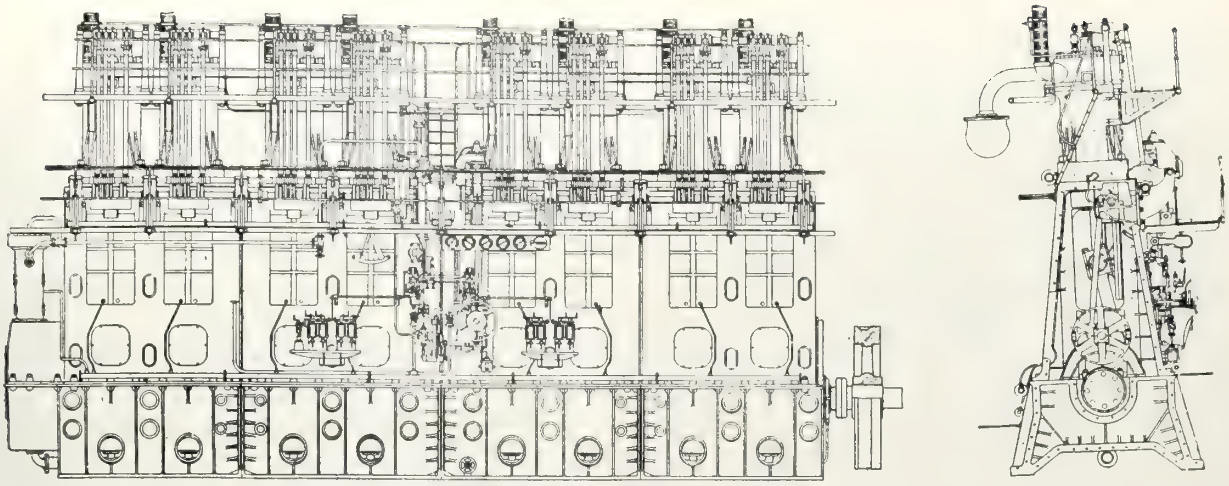
The vessels previous to the Fionia have a single stage compressor on each main engine, which take air at 350 pounds from the maneuvering air tanks, charged by the two-stage compressor, in turn driven by an auxiliary engine. There are two of these auxiliary engines, arranged on port and starboard sides of four cylinders each. They drive generators and compressors in tandem with the latter able to be thrown in and out of use by means of a clutch between generator and compressor.

In the latter installations three auxiliary engines, of two cylinders each, are employed driving generators only, which supply current to a single electrically driven two-stage compressor on starboard

NAME OWNERS	Year Put in Service	Length	Beam	D. W.	Knots Des'd	No. Cyl.	Bore m. m.	Stroke m. m.	Total I.H.P. Des'd	R.P.M. Des'd
Selandia—East Asiatic Co.	1912	370′	53′0″	7400	12	8	530	730	2500	140
Christian X—Hamburg-American	1912	370′	53′0″	7400	12	8	530	730	2500	140
Suecia—North Star S. S. Co.	1912	362′	51′3″	6550	10.75	8	500	660	2000	140
Pedro Christophersen—North Star	1913	362′	51′3″	6550	10.75	8	500	660	2000	140
Siam—East Asiatic Co.	1913	410′	55′0″	9700	11.25	8	590	800	3000	125
Annam—East Asiatic Co.	1913	410′	55′0″	9700	11.25	8	590	800	3000	125
California—United S. S. Co.	1913	405′	54′0″	8300	11.25	8	540	730	2600	140
Kronprins Gustaf Adolf—N. Star	1914	362′	51′3″	6550	10.75	6	540	730	2000	140
Kronprinsessan Margareth—N. Star	1914	362′	51′3″	6550	10.75	6	540	730	2000	140
Fionia—East Asiatic Co.	1914	395′	53′0″	6700	13.5	6	740	1100	4000	100
Malakka—East Asiatic Co.	1914	410′	55′0″	9200	11.25	6	630	960	3100	125
Tong King—East Asiatic Co.	1914	410′	55′0″	9200	11.25	6	630	960	3100	125
Pacific—North Star S. S. Co.	1914	362′	51′3″	6550	10.75	6	540	730	2000	140
Panama—East Asiatic Co.	1915	410′	55′0″	9200	11.25	6	600	960	3100	125
San Francisco—North Star S. S. Co.	1915	362′	51′3″	6550	10.75	6	540	730	2000	140
Australien—East Asiatic Co.	1915	410′	55′0″	9200	11.25	6	630	960	3100	125
Columbia—East Asiatic Co.	1915	425′	55′0″	9500	11.15	6	630	960	3100	125
Chile—East Asiatic Co.	1915	425′	55′0″	9500	11.15	6	630	960	3100	125
Oregon—United S. S. Co.	1916	405′	54′0″	8300	11.15	6	590	900	2800	140
Peru—East Asiatic Co.	1916	425′	55′0″	9500	11.15	6	630	960	3100	125
Geo. Washington—F. Olsen & Co.	1916	425′	55′0″	9500	11.15	6	630	960	3100	125
Valpariso—North Star S. S. Co.	1917	367′	51′2″	6500	11.25	6	590	900	2600	130
Lima—North Star S. S. Co.	1918	367′	51′2″	6500	11.25	6	590	900	2600	130
Bonheur—Fred Olsen & Co.	1918	425′	55′0″	9500	11.25	6	630	960	3100	125
Asia—East Asiatic Co.	1919	425′	55′0″	9500	11.25	6	630	960	3100	125
Hull 514 (building) East Asiatic Co.	....	445′	60′0″	11000	11.9	6	740	1150	4500	115



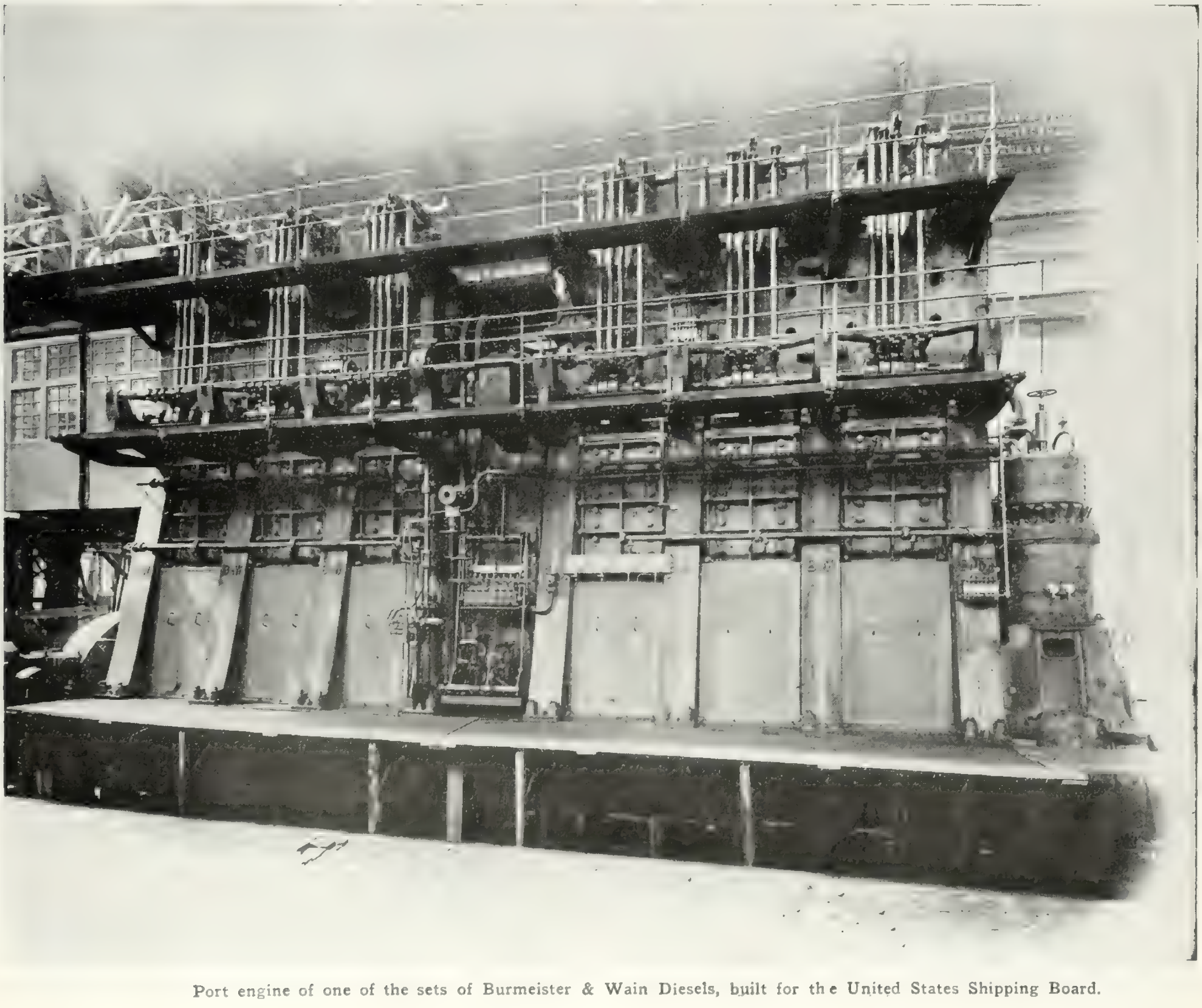
Inboard profile and plan of Burmeister & Wain Diesel motorship Siam



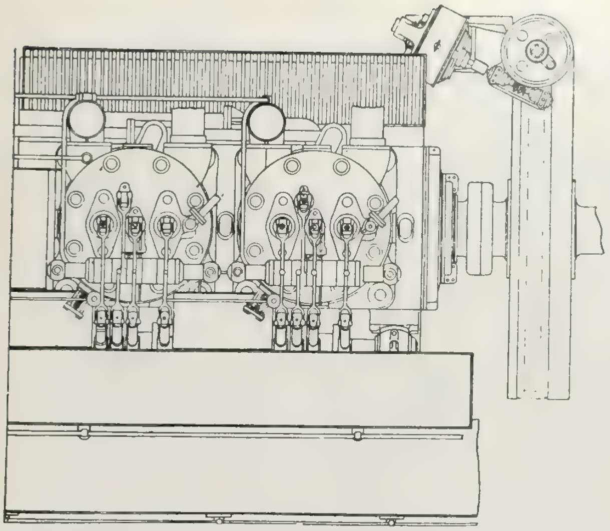
Sectional general arrangement of Burmeister & Wain marine Diesel engine

side for charging maneuvering air tanks. These auxiliary sets together are of smaller power compared with the two four-cylinder units, and require considerably less room, being placed in line on the port side of engine room. As only one auxiliary set is usually required at sea and two in port for the winches, these engines require no special attention in port and any routine overhaul can be done while at sea. This is a great advantage over the earlier installations with the larger four-cylinder auxiliary sets which must have their routine overhaul done in port, similar to the main engines, and which is apt to put too much work on the engineer personnel at this time.

Burmeister & Wain's practice from the beginning has been to use electrically-driven auxiliaries throughout for both engine room and deck machinery, although this has not been strictly adhered to by all licensees. A small vertical donkey boiler is placed in the after part of engine room for heating purposes and to comply with regulations for extinguishing fire in holds. This is also used for



Port engine of one of the sets of Burmeister & Wain Diesels, built for the United States Shipping Board.



Plan of part of a Burmeister & Wain Diesel showing arrangement of valves on cylinder head, electric turning motor and bearing gear

driving a small steam compressor for charging one of the small air flasks of one of the auxiliary engines when a vessel is new or when there is no starting air from other causes.

No details are here given in regard to vessels built under license by Harland & Wolff in Great Britain, Akers in Norway, and Gotaverken in Sweden, which in all total sixteen vessels.

The following are Burmeister & Wain's standard engines for twin screw vessels, the eight-cylinder engines being intended for large fast cargo or semi-passenger vessels:

Type	Number Cylinders per Engine	Bore M. M.	Stroke M. M.	Total I. H. P. Diesel	Approximate I. H. P. Steam Equivalent
6-125	6	500	660	1600	1400
6-150	6	540	730	2100	1200
6-200	6	590	900	2800	2400
6-250	6	630	960	3100	2700
6-275	6	680	1100	3800	3300
6-300	6	740	1150	4500	3900
8-275	8	680	1100	5000	4300
8-300	8	740	1150	6000	5200
8-400	8	800	1200	8000	7000

The company also has issued a set of designs for long-stroke engines of the same bores as the standard engines, but about two-stroke bore ratio. These are for replacing existing single screw steam installations should there be such a demand.

A set of main engines corresponding to type 6-300 with necessary engine room auxiliaries was purchased recently by the Shipping Board. These are to be installed by William Cramp & Sons at their yard in a hull being built by Pusey & Jones at Gloucester, N. J. This will give a most excellent try-out of this type of machinery since there are several sister ships being built with other types of machinery, including electric, reciprocating and geared turbine. A picture of one of these main engines for this interesting installation is shown in accompanying photograph.

CAPTAIN PILLSBURY HONORED BY SHIPBUILDERS

HONORING Captain A. F. Pillsbury, manager of the Southern Pacific district of the United States Shipping Board during the war, 100 shipbuilders of California gathered Thursday evening, September 25 at a banquet at the Palace Hotel, San Francisco.

"Few men out of public office find themselves surrounded by so many friends after they leave office, as does Captain Pillsbury," said Mayor James Rolph, Jr., who acted as toastmaster. He continued:

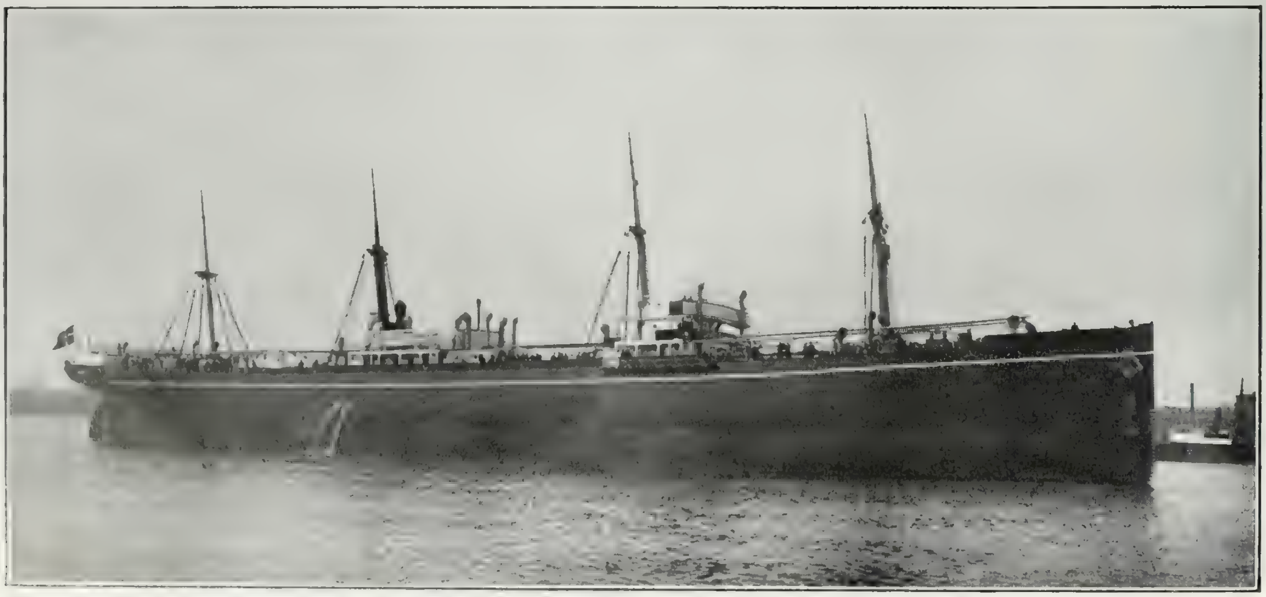
"Shipping men knew Captain Pillsbury as a fine skipper of the old school. They subsequently came to know him, during the great crisis through which our country has just passed, as the able director of the Shipping Board's activities on the Pacific Coast. They came to know him as a man who always exerted his brains and never showed his authority."

Gavin McNab read a resolution extending thanks to Captain Pillsbury for his unselfish, effective and distinguished services to his country.

J. J. Tynan, who was introduced by Mayor Rolph as "the greatest shipbuilder of the world," spoke of Captain Pillsbury's great services to the cause of America and victory. Other speakers included Thomas Ransome, district officer at Los Angeles for the Shipping Board; Captain Thomas Whitelaw, Henry Petersen and Thomas Crowley.

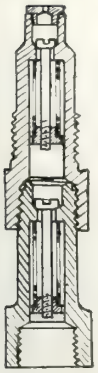
Captain Pillsbury, in reply, said that a great deal of the credit for the work done belonged to his loyal and able associates.

Among those present were many shipbuilders from Southern California.



A Discussion of the Semi-Diesel Engine

By G. N. Somerville



N the last two or three years there have appeared on the American market no less than a dozen different makes of hot surface ignition oil engines commonly known as the "Semi-Diesel" type. This has proved that there is a demand in this country for a medium pressure engine of the internal combustion type burning the heavier grades of refined petroleum. While the economy in pounds per horse power hour is no better, if it is as good, as the distillate engine, it at least represents the more economical power unit from its ability to burn cheaper fuel. Fuel oils from 24 to 27 degrees Baume are readily burned and these fuels cost only about half as much as kerosene and distillate. Most semi-Diesel engines to be found in this country operate on the two stroke cycle, as it has been found that this cycle gives from about 50 to 65 per cent more power for a given cylinder size than the four stroke cycle, and the heat control is simplified by the greater number of combustions a minute at a given r. p. m.

While very little of a technical nature has been published on the subject of semi-Diesel engines in this country, due no doubt to the fact that manufacturers are disinclined to publish the results of their experiments and development work, much is being learned by watching the operation of commercial installations. The marine field probably has offered the greatest opportunity to study the semi-Diesel engine, as the largest number of installations have been made in this field. While the general design does not vary a great deal among the different makes, there is a wide divergence of opinion among manufacturers regarding the proper application of the principles and a great variation is to be found in the details of their product.

Fuel Nozzles

Fuel nozzles of the solid injection type, which are by far the more numerous, do not vary to any great extent among manufacturers in this country. Practically every nozzle of this type is provided with a small renewable tip which allows the nozzle to be renewed when it becomes worn through erosion occasioned by the high velocity of the oil through the orifice and also because of the solid material contained in all fuel oils. The removable nozzle also permits of variation in the size of orifice and on this point experiments have been found necessary in practically all sizes and types of engines after installation. It is not infrequent that engines have given good account of themselves on the factory testing stand and when placed in commercial operation it has been found necessary to vary the size of the orifice. This no doubt has been due to local conditions. Either a change in the gravity of the oil or the pressure on the suction side of the fuel pump might cause this alteration.

A good deal of trouble has been occasioned by failure of the fuel nozzle to function properly and in many instances this can be traced to the failure of the fuel nozzle valves to maintain a tight seat. A type of nozzle which has given excellent satisfaction is shown in Figure 1, which illustrates the type of fuel nozzle used by Mietz & Weiss. It will be noted here that the nozzle is provided with a double set of valves with long helical springs. The valves and seats are spherical and it will be further noticed that the valve springs are so located that they are far away from the heat of the cylinder or combustion chamber. In one type of European nozzle we find a single valve with the spring between the valve and nozzle orifice. In this instance, the heat which is absorbed by the end of the fuel nozzle protruding into the cylinder or combustion chamber must necessarily pass in close proximity to this spring which is in time annealed, causing a loss of tension. This state of affairs must sooner or later result in the failure

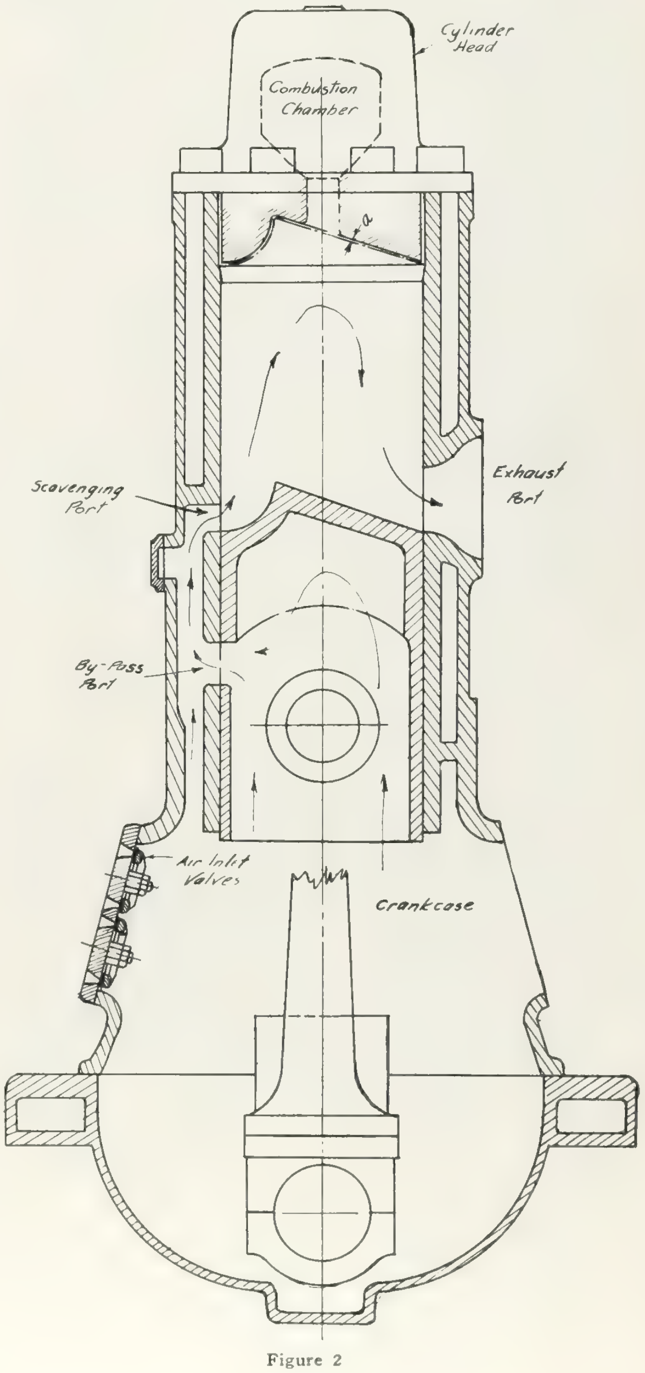
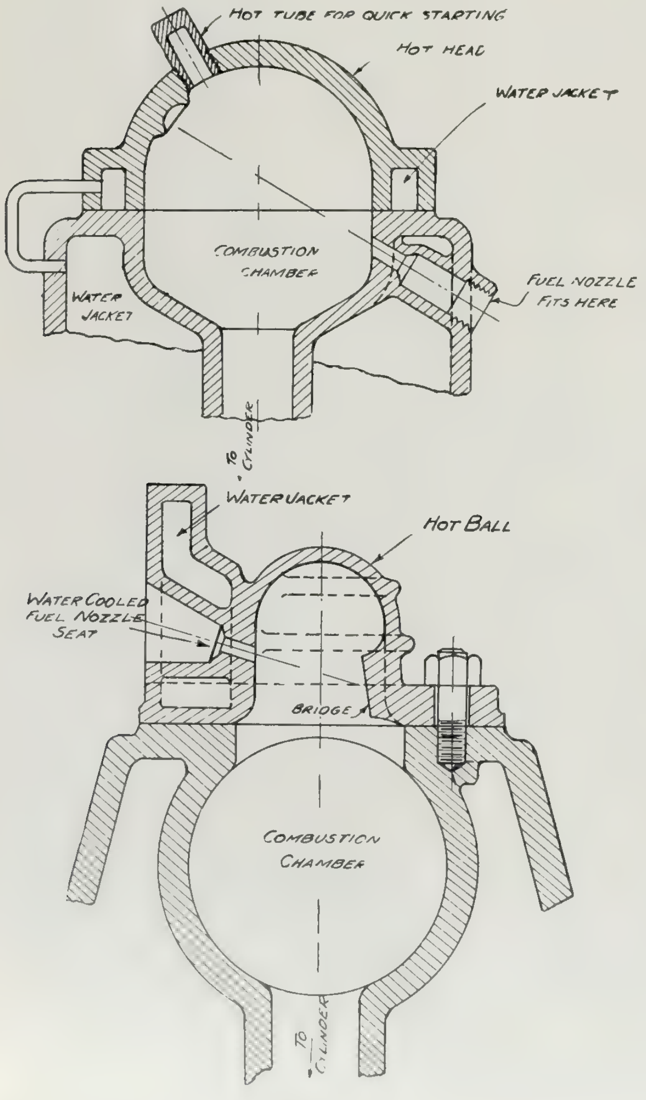


Figure 2

of the fuel nozzle and has caused much trouble. By far a better arrangement is to have something in the nature of double valves and a design which protects the springs as much as possible from destructive heat.

When we consider that most semi-Diesel engines are governed by varying the stroke of the fuel pump, it is evident that the failure of one nozzle to function properly results in a very uneven distribution of the load among the various cylinders of the motor.

Figure 2 is a typical cross section through the vertical center line of a crank case compression engine. Inlet valves located on a removable deck fastened to an opening in the crank case allows fresh air to be drawn into the space below the piston when the latter ascends on the compression stroke. Light springs behind these valves, rapidly close them when the piston reaches the top center. Upon the expansion stroke of the piston this air is compressed to pressures varying from 3 to 7 pounds a square inch. At a point between 85 and 92 per cent of the stroke, the piston uncovers the scavenging and by-pass ports. The air compressed within the crank case is thus allowed to pass through the by-pass port and by reason of the peculiar shape of the piston head is deflected up as shown by the arrows in the cut. The function of the by-pass port in the cylinder and the corresponding port in the piston is a patented feature of the Skandia engine and is the method used to circulate comparatively cold air around the piston pin, tending to cool this member. At the same time this air absorbs a portion of the heat of the cylinder head, as the underside of the piston is provided with ribs with which this air comes in contact.



Figures 3 and 4

Scavenging

One of the biggest difficulties of the two cycle engine is that of thoroughly scavenging the cylinder every revolution of the crank. This feature alone is probably responsible more than any other for the low fuel economies sometimes encountered. Many manufacturers claim that a proper combustion of fuel with the resultant high economy is dependent entirely upon the design of the combustion chamber, a point on which the writer thoroughly agrees. In the earliest designs of this type of engines, and indeed in a large majority of modern designs, we find combustion taking place in a compartment or chamber separated from the cylinder proper and connecting with the cylinder through a narrow passage. The theory seems to have been that a more thorough combustion is obtained under these conditions, by reason of the fact that the temperature within the combustion chamber is more nearly constant. One of the main disadvantages of this design is that the area of this communicating passage must be very carefully maintained or else a loss of power will be occasioned due to the inability of the expanding gases to obtain a velocity sufficiently high to follow the piston, resulting in a drop in the expansion line of the curve at a point past top center and a flattening out near the bottom center. It will be noticed in Figure 2 that the piston at the top center comes up very close to the bottom of the cylinder head as shown by dimension A. This clearance is maintained at about 1/32 of an inch. It has been noted that, other conditions remaining constant, an increase of this dimension results in an increase in the color of the exhaust. Some engineers claim this to be due to a chilling of the partly combusted gases and propound a theory in favor of the closed combustion chamber. There are some European engines, notably the Bolinder, which in their larger sized units deviate from this theory, as the area of the communicating passage is almost as large as the cross section area of the combustion chamber and the writer has noted engines of this design which have operated with as little smoke as many other types. The Bolinder, however, uses air injection with its fuel, the fuel nozzle being located directly in the center and on top of the cylinder head, and it may be that this location of the fuel nozzle together with the introduction of the oxygen in the injection air is partly responsible for the better combustion and smokeless exhaust. A type of cylinder head used by the Fairbanks-Morse Company and giving excellent satisfaction is shown in Figure 3. Here a separate combustion chamber is utilized and a connecting passage connects the cylinder proper with the combustion chamber. In this case, however, the combustion chamber is parted and the top half forms the hot plate or head. This head is provided with a removable hollow plug, which is heated by means of a blow torch for the initial heating to start.

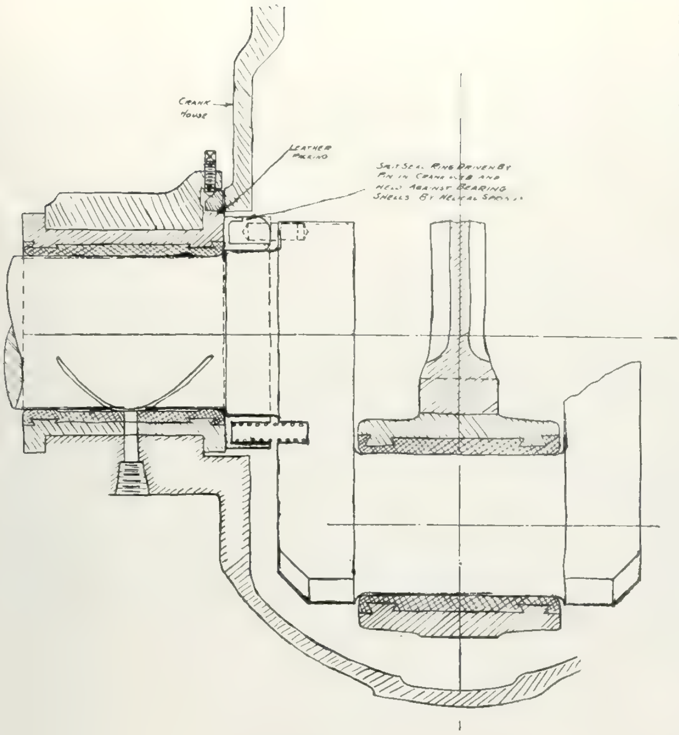

Crank House
Leather Packing
Split Seal Ring Driven By Pin in Crank Web and Held Against Bearing Shells By Helical Springs

Figure 5

(Many of their late engines have electric heating units.) After the head has attained a sufficient amount of heat to ignite the fuel, the torch is no longer necessary. It will be noted that the lower half of this hot head is provided with an annular space through which water can be circulated to aid in the maintenance of the proper heat for ignition. The writer's experience, however, has been that this water circulation in the hot head is seldom used and the water circulation through the regular jacket on the lower half of the head is sufficient for all practical purposes. The Fairbanks-Morse engine uses solid injection, and as in most other solid injection engines, the fuel impinges against a bridge or cup which aids in the vaporization of the fuel. Many engineers claim that the oil as a solid stream never reaches this bridge but that because of the high velocity of the oil on leaving the fuel nozzle orifice, it is thoroughly atomized within a very short distance of the fuel nozzle. However, we find that practically every engine of the solid injection type is provided with a bridge so designed that it absorbs sufficient heat to guarantee that the fuel will be atomized upon coming in contact with its surface. It is highly important that the fuel nozzle tip be kept as cool as possible, and the cuts herewith show the seats for the fuel nozzle all adequately cooled by the circulating water within the cylinder heads. Figure 4 illustrates a hot ball design of the Gulowsen-Grei Company of Seattle. In this case a hot ball is provided on one side with a bridge projecting into the combustion space while the outside is provided with ribs for strengthening and the retention of the heat. In this engine a fuel nozzle enters through the side of the hot ball and provision is made for cooling the nozzle by means of a water passage cored in the hot ball casting.

Bearing Sealing

The Skandia motor, manufactured by the Skandia Pacific Oil Engine Company of Oakland, California, uses crank case compression up to cylinder diameters of 14 inches. The method of sealing a crank case against the escape of scavenging air along the shaft is shown in Figure 5. Double sealing rings are utilized. An inner ring in two pieces bolted together and accurately fitted to the shaft is held against the bearing liners by means of a number of helical springs. A driving pin fitted into the crank webs of the crank shaft rotates these rings with the shaft. Lubrication of this ring is provided for by oil mist in the crank case formed by the oil splashing off the connecting rod and crank shaft. This inner ring prevents the escape of air between the crank shaft and bearing liner. An outer half ring of steel is used which by means of the set screws shown forces down a soft leather packing, sealing the joint as shown. The only disadvantage to this double seal arrangement is the fact that the bearings are continually under pressure due to the pressure maintained on the lubricating oil which supplies these main bearings. If the sealing rings on both sides of the bearing are in fine working order, maintaining an absolutely tight joint, provision must be made occasionally to drain off the dirty oil, which in time, if allowed to collect, would fill the oil grooves. This is accomplished by means of the oil grooves and drain connection shown in the cut. The groove is cut on the bottom liner parallel with the center line of the shaft and two half-moon grooves cut on each side which drain toward the center of the bearing where a drain pipe connection is provided. A proposed improvement of this design is shown in Figure 6, where a single ring is used and driven in a manner similar to that described above. By reason of the close feed between the seal ring and the shaft by which it rotates, the escape of pressure along the shaft is maintained at a very small and negligible amount. The escape of pressure between the crank case and bearing liner in this case is prevented by the sealing between the ring and the crank case. This construction would relieve the bearings from air pressure.

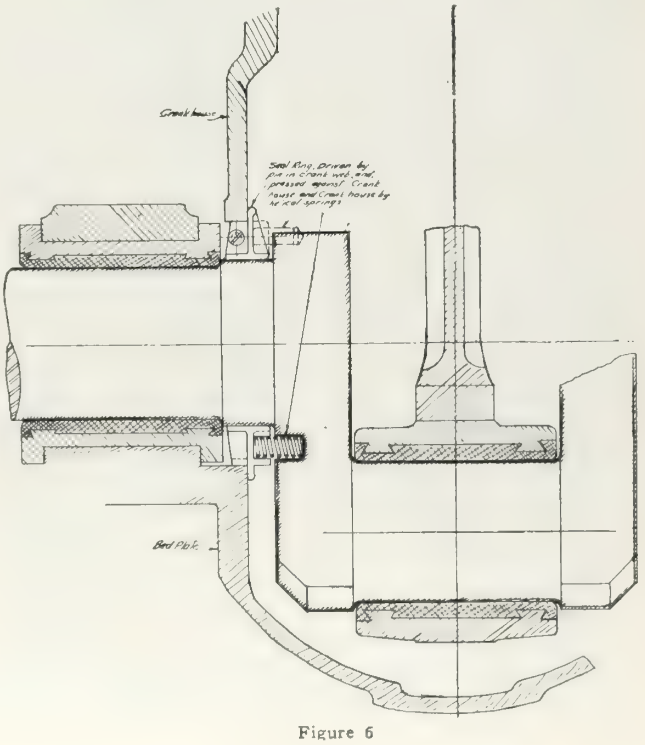

Crank house
Seal Ring, Driven by pin in crank web, and pressed against Crank house and Crank house by helical springs
Bed Plt.

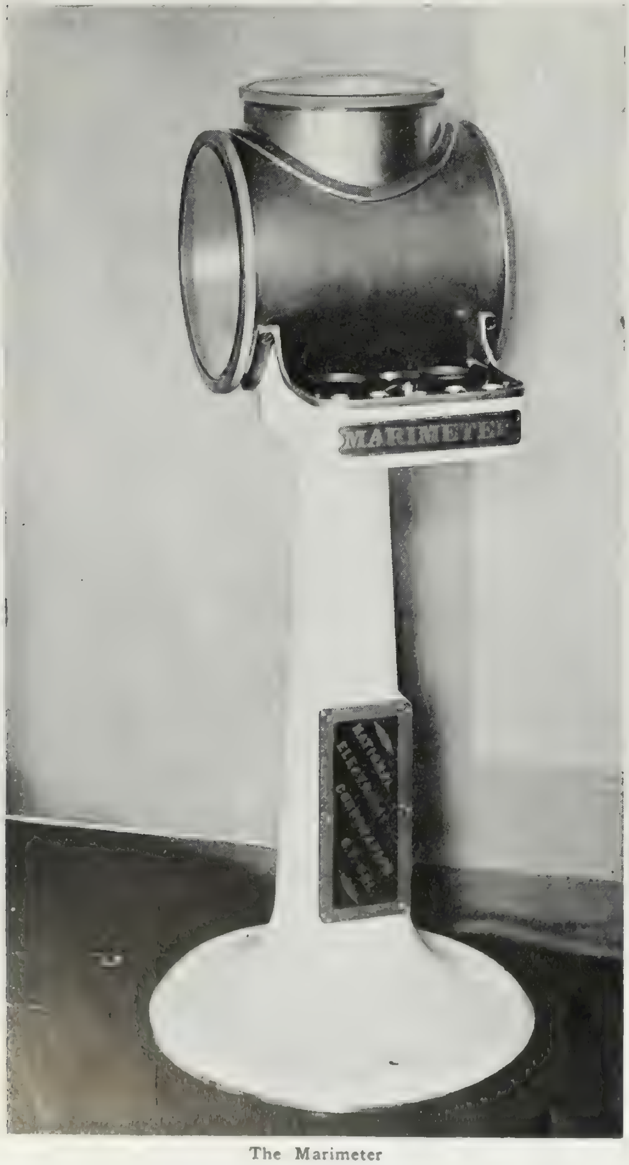
Figure 6

The Marimeter

THE "Marimeter" is a local invention produced by Samuel Spitz of Oakland, California. The entire practical development of the invention and its application to marine soundings have been under the direction of Mr. John Eldridge. The first installation is now being made on the Pacific Steamship Company's steamer Governor while the vessel is in dry dock in Seattle.

The principle upon which this ingenious device works is electricity controlled by sound vibration. A sound wave is sent out from the bottom of the vessel mechanically and the instant this sound is started it is picked up electrically and relayed to the recording instrument and the dial of the recording instrument begins to register. The sound wave travels to the bottom of the ocean and returns in the form of an echo and this echo is also picked up by the diaphragm in the bottom of the boat and is also relayed by electricity to the recording instrument, causing the pointer to immediately stop. The depth will be shown in fathoms and four soundings may be made per minute, all directly under the ship's keel.

Sound travels at practically a uniform rate in the water (about 4000 feet a second). The depth is measured by accurately taking and recording mechanically the time for sound to travel down and back. This will show the actual depth under the keel of the boat.



The Marimeter

It is similar to the method used by mariners in the fog when they blow the whistle and listen for the returning echo, using guess work as a means of determining the distance. Our method is not guess work, but is figured down to the minutest fraction of a second and electricity is utilized to accomplish this result.

Old methods used to make soundings are not accurate and are very slow, requiring from ten to twenty minutes for each sounding. When obtained the sounding is not the depth actually under the vessel, as it has passed the spot where the lead was thrown. It must be remembered that it takes time to cast the lead and haul it in again and then to compute the distance.

Horizontal soundings may also be made, thus making it possible to determine the distance from ship to shore or from ship to another object in the water. These soundings may be made either from port, starboard or bow, but only from one direction at a time. The maximum depth which the apparatus will measure cannot be determined at this writing, but it is figured that it will reach 1000 fathoms and that it will record a minimum of one fathom.

The National Electrical Corporation, a Pacific Coast organization controlled by Pacific Coast shipping interests, are manufacturing the marimeter. They claim absolute safety at sea with this apparatus and thereby greatly reduced insurance. It will save time and the vessel may proceed at full speed in thick weather. It will save coal also. The safety to human life is the greatest item. The company claims it to be the greatest safeguard to shipping ever produced except the wireless.

NEW WESTERN ELECTRIC DEPARTMENT

THE Western Electric Company has recently added a lighting department to its general sales organization for the purpose of fostering the propaganda for better lighting in factories, offices, hotels and residences.

This new department has been placed under the direction of E. Cantelo White. Mr. White's experience in the electric lighting field covers a period of almost fifteen years, during which time his activities have covered both the United States and Canada as a salesman and designer of lighting equipment. Particularly in Canada, many of the most important lighting installations have been planned and sold by Mr. White and installed under his supervision.

Mr. White is also well known to the electrical industry as the originator and designer of the "Duplexalite" line of lighting fixtures. In this connection Mr. White has done a great deal of standardization work and it will be his aim to carry on this standardization of lighting fixtures to such a degree that planning efficient lighting installations and merchandising the equipments will be greatly simplified.

The Last Word in Wooden Ship Building

The Foundation Company

IN the fall of 1918 the Foundation Company signed a contract with the government of the Republic of France for the construction of twenty wooden steamers at Victoria, British Columbia. At this time the Foundation Company had a four-way yard in Victoria at Point Hope on the Indian Reserve, where they were just completing a contract with the Imperial Munitions Board of Canada for five wooden steamers. In order to finish the French contract in specified time, an adjoining yard of four ways at Point Ellice was taken over and ten boats allotted to each yard under one general management. These two yards together comprised a tract of about twenty acres with an available water frontage of one thousand feet and a total of eight shipways. Each yard has four ways, 75 feet on center, with an inclination of 11/16 inch to the foot.

The overhead handling is carried on in each yard with a series of four gantry cranes supported by overhead guys to concrete anchors on three sides and to pile dolphins on the water side. The rig of the gantries includes a mast 100 feet high, pivoted top and bottom by means of ordinary gudgeons. It carries a boom 80 feet long, elevated 60 feet above ground, with an operator's cage at the intersection of boom and mast, giving the operator a complete view of all hull work under his rig.

A brief description of the two yards, each a complete unit in itself, and to a great extent similar, is as follows:

The executive offices, 30 feet by 70 feet, two stories high and controlling both yards, are at the entrance to the Point Hope yard. The French representatives and inspectors are also located in this building. The mill building is 50 feet by 100 feet, two stories high. The lower floor is taken up by five band saws and the saw files. On the second floor is the mold loft.

Included in one building 30 by 100 are the blacksmith shop, compressor room and boiler room. A few of the other buildings are a joiner shop 30 by 50, machine shop, tool room, treenail shed, oakum shed, paint and oil house, and Stetson-Ross machine building. Adequate fire line protection is provided throughout both yards, together with efficient electrical, steam, water and air systems.

On September 9, 1918, the last vessel of the I. M. B. contract was launched, and on September 25 one keel of the new contract was laid in each yard, followed in quick order by six others. Due to the material shortage and delayed shipments, it was practically six months later that the first boats were launched. On March 27 the first boat was launched from the Point Hope yard and on the 29th one from Point Ellice. As the material began to arrive, the schedule was increased and from that time on a launching record of three boats a month was made. At the present time, September 20, eighteen boats have been launched, one is scheduled for September 30, and the last hull of the contract goes into the water on October 10. This will make a record of twenty boats from September 25, 1918, to October 10, 1919, or one year and fifteen days.

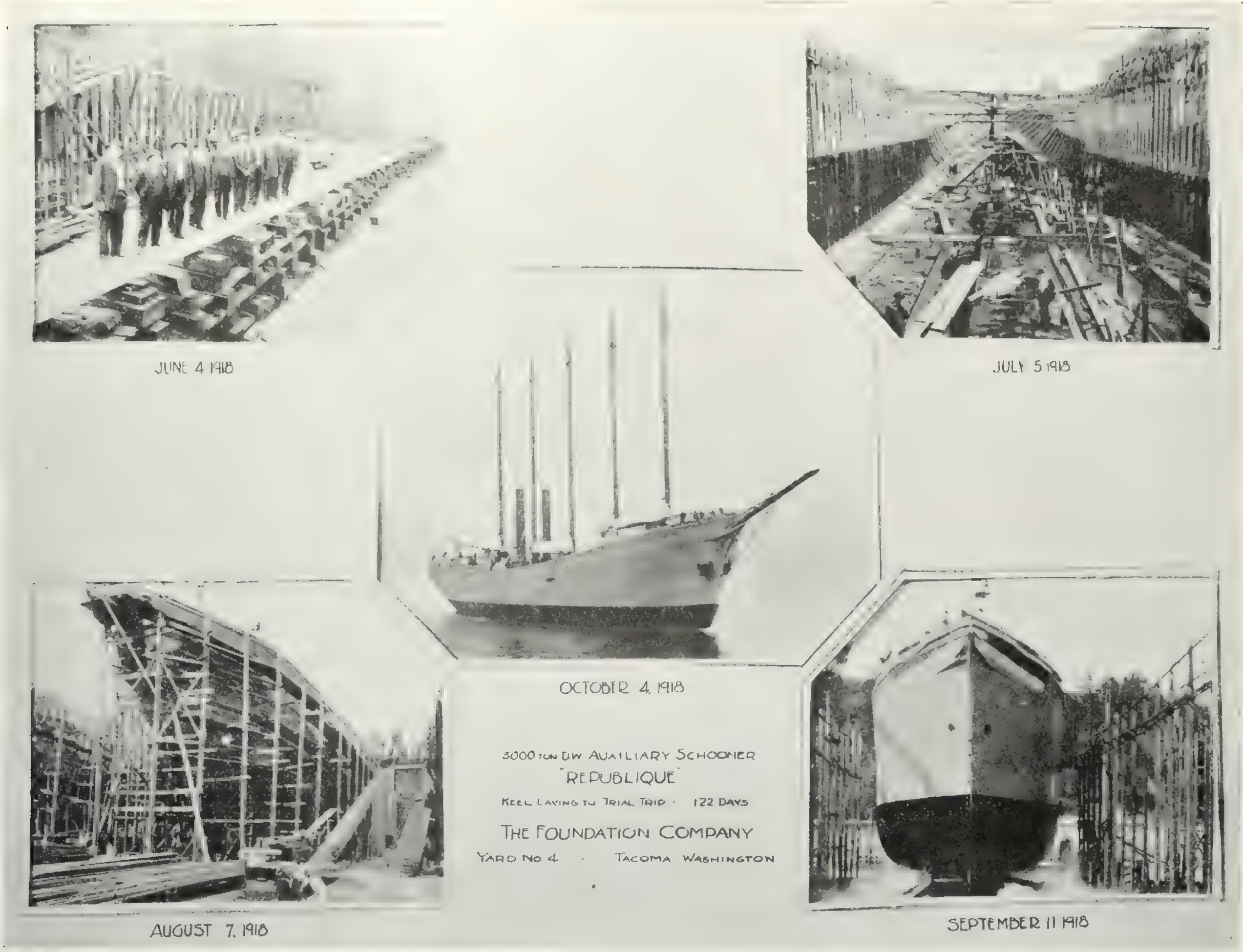
Outfitting Plant

Early in 1919 the Foundation Company acquired the assembly plant of the Imperial Munitions Board at Ogden Point for the outfitting of the steamers. This plant consisted of an outfitting pier with berths for six hulls at a time. The shops are entirely included in one huge building on the pier, 200 feet wide and 700 feet long.

Equipment

The main shops in this building are: A modern joiner shop equipped with two 24-inch circular saws, one 30-inch band saw, one 18-inch swing saw, tenon machine, boring machine, chisel mortiser and boring machine; 14-inch jointer, No. 3 Yates planer, 48-inch sander, No. 3 American shaper, 12-inch lathe, 12-inch sticker, clamp machine and complete blower system. Compressor plant with one 12 by 12 and one 14 by 12-inch air compressors. The pipe shop is equipped with 4-inch pipe threading and

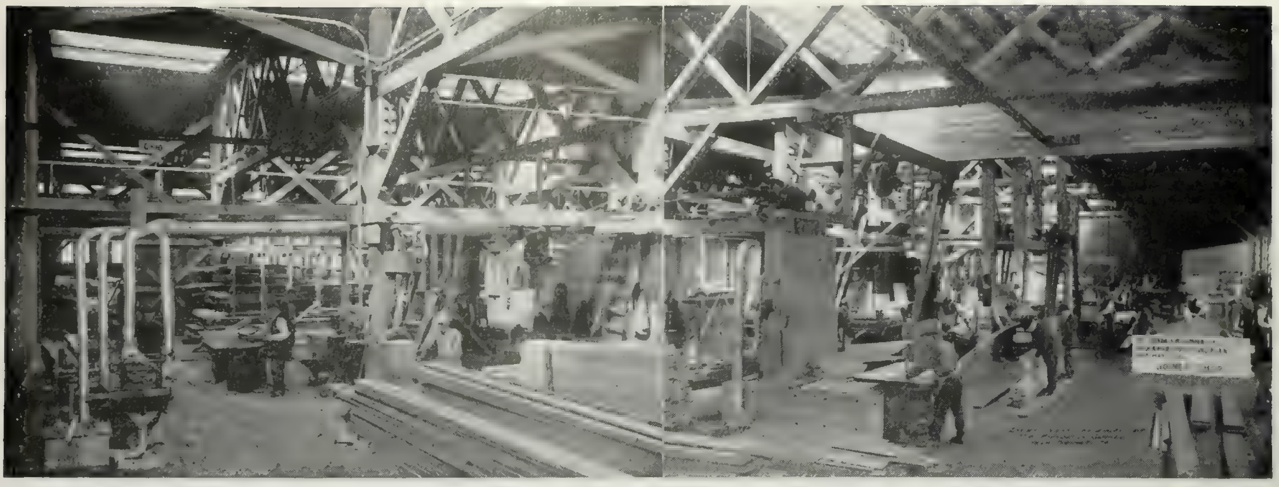
Bailey Hipkins, vice-president of the Foundation Company of British Columbia



cutting machine, two 6-inch machines and one 12-inch pipe machine. The sheet metal shop is equipped with one splitting No. 3 Niagara shear and punch, one No. 5 improved B. S. & W. punch, portable forge, 41 rolls, two 30-inch rolls, bench splitting shear, one 30-inch open end shear, one swedging and crimping machine. Machine shop: One steptoe shaper, 14-inch stroke, one 22-inch shaper, one double-headed bolt threading machine, 1½-inch capacity, one single-headed bolt threading machine, 2-inch capacity, one 7-inch vertical drill, one 5-inch vertical drill, one 3-inch vertical drill, one 1¾-inch spindle bench drill, two high-speed cold-iron saws, two 9-inch center lathes, one 8-inch center lathe. Blacksmith shop: One 800-pound hammer (air driven), one 1200-pound hammer (air driven), one trip hammer, nine forges, one 60-inch forge blower. Plate shop: One ½-inch punch, one ¾-inch punch and shear, one ½-inch punch and shear, one 5-inch drill press, one double emery wheel, one 3-inch knife grinder, one 8-inch hand plate press, seven portable forges. Mast and spar shop: one circular band saw (Fay & Egan, No. 311), one circular band saw 19 feet 3 inches long, one 18-inch jointer. Pipe-bending shop: One stationary forge, two pipe-bending slabs. Galvanizing plant: One gear pump, one 100-gallon oil tank, one galvanized tank 10 feet by 2 feet. Hoisting equipment: One 10-ton electric crane in building, one 5-ton locomotive crane, one 3-ton electric traveling stiffleg derrick, one 15-ton steel stiffleg derrick, one 50-ton shear leg.

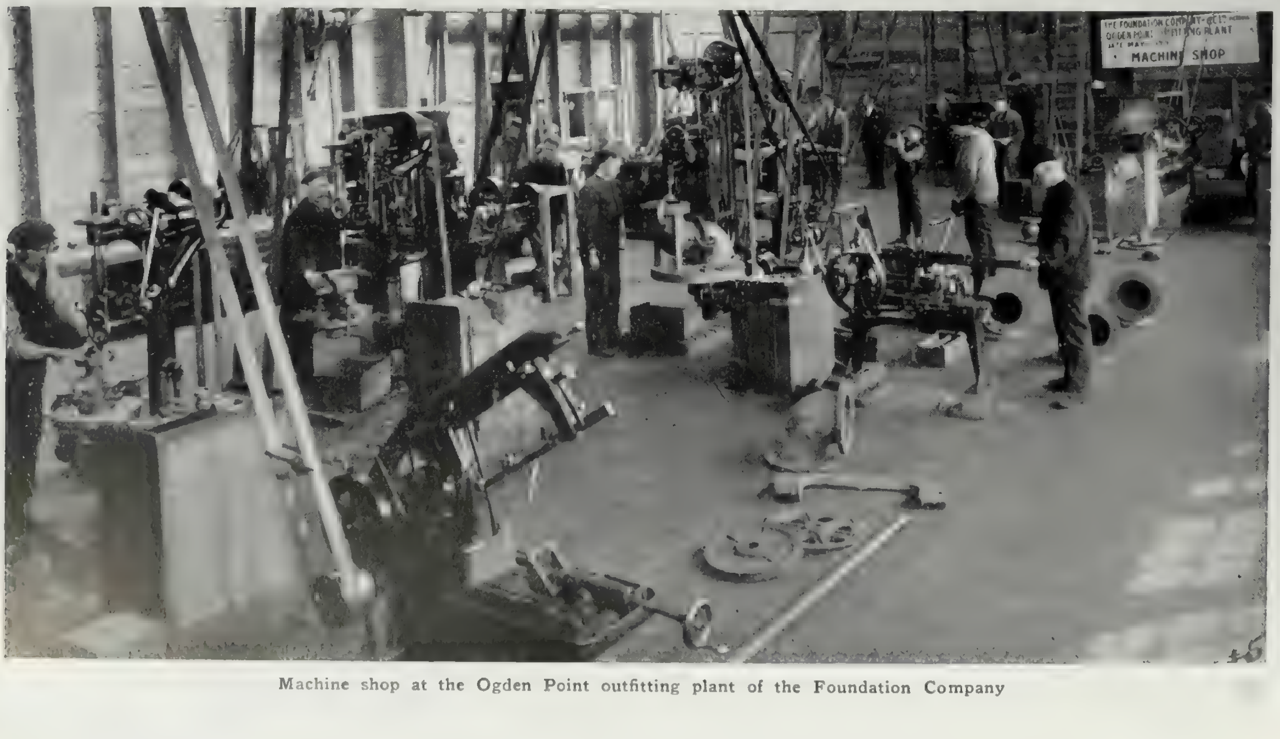
The Ogden Point assembly plant started active operations about the first of April and the first trial trip was held July 5. To date ten boats have been on trial and the present schedule of one trial trip

E. E. Jenkins, Assistant Manager, Foundation Company, British Columbia



Joiner shop at the Ogden Point outfitting plant of the Foundation Company

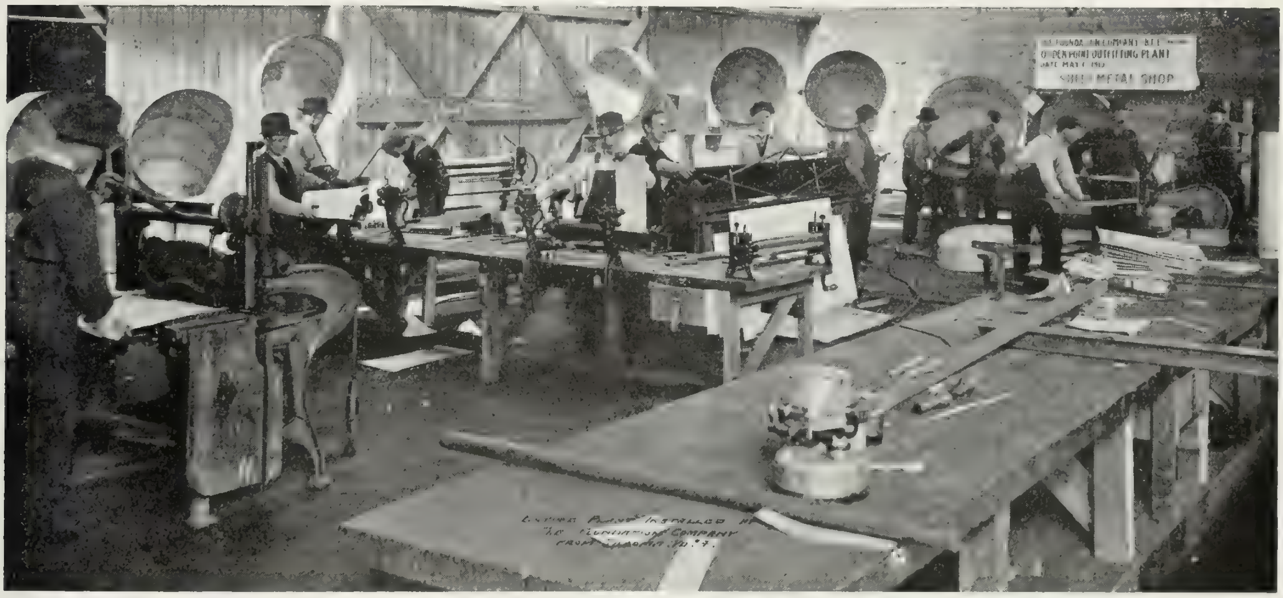
Blacksmith shop at the Ogden Point outfitting plant of the Foundation Company



Machine shop at the Ogden Point outfitting plant of the Foundation Company

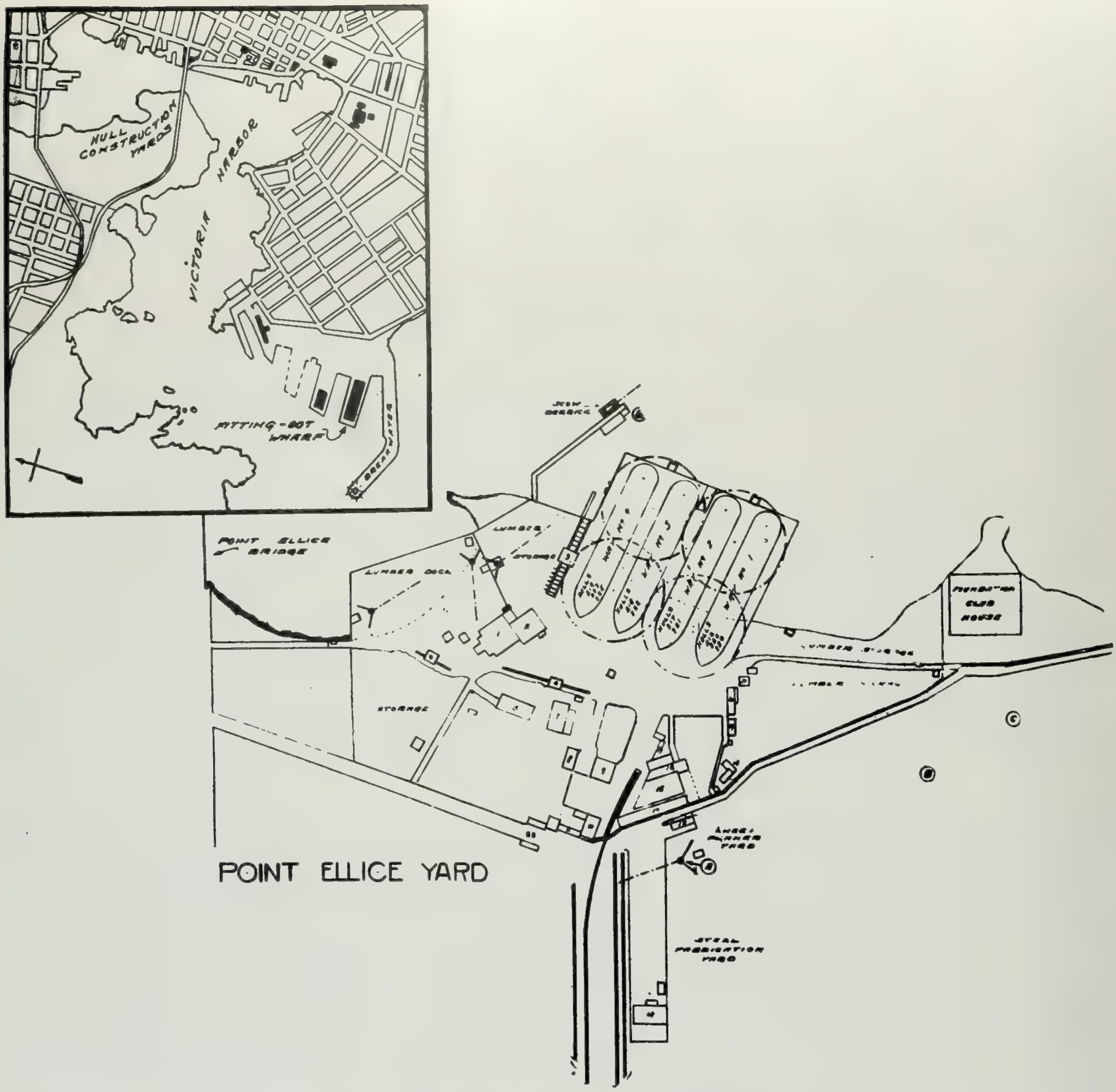
The Ogden Point outfitting plant of the Foundation Company

A boiler shop of the Foundation Company

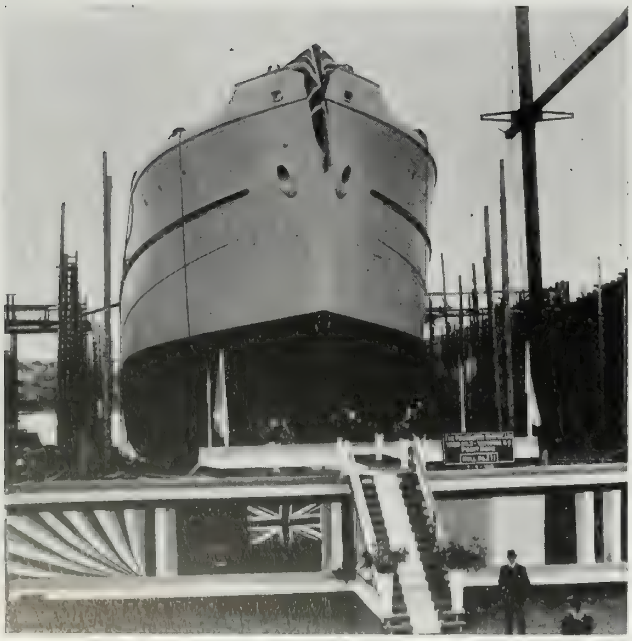


A sheet metal shop at the Ogden Point outfitting plant of the Foundation Company

The Finished Product



The Point Ellice yard, general lay-out plan


Ready for launching, Point Hope yard of the Foundation Company

a week is being easily maintained. The schedule will complete the contract early in December.

The Slips

The vessels are twin-screw, single-deck, cargo type of 3400 tons deadweight, with elliptical stern, long poop deck aft and forecastle forward.

General dimensions: Length over all, 293 feet 2 inches; length between perpendiculars, 279 feet; beam, extreme 47 feet 6 inches, moulded 46 feet 6 inches; depth moulded, 23 feet 6 inches; load draft over keel, 21 feet 9 inches; tons displacement loaded, 5665; tons displacement light, 2265; tons deadweight carrying capacity, 3400; block co-efficient, .719; freeboard amidships, 3 feet 10 inches; bunker capacity, 520 tons; horsepower, 1100; revolutions per minute, 130; contract speed, 11 knots.

They have one smoke stack, two derrick masts, one on well deck and one on poop deck, and one wireless mast. The forward derrick mast carries four cargo booms, feeding two main hatches 20 by 24 on the well deck. Cargo is handled here by four single-drum three-ton winches. Two cargo booms on the wireless mast serve a 10 by 20 cargo hatch and two 6 by 6 coal hatches, handled by one single-drum three-ton winch. The aft derrick mast has two cargo booms serving a 20 by 24 cargo hatch aft on poop deck by means of two single-drum three-ton winches.

Hull construction: The outstanding feature of the construction of these vessels is a steel truss built full height between the top of keelson and underside of main deck beams, running continuous fore and aft through bulkheads for the full length of the ship. The bottom cord is securely fastened to the keel and the upper cord bolted through the main deck beams.

Accommodations: Accommodations for engineers are in a deckhouse built entirely around the engine and boiler casing. The galley is arranged at the forward end of this house.

Officers' accommodations are in forward deckhouse on poop deck, with pilot house and navigating bridge over.

Quarters for firemen and seamen are located in forecastle. They are equipped with metal berths and springs, steel lockers and large shower.

Steel water tanks lie aft of engine room around shaft tunnels with 24,000 gallons' capacity.

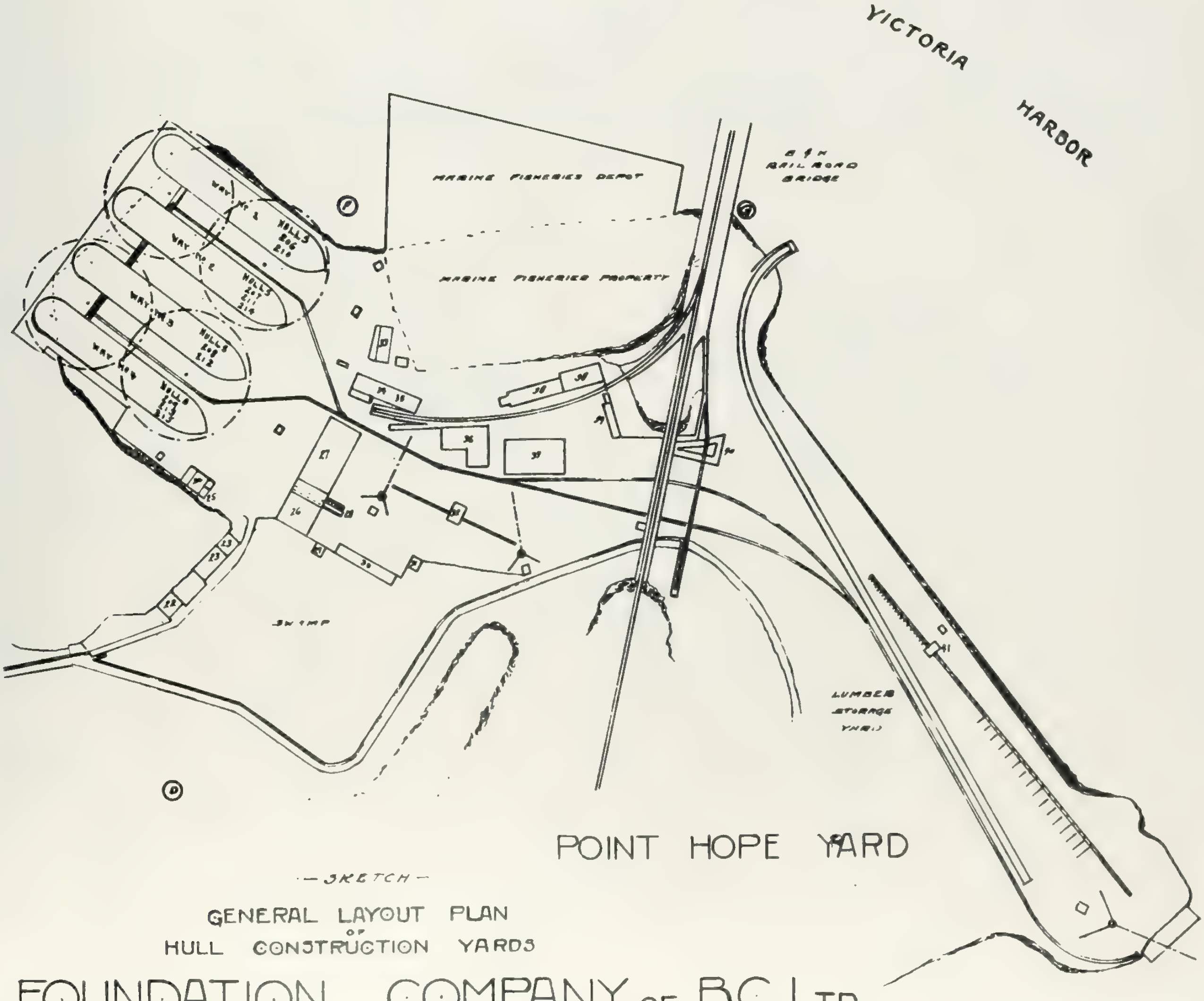
Propelling machinery: The propelling machinery consists of two triple expansion inverted three crank engines, condensing type, 36 by 22 by 13½ inches, with 30-inch stroke developing 550 horsepower each. Two three-furnace Scotch marine boilers with 4000 square feet heating surface and 122 square feet grate area; surface condenser, auxiliaries, pumps, hotwell, tank, feed water heater and evaporator.

The electric lighting installation consists of a 10-kilowatt Engberg direct connected (reciprocating) set, located on tween deck flat in engine room.

The wireless set is a one kilowatt French naval set, manufactured for the French mine sweepers and diverted to Victoria for these ships after the signing of the armistice.

The steering gear is of the steam quadrant type with hand-operating gear on deck. Two repeating telegraphs are cross connected from the bridge to the engine room.

The vessels are built in accordance with the rules and regulations of the French Bureau Veritas and receive the highest rating of their class.



— SKETCH —
GENERAL LAYOUT PLAN
OF
HULL CONSTRUCTION YARDS
FOUNDATION COMPANY OF B.C. LTD.
VICTORIA

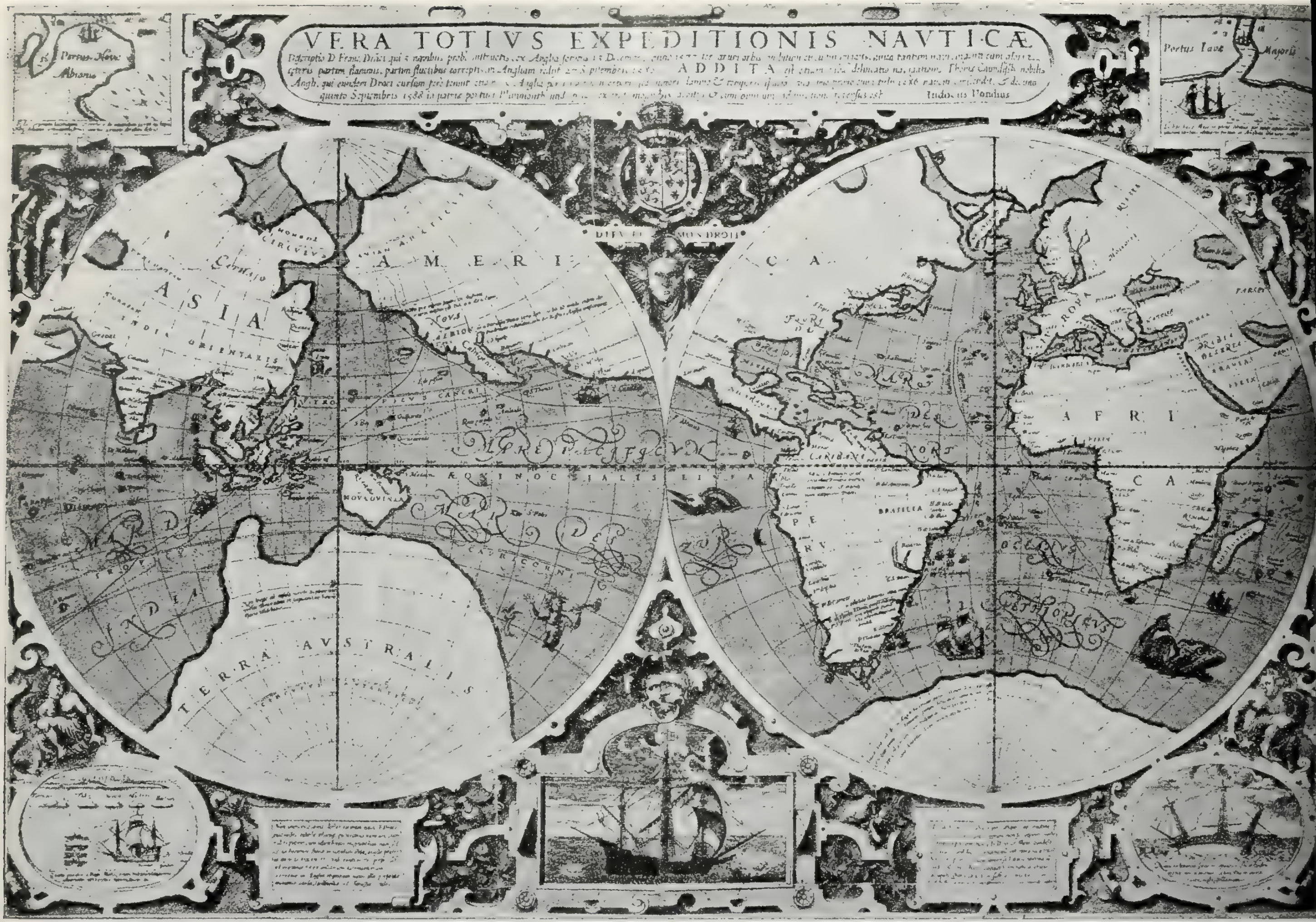


Figure I. Map showing the Circumnavigation of the world by Sir Francis Drake, compiled by Jodocus Hondius and printed at the Hague, 1595. This is reproduced from the only known copy in the world, now in the British Museum. In the left-hand corner is an insert showing where Drake landed within a few miles of San Francisco Bay. The map shows the world divided into eight equal divisions, with America in the middle.

[The above map is here reproduced by the kindness of Mr. J. A. J. de Villiers, Honorary Secretary of the Hakluyt Society and Map Curator of the British Museum, who forwarded the copy here reproduced together with enlarged transcriptions of the Latin text concerning California.]

Girdling the Globe by Sea and Air

California's interest in a Curious Cartographical Coincidence

By B. J. S. Cahill, F. R. G. S.

IN the year 1519, exactly four centuries ago, Magellan set sail from Portugal for the first circumnavigation of the globe. Six years before that, Vasco Nunez de Balboa first glimpsed the Pacific "from a peak in Darien." But it was not until 1577 that Sir Francis Drake, on his way round the world, sailed up this coast as far as latitude 42°, that is, to the Oregon border of today and then, on account of the cold, turned his good ship, the Golden Hind, south. This was on the fifth of June, 1579, and after sailing for twelve days, still in cold weather and "stinking fogs," he at last discovered a "conuenient and fit harborough" in latitude 38° 30′. This would indicate Bodega Bay, which the Spaniards later identified with the place of Drake's landing and not what is now called Drake's Bay. Here, we are told, he beached his vessel and had some curious dealings with the natives, who were well disposed, and who went through some sacrificial ceremonies and crowned him "hioh" or King. The record goes on to speak of "an infinite companie of deere and strange kind of conies." After staying here until July 23, Drake sailed away, but not before, in the quaint words of Chaplain Fletcher, "Our Generall caused to be set up a monument, a plate of brasse fast nailed to a great and firm post, whereon is engraven Her Grace's name and the day and year of our arrival there and of the free giving up of the province and Kingdome both by the king and people into her maiesties hands together with their highnesses picture and arms in a piece of sixpence currant english monie showing itself by a hole made of purpose through the plate."

Drake's voyage round the world, 1577-1580, together with that of Cavendish (1586-1588) in the opposite direction, were afterwards shown on a specially engraved world map compiled by a Dutchman, Jodocus Hondius, and printed at the Hague in 1595. There is only one known copy of this map in the world and that is in the British Museum. See Figure I.

One could say a good deal about this fascinating old document. The first thing that attracts attention is the amount of ingenious and beautifully executed design forming the framework of the map. Into these scrolls, cartouches and strap work, so distinctive of the Elizabethan period, are woven the pictured incidents of the long voyage. The lower central one shows the Golden Hind, a ship of 300 tons only, in which Drake made his voyage. No mere map draftsman drew these details, but a trained artist of unusual skill. But of vastly more interest to Californians is the insert map in the upper left corner—"the port of New England," the actual outlines of Drake's or Bodega Bay in the vicinity of Point Reyes.

It is a long cry from that far away lonely visit to a spot almost in sight of San Francisco's International Exposition of 1915, which celebrated the piercing of this very "peak of Darien" on which Balboa stood four hundred years before.

Empire moves west and history repeats itself, though always with startling variations. Due west on the parallel of Lisbon twice four thousand miles and after four hundred years, in San Francisco, facing the Pacific instead of the Atlantic, another world encircling tour is projected, not by sea, for that has become a commonplace, but by air—in and above the very clouds!

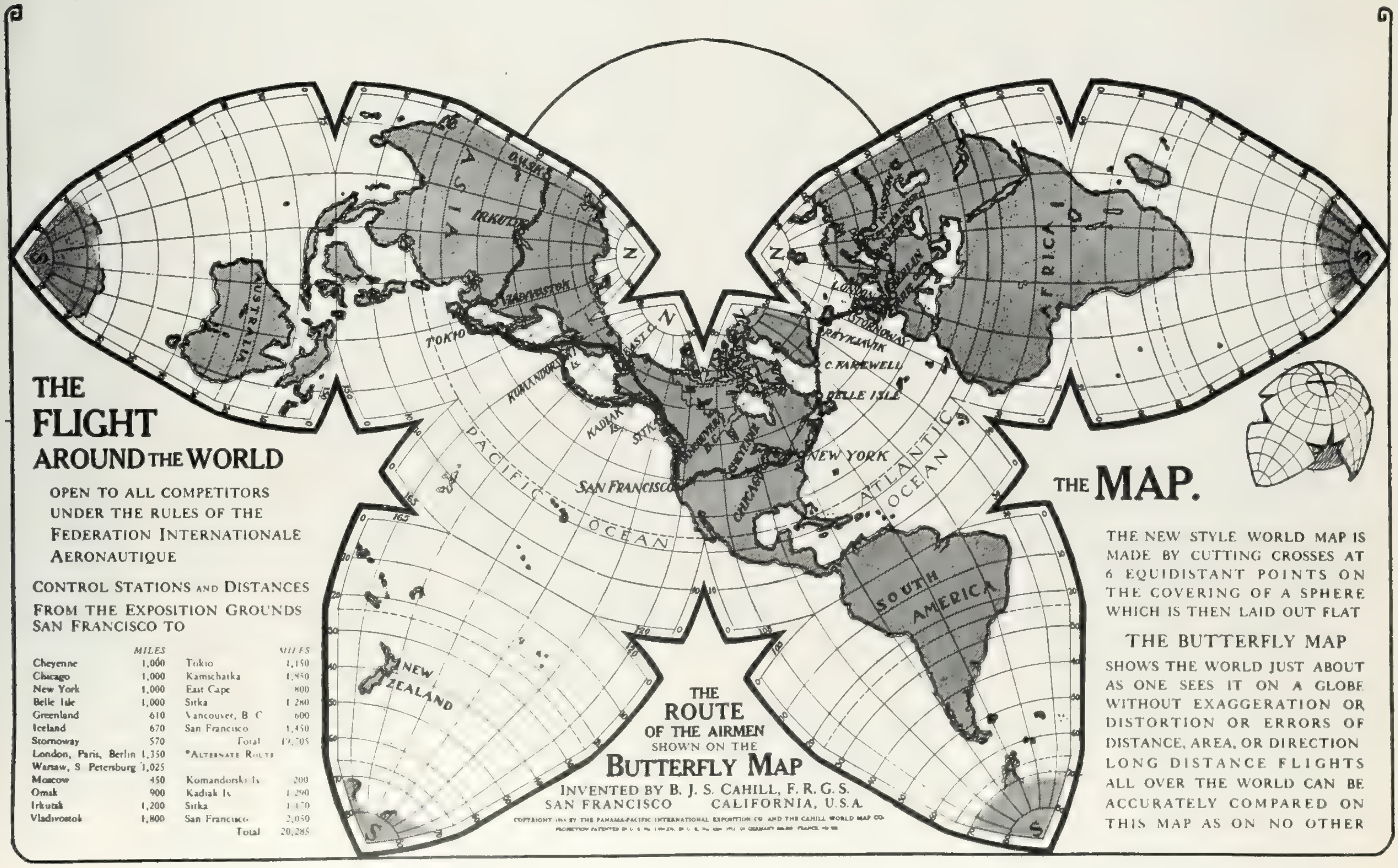
And just as a world map with an architectural framework was made to illustrate Drake's circumnavigation of the globe, so again, here in San Francisco, was made another world map (if not with architectural embellishments, at any rate designed by an architect) to illustrate the "circumaviation" of the globe. See Figure II.

The Hondius map, at first sight, appears to be the familiar double disc projection of the world, but on closer inspection the equator and central meridian of each disc are seen to be emphasized by heavy double graduated lines so that the map is divided not into two but into eight equal parts, each containing 90 degrees of latitude and 90 degrees of longitude. As each of the three boundaries is exactly the same length on the globe, the triangles, of course, should be equilateral and not right angled, but none the less each part contains exactly the same divisions of the world as are shown in the butterfly map; and this because out of a possible 360 meridians to choose from, the first map maker has selected for his prime or dividing meridian practically the identical meridian chosen by the author of the second.

This meridian in the middle of the right hand disc comes midway between the east coast of Brazil and the west coast of Ireland, which would be about 24° 10′ west of Greenwich, but, to allow for the error of that day in measuring a degree, we must check this, and we take Gibraltar, a well known point to early navigators. This shows the prime meridian about 15° west of this point, or 20° 15′ west of Greenwich. Add 24° 10′ to 20° 15′ and divide by 2 to get an average and the result is: Prime meridian of the Hondius map 22° 12′ —or the same as the prime **dividing** meridian of the new map 22° 30′ within the fraction of one degree!

Now, most double disc maps show the old world to the right and the new world to the left, the prime meridian being in the center.

Quite unusual is the Hondius map in placing half the old and new world in each disc. But this is exactly the arrangement of the new map. Thus both maps made to show the girdling of the globe divide the world into practically the same eight divisions of the earth and both place America in the center.


THE FLIGHT AROUND THE WORLD
OPEN TO ALL COMPETITORS UNDER THE RULES OF THE FEDERATION INTERNATIONALE AERONAUTIQUE
CONTROL STATIONS AND DISTANCES FROM THE EXPOSITION GROUNDS SAN FRANCISCO TO
ASIA
OMSK
IRKUTSK
VLADIVOSTOK
AUSTRALIA
TOKIO
KOMANDORSKI Is.
KADIAK Is.
SITKA
SAN FRANCISCO
PACIFIC OCEAN
NEW ZEALAND
N
S
AFRICA
LONDON
REYKJAVIK
C. FAREWELL
BELLE ISLE
NEW YORK
ATLANTIC OCEAN
SOUTH AMERICA
THE ROUTE OF THE AIRMEN SHOWN ON THE BUTTERFLY MAP
INVENTED BY B. J. S. CAHILL, F. R. G. S.
SAN FRANCISCO CALIFORNIA, U.S.A.
COPYRIGHT 1914 BY THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION CO. AND THE CAHILL WORLD MAP CO.
THE MAP.
THE NEW STYLE WORLD MAP IS MADE BY CUTTING CROSSES AT 6 EQUIDISTANT POINTS ON THE COVERING OF A SPHERE WHICH IS THEN LAID OUT FLAT
THE BUTTERFLY MAP
SHOWS THE WORLD JUST ABOUT AS ONE SEES IT ON A GLOBE WITHOUT EXAGGERATION OR DISTORTION OR ERRORS OF DISTANCE, AREA, OR DIRECTION
LONG DISTANCE FLIGHTS ALL OVER THE WORLD CAN BE ACCURATELY COMPARED ON THIS MAP AS ON NO OTHER

	MILES		MILES
Cheyenne	1,000	Tokio	1,150
Chicago	1,000	Kamschatka	1,850
New York	1,000	East Cape	800
Belle Isle	1,000	Sitka	1,280
Greenland	610	Vancouver, B. C.	600
Iceland	670	San Francisco	1,450
Stornoway	570	Total	19,705
London, Paris, Berlin	1,350	*Alternate Route	
Warsaw, S. Petersburg	1,025		
Moscow	450	Komandorski Is.	200
Omsk	900	Kadiak Is.	1,290
Irkutsk	1,200	Sitka	1,170
Vladivostok	1,800	San Francisco	2,050
		Total	20,285

Figure II. Map showing the circumaviation of the world proposed from San Francisco in 1914 by the Panama Pacific Exposition. This Projection was invented in San Francisco. By a strange coincidence it also divides the world into the identical eight divisions with what might be called exactly the same boundaries and with America in the center on the same dividing meridian as the Hondius map.

Pacific Marine Review
The National Magazine of Shipping

576 Sacramento Street
SAN FRANCISCO, CALIFORNIA U. S. A.

Official Organ of the Shipowners Association of the Pacific Coast

Subscription Price, per year (Domestic) $3.00
(Foreign) $3.50
Single Copies . . . . 25 cts

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PORTLAND OFFICE
1029 Northwestern Bank Building
F. E. SHORT, Manager

Pacific Marine Review is sold at all leading News Stands
Entered as second class mail matter at Postoffice
San Francisco, California

Published on the First of Each Month. Copyright
1919 in the United States by J. S. HINES

LEGISLATION AND SHIPPING

SEVERAL bills of great interest to the shipping community are now under the consideration of Congress. Notable among these is the Ship Mortgage Bill which was drawn up by Admiralty Counsel Ira Campbell of the United States Shipping Board. This act if passed would repeal all previous acts relating to liens on vessels for repairs, supplies or other necessaries and would supersede the provision of all state statutes regarding liens on vessels. The bill provides for the recording of mortgages on vessels and notation thereof on certificates of registry or enrollment and license and creates jurisdiction in the district courts of the United States for a foreclosure on such mortgages and provides for maritime liens upon vessels for supplies, necessaries and repairs; arranges for the enforcement of these liens, but makes them subordinate to the liens of mortgage. The object of this bill is to attract capital to investment in shipping security by making that capital more secure than it is at present. This is a very praiseworthy object from the standpoint of the advancement of the American merchant marine, but there seems to be considerable doubt in the mind of a great many experts as to the usefulness of this bill in forwarding the object for which it was framed.

It would seem to the layman that the provision in this measure arranging for liens for repairs on vessels would necessarily involve considerable red tape in making collections, and this phase of the matter appeals so much to the shipbuilders who might undertake repairs that they have suggested an amendment which is also under consideration and which would reserve 25 per cent of the value of the ship free from the mortgage lien and subject to liens for repairs. It must always be considered by capital in looking for security in ship investment that the earning power of such security depends as much upon the quick turn around of the vessel as a freight carrier as on any other feature of its operation, and they should therefore welcome any legislation which would facilitate necessary repairs at all times and in all places.

In his testimony before the Committe of Merchant Marine and Fisheries, Ira A. Campbell, formerly counsel for the United States Shipping Board, indicated that if this bill should pass in its present form he would like to see the United States issue against the mortgages, debentures or bonds which would be sold to the people of the United States. These debentures would bear the name of "Ship Debenture" and be sold in small denominations so as to give the people throughout the country a certificate, at which, to use Mr. Campbell's words, "each man can look and say: 'I have a real personal, material interest in this merchant marine that the government has built.'" Mr. Campbell's idea was that this would educate the people up to a desire for investing in ship securities. This argument seems to us somewhat far fetched, the security for these debentures being not the ship, but the underwriting power of the United States government. We maintain that no people have any real interest in a ship until, along with the profits of investment in ships, they assume the responsibility of losses in ships. If these debentures are covering in general the credit issued to ship buyers by the United States government and the government is behind the debenture, we can see no difference in the personal interest of a debenture holder and the interest that there is now among the holders of Liberty Bonds, the purchase of which made possible the emergency shipbuilding program.

If the United States Shipping Board could sell shares in their ships direct to the people on a basis of the government taking one-third of the value, the popular shares one-third of the value and the operating company one-third of the value, the operating company and the popular shares to be preferred stock in the matter of dividends and the Shipping Board having representation on the directorate to conserve their own and the people's interests in the ship, there would be a real personal interest on the part of stockholders, and we believe that some such method as this should be employed in disposing of the ships, accepting for popular shares payment either in cash or Liberty Bonds.

Such a plan would bring home to all shareholders the responsibility and losses incident to foreign trade and all overseas operation of freight carriers and would have a very beneficial tendency toward making the population of the United States ship-minded and willing to undertake constructive merchant marine legislation. The absorption of one-third of the present value of the ships by the United States government would put the operating companies on a competitive basis as to their initial capital investment.

Another bill which is attracting considerable investigation from congressional committees is the so-called Rowe Bill, introduced at the instance of the Training Bureau of the Shipping Board. This bill amends section 13 of the Seamen's Act so that young Americans, after graduating from the school ships of the Shipping Board and having six months' experience at sea, can qualify as ablebodied seamen. Section 13 has heretofore called for three years' experience at sea. The bill also proposed to reduce the percentage of able seamen required in a crew to twenty per cent for the first year, with yearly increase in this percentage up to fifty per cent.

Mr. Andrew Furuseth and other officials of the Seamen's Union are opposing the passage of this bill, but we are of the opinion that in this opposition they will not be upheld by any fair-minded American. The records of young American graduates from the training schools of the Shipping Board who have been in war service both on the Atlantic and Pacific during the last two years have shown that it is easily possible for any young man of ordinary intelligence to qualify as an able seaman is even less than six months' time, and certainly every opportunity should be given these splendid young fellows to work in the merchant marine. We personally know men who have qualified not only as able seamen, but as ship masters and navigators of the highest order, even on the sailing ship, before they were twenty-one years of age, and when we consider the ordinary duties of a deck hand on a steam freighter as against the intricate tasks formerly assigned to A. B.'s on the sailing ship, we must all feel that this bill is a step in the right direction, and it certainly would open to young Americans a very much better prospect at sea than they have at present and would probably be of great benefit in obtaining a higher grade of personnel in the crews of our merchant marine.

SPEED AND COSTS

THE proposal of the United States Shipping Board to build passenger liners for the Atlantic service 1000 feet long and with approximately 65,000 tons displacement and with a speed of thirty knots an hour, has raised a tremendous amount of discussion among marine engineers, both here and in Europe, as to the advisability of increasing the size and speed of passenger ships.

There is nothing impracticable or impossible in the 1000-foot passenger lines, nor is it in the present state of marine engineering at all impracticable to drive such a ship at thirty knots an hour across the Atlantic. The question of its advisability is one which rests entirely on commercial reasons and the majority of those that should know are inclined to think that such ships would not pay from a commercial standpoint.

In "Shipbuilding and Shipping Record" of August 21 is given an interesting table of the probable horsepowers for the various speeds of such a ship, assuming the dimensions to be 1000 feet in length, 110 feet in beam, 36 feet in draft and 68,000 tons displacement. The shaft horsepower figures at 45,000 for 20-knot speed, 71,000 for 24-knot speed, 120,000 for 28-knot speed, 160,000 for 30-knot speed. This table shows that the additional power necessary on such a ship to increase the speed from 20 to 26 knots is slightly greater than the power necessary to drive the ship at 20 knots, and still more striking is the fact that to gain the two knots between 28 and 30 requires almost as much shaft horsepower as will drive the ship at 20 knots.

Another question which touches the commercial aspect of the case and is also very important from the operating standpoint is the difficulty of maneuvering these huge liners. The Aquitania of the Cunard Line, notwithstanding the well-known conservative operating policy of that company, has more than once run down and cut in two vessels anchored in harbor, and the testimony of the officers on these liners is that they are practically powerless to prevent such accidents where the ship is driving at any speed. It also should be borne in mind that with the present system of multicellular watertight compartments these huge ships have proved themselves very unsafe in case of accident, due to the fact that they heel or list so suddenly in case of the filling of a few compartments with water that they are apt to sink more rapidly than the smaller ships and they almost immediately get into a position where it is impossible to work the boats on one side of the ship. This was shown in the disaster to the Titanic and in the sinking of the Lusitania.

No one would be more proud than the writer to see America take the lead in size of passenger ships on both the Atlantic and the Pacific, but we can see no advantage in building a ship of the same type a few feet longer, a few knots faster and a few tons heavier than the present giant liners. What we would like to see is a distinctive American design of hull, propelled by electric motors, the power for which is supplied by Diesel-driven generators. The space and weight saved by the installation of a power plant of this character could be used to provide more comfortable quarters for a larger number of passengers who could travel in comfort and safety at less expense than is possible in liners of the present type.

FIFTEEN YEARS AGO

The child Pacific Marine Review grew and waxed strong, and in October, 1904, at the tender age of six months it gave voice to the following:

"We beg to announce that owing to the expansion of our business we have removed to good centrally located offices, Nos. 37 and 38 in the Sullivan Building, First avenue, our telephone number remaining, as before, Main 5703. We have placed a desk in our office at the disposal of non-resident visitors and shall be pleased if any of our out-of-town friends who have occasion to visit this port will make use of this office and its facilities. Any letters and telegrams directed to our care will be carefully preserved and delivered."

In the same issue is reported the launching by Moran Brothers of the United States battleship Nebraska, which "marks a memorable epoch in the history of Seattle, and we hope presages a new era in the shipbuilding industry of this Coast."

ERRATA

The article entitled "Lubrication of Diesel Engines" on page 115 of Pacific Marine Review for September should have been credited to the technical department of the Vacuum Oil Company.

The caption under the upper illustration on page 93 of the September issue should have read, "Ships Outfitting at the Ogden Point Outfitting Plant of the Foundation Company of British Columbia."

We hereby apologize for the omission and the error.

Labor and Shipping

ORGANIZED labor all over the world seems to be in a state of great unrest. While political demagogues and all sorts of reformers are continually prating about the necessity for capital and labor getting onto a common ground, the practical hard facts of the last two years would seem to indicate that if capital gets onto any ground that labor has specified as being a basis of agreement, labor immediately jumps the fence onto another lot. In the United States this condition is reaching an acute stage, and in the opinion of many hard-headed business men, industrial conditions must soon come to a deadlock.

Shipping operators are particularly interested just now in the developments of the various phases of labor trouble in connection with the loading and unloading of ships at the terminals at both Atlantic and Pacific ports, and it is well that the plain facts of the controversy should be laid before our readers. Taking the waterfront conditions at San Francisco as a concrete case in point, we find that at the time the United States entered the war, April 6, 1917, there was in force a contract between the Unions of Longshoremen and Riggers and the Waterfront Employers' Union, which contract had been in force since August 1, 1916. Early in 1918 the riggers and stevedores demanded an increase in wages from the existing base rate of 55 cents an hour. After considerable negotiations the Waterfront Employers' Union granted the longshoremen an increase to a base rate of 70 cents an hour, together with concessions in working conditions. This rate was increased again on July 1, 1918, to 80 cents an hour. The 80-cent rate remained in effect until August 20, 1919, on which date the rate for stevedores was raised to the $1-an-hour basis, making a total increase of 100 per cent on the base rate in five years. The increase for handling certain specific commodities reaches as high as 127 per cent.

According to United States government statistics recently published in the National Labor Digest, the increase in living expenses to the American wage-earner between July, 1914, and July, 1919, amounted to 71 per cent. It is very easily figured, therefore, that the longshoremen's hourly wage has much greater buying power today than it had in July, 1914. During and since the war, the members of the local Longshoremen's Union have, in a great number of instances, arbitrarily and without warrant walked off the job, thereby delaying the great task of dispatching vessels much needed for the carriage of war supplies. Notwithstanding the present high wage, this union has again walked out on strike. This action was taken, according to their own records, by a vote which was in direct violation of their own constitution. After a majority vote by the members of the Union against this strike by secret ballot, a series of three rising votes were taken covering a period of several days. That this rising vote method was used for intimidation purposes is shown by the following resolution passed when the San Francisco Labor Council tried to bring about an adjustment in this union:

> "Resolved, That the San Francisco Labor Council be instructed either to help the Riggers' and Stevedores' Union in the way it wants to be helped, by declaring to the employers that the council will go to victory or defeat with the Riggers' and Stevedores' Union, or else that the Labor Council desist from spreading the propaganda of the employers by demanding that a secret vote be taken which would compel the union to announce just how many traitorous and weak-kneed individuals there are in our army."

Now we have no quarrel with unions in labor per se, but we do contend that all friends of labor should do everything that is in their power to remove from unionism those abuses of its power which, by making industrial progress impossible, will ultimately re-act upon labor itself. Anyone who is familiar, or has been familiar, with working conditions on the waterfront of San Francisco knows that the majority of work done there by the stevedores is not of such a nature as to demand any very great training, nor any great physical exertion, in comparison with some other lines of work, and in order that we may realize very concretely the compensation refused for such work by the Stevedores' Union, we have computed from the records of a number of steamship companies covering 118 individual cases of longshoremen during the period between August 23 and September 6, 1919. These records show that the average weekly wage of these 118 men amounted to $67.01¼. The highest wage per week in the cases examined was $85.75 and the compensations ranged from that down to $12. A number of the instances evidently being for work of two or three days.

The Stevedores' and Riggers' Union have recently, by resolution, announced their position to be that nothing short of partial ownership of the stevedore companies and partial share in dividends will be considered by them as justice. Why, if that is so, do not the Stevedores' and Riggers' Union incorporate into one big company and contract all the jobs on the waterfront? They could then get all the profits that were coming from their own labor and at the same time they would be responsible, so that steamship companies and others interested in the loading and unloading of freight could deal with them in the same way that other responsible bodies are dealt with. This would be doing collectively just what every individual does who comes up from the laboring stage to the ownership stage in any industry, and is the logical method of achieving what labor claims and we acknowledge to be its just due.

The waterfront of the shipbuilding plant of J. Coughlan & Sons, Vancouver, British Columbia

The Coughlan Plant

THE name of John Coughlan has been definitely associated with the industrial development of Vancouver and vicinity for nearly twenty years, and today the firm of J. Coughlan & Sons, which is composed of John Coughlin and three sons—John J., Stanley H., and Charles Coughlan—is one of the leaders in the industrial life of British Columbia. They were pioneers in the district in the manufacture of bricks, structural steel fabrication, and in general construction work, and the results of their foresight and ability as engineers may be seen in many of the large buildings and bridges of the Province.

With the great war calling on the resources of the Empire, all of the firm's energy and fighting spirit were given without stint toward aiding the government in those lines where the needs were greatest, and construction engineers became manufacturers of shells and builders of steel ships. The first was a comparatively simple transition, as a large part of the machinery was on hand, but the latter change was far more complicated, and a brief sketch of the manner in which the work was undertaken and the results achieved will doubtless be of interest to those identified with shipbuilding and ship operating.

In 1903 the firm found it necessary to concentrate its structural steel work in one plant and a location was chosen in the heart of Vancouver city within a short distance of tide water. The demand for work of this type was such that it was later found necessary to build an additional steel fabrication plant and the construction of this was started in the summer of 1912 and completed early in 1913. The second location was chosen on tide water but a few hundred yards from the original plant.

With the demand for merchant tonnage the firm conceived the idea of converting the number two, or tide water, plant into a steel shipyard, and a large share of the executive work in connection with organizing was directed by Mr. J. J. Coughlan, who has continued in this work of directing the activities of the company.

It was not only necessary to purchase additional ground, but a great deal of preliminary work had to be done before it was possible to lay the ways for the first ship. Practically the entire plant is built on piles and this work required considerable time. Four building ways for vessels up to 12,000 tons were constructed, and when this work was well in hand the firm obtained its first contract for one vessel of 8800 tons deadweight capacity, which contract was later supplemented by others until a total of fourteen vessels were contracted for by the British and Canadian governments, ten being of the 8800-ton type and four of 8100-ton deadweight capacity.

The need of ships was so great that it was impossible to wait for the completion of the overhead crane structures before starting the actual work of ship construction, so a temporary aerial cable system was installed. At the same time, rapid progress was being made in erecting the superstructure for the crane ways. This superstructure is of wooden construction with three crane ways over each slip, which arrangement gives a large range of elasticity of operation, it being possible to erect on the center line, port and starboard sides of a vessel simultaneously, and also gives a large combined lifting capacity for handling heavy units, such as bulkheads.

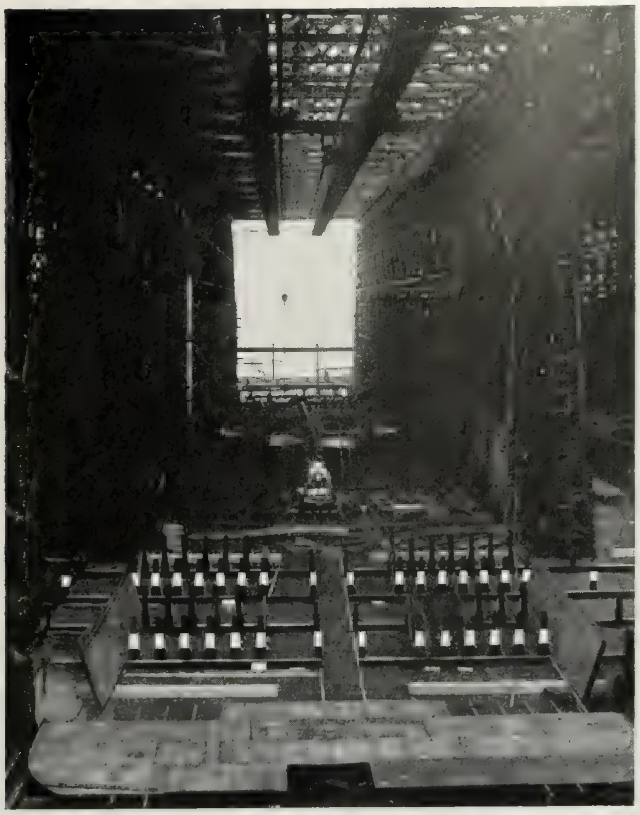
In addition to the original fabricating plant, three outfitting berths were dredged and equipped, and the usual shops required in the shipbuilding industry were constructed, including a general office building, mold loft, power house, machine shop, general stores building, wood-working, electrical, pipe and rigging shops, and a boiler manufacturing plant.

In May, 1918, with the third vessel ready for launching and the fourth within a few weeks of that state, the firm received a setback in its program through the destruction by fire of the boiler manufacturing plant and a large section of the superstructure over the ways.

The work of reconstruction was immediately undertaken, but the boiler shop was not rebuilt, as there were outside boiler manufacturing facilities in the immediate vicinity.

The building berths as finally completed are, from

The Morning after the Fire at the Coughlan plant



View of one of the shipbuilding ways at the Coughlan plant. Note at the side the three-story service station in the foreground, the arrangement of plate racks and the assembly center, also arrangement of three cranes spanning the ways.

a standpoint of design, construction and utility, among the best on the Pacific Coast. Assembly centers for bulkhead and other similar work have been established at each end of the building ways and suitable storage racks for plates and shapes awaiting erection are located at the forward end of the ways.

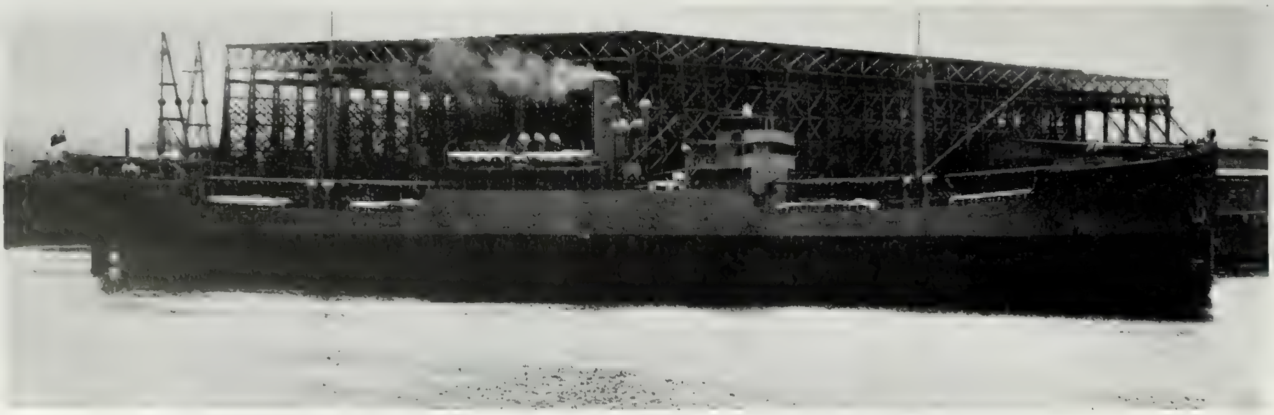
Planned by experienced men, the plant as a whole is very compact, which condition makes for better supervision as well as a direct reduction in material-handling charges. In addition, the routing of material has been very carefully studied from the time the material enters the yard until it is a finished product, and practically all back-tracking has been eliminated.

In the development of the supervisory organization, preference has been given to men who are aggressive, optimistic, and inclined by disposition and training to enjoy working in co-operation and harmony with each other. Practically every man in the organization has an enviable record for past achievements in shipbuilding lines, and the staff as a whole is probably as well advanced as any on the continent from a standpoint of functional organization.

The central planning department, which is supervised by the assistant works manager, controls the routing of all work and the issuing of all shop orders from a standpoint of scheduling. Through this central agency the activities of all departments and all shops are thoroughly co-ordinated. The schedules on which the orders are based are the direct results of detailed study on the part of the management (including the technical and operating heads), and the capacities of each shop, both as to machinery and man power, are definitely balanced against those of other shops and contract requirements.

Every effort has been made to conserve labor through the development of mechanical methods to eliminate useless handling of material and other non-productive work, and the main fabricating shop is a first-class example of the results obtained in this direction. In order to insure the maximum production and the maintenance of the highest standard for quality, the material which passes through the fabricating shop has been divided into classes from a standpoint of mechanical operations performed and the different handling facilities required for each class. Throughout the shop inclined roller conveyors are used wherever possible between machines or operations in order to eliminate the necessity of moving material from place to place by crane or truck. These roller conveyors also insure the immediate transfer of material, and as a storage place is provided at the end of the rollers, the work ahead of each operating center is immediately available and the operating time of the various machines is conserved. The machines and rollers are placed at such heights that the material does not need to be lifted or lowered and the transfer is easily and quickly made.

All narrow plates are put through one of the main bays of the shop, where the equipment from the raw material storage to the final delivery point has been especially located and rigged for this class of work. There is a similar arrangement for the handling of wide plates which ordinarily have to be picked up and turned around for punching both edges. In this bay two Lishom table punches are located, adjoining and in line with each other, but facing in opposite directions, and the plate rolls through from one table to the next without turning. By proper team work on the part of the punch operators a considerable increase has been made in



Eighty-eight hundred ton freighter built at the Coughlan plant for the Imperial Munitions Board production. All tools, both hand and machine, have been carefully studied and standardized in order to give maximum results both in quality and output.

The employes throughout the plant fully realize that the future of the industry is dependent upon the creditable record from a standpoint of quality, speed, and cost of production. They have shown a fine spirit of co-operation with the management and are enthusiastic in supporting those changes which are made from time to time to develop the production capacity of the yard. Many of the changes are direct results of suggestions from the operating employes.

In order to insure a high standard of product and impartial yard inspection, the inspection function has been placed with the naval architect and the chief engineer of the plant, which plan has been found to work out with satisfactory results as a means of expediting construction and improving the quality of the workmanship.

The assembly centers have been laid out for each class of assembly work. These centers are equipped to the maximum in order to permit the men to work under satisfactory shop conditions and thus conserve time and energy, which is usually not possible in cramped quarters aboard the ship during construction. All assembly and storage centers are identified by symbol numbers and orders issued from the planning department give not only the instructions as to fabrication or machining, but also the routing of the material through the shops to the assembly centers and the storage racks. A careful check is kept on the progress of work in order to insure that all items for any given assembly are on hand at the proper time.

An Interesting Salvage Operation

On August 28, 1917, the British Columbia, a steel coasting steamer with a cargo capacity of 1000 tons, capsized at the loading dock of the British Columbia Mills Company in Vancouver harbor. The cause of the accident was the deckload and the error in thinking the tanks had been pumped out. When sinking she fell over against the dock, carried away her masts and smoke stack and went down in thirty-five feet of water. The ship lay broadside at an angle of 86 degrees. She rested diagonal to the dock, her bows twenty-five feet and her stern fifteen feet out of the water. When she sank her deckload floated off, but her hold was filled with a coal cargo.

On September 10 the contract to float the vessel was let to the Vancouver Dredging & Salvage Company.

The first thing was to develop a plan to right her; then plans were made for floating. The company's engineer was called in, and after determining the weight of the hull and cargo as it lay, less displacement, a scheme was evolved of first righting the ship and then removing her to a point 600 feet away, where she could be pumped out at low water.

The general plan as finally determined was to mark the ship in three equal parts and place across the deck at these points three heavy 24 by 30 fir timbers well secured at the lower ends and with shoes fitted to the upper ends to receive the ends of rams extending into the dock at right angles to the ship's deck. The dock was reinforced to withstand the strain of 300-ton jacks which were to be used on the inshore ends of the rams. Two pairs of piles were driven opposite each of the heavy cross-timbers extending across the deck. The ends of the rams, which were also 24 by 30 fir timbers, were cross-bolted to prevent splitting

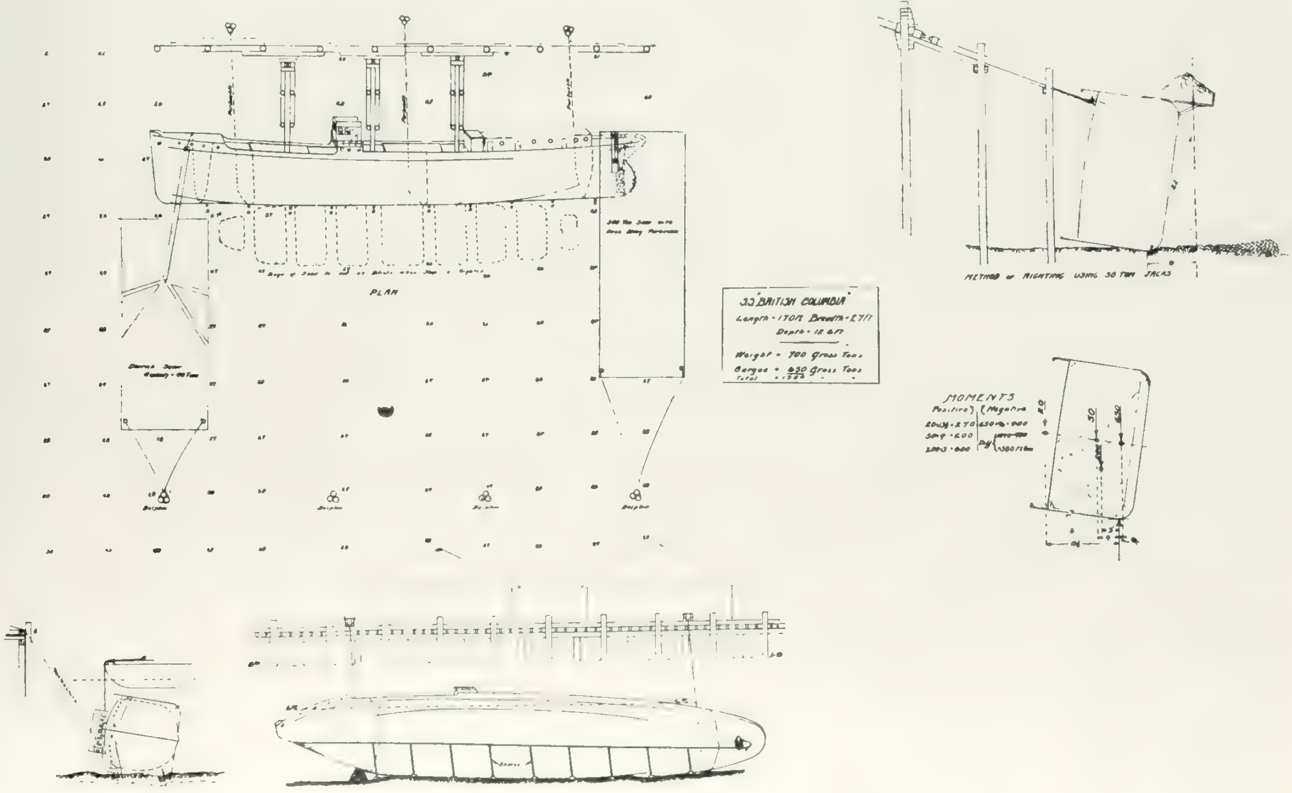
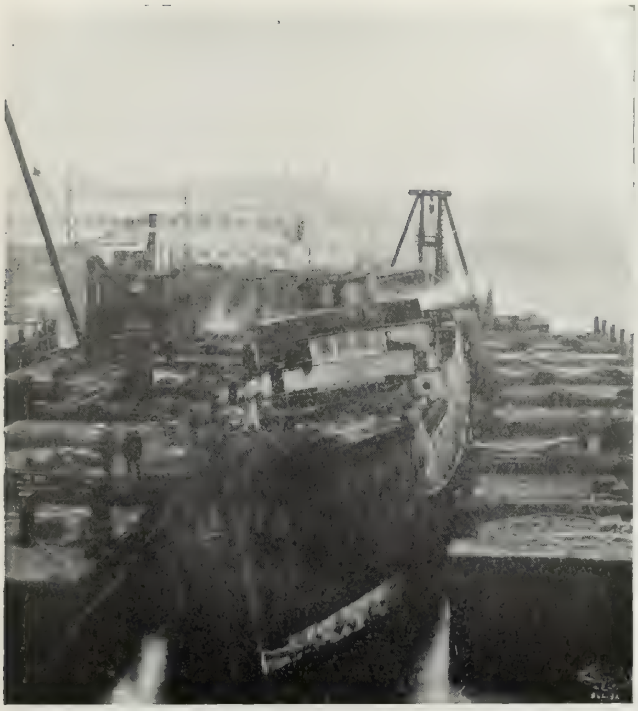


Diagram showing method of righting the steamer British Columbia



The British Columbia suspended between scows ready for beaching

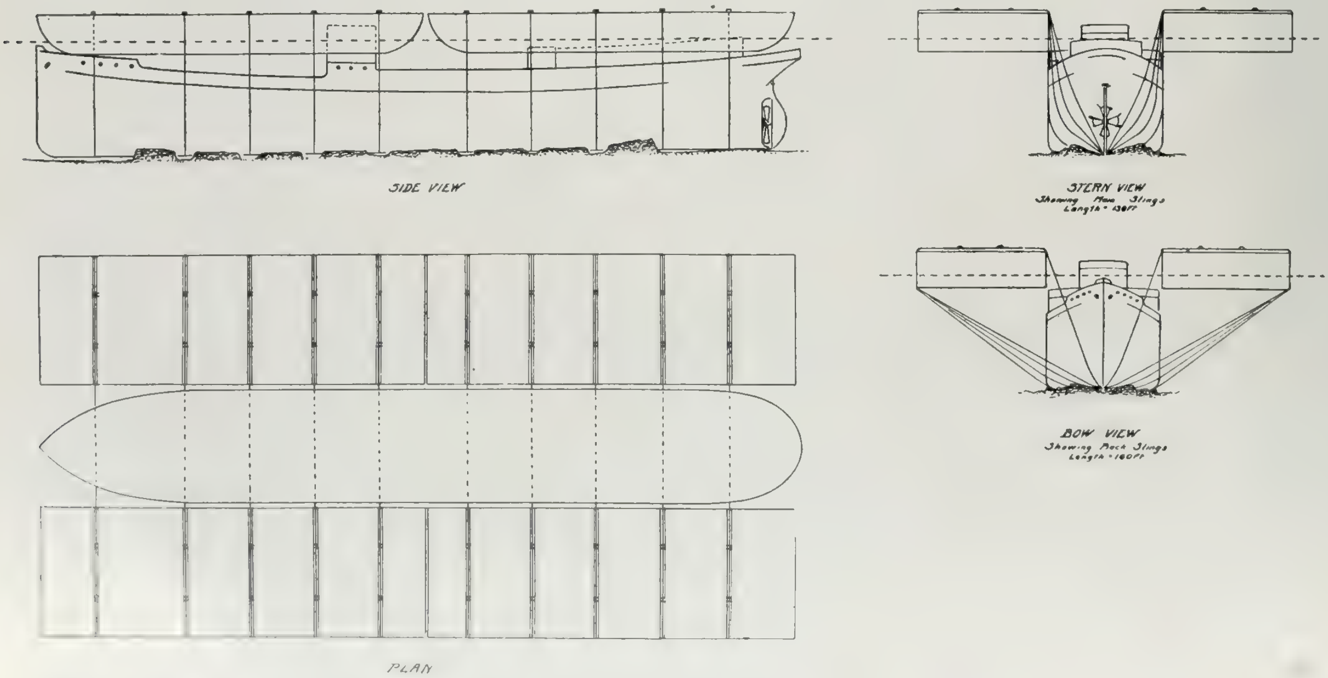
and were protected at the inner end by steel plates. The outer end, fitting into the shoe, was rounded off sufficiently to permit the ram to accommodate itself to the different angle of the ship as she was slowly pushed over into normal position.

At a point about sixty feet from the bow, heavy timbers were extended along the side of the vessel to a considerable distance outside the bilge, the inner ends, which extended over the bulwark, being lashed to bitts on the lee side. Platforms were built on these and heavy counter-balance applied to overcome the effect of the ship's machinery.

The next step was to pass three heavy steel cables completely around the hull and back under the dock a distance of 200 feet. These were so placed as to correspond with the heavy timbers at right angles to the deck line. The cables were drawn taut with jack-screws and formed the parbuckle or hinge to hold the vessel in position while the rams forced her over, lessening the angle as the work progressed. In addition to the rams and counter-balances, four derrick scows were used.

In the calculations made to find the necessary power, the basis could only be made from the point of the vessel lying on a solid foundation. As she was lying on a soft clay bottom covered with great boulders, it was found necessary to fill in with between 5000 and 6000 cubic yards of sand to prevent damage when righting. But, it is pointed out, this would alter all calculations as to the necessary amount of power owing to the fact that the vessel would roll a heavy wave under her bilge as the operation proceeded. To arrive at the difference between the actual power necessary and that shown by the calculations, a model was made and the weights of hull and machinery distributed in as nearly the same manner as in the vessel herself, due care being taken to allow for displacement of hull and cargo. This model was made on a scale of one ounce to the ton. It was placed on a large table and imbedded in sand in as nearly as possible the same position as the vessel at the dock. A pair of small scales were then used in measuring the required strain to right the ship. A mean of ten experiments taken and compared with the calculations showed a difference of about 30 per cent between the calculations and the actual power required.

The work which followed was very successful. In measuring the strains required the gauges in the hydraulic jacks and the displacement of the scows under stress corresponded very closely to the experiment carried out on the table. The actual work was begun about September 15. The vessel was righted, her cargo discharged with clamshell dredges, and she was slung between two scows, as shown in illustration, carried 600 feet and grounded. The following morning, October 31, she was floated. There was not a hitch of any kind during the operation, nor any variation whatever from the original plans.



Diagrammatic plan showing method of raising and suspending the wreck of the British Columbia between scows

The World's Mercantile Marine

By Dr. Toshinobu Suda, D. E.
Vice-President of the Nippon Yusen Kaisha

THE great war has exercised a truly revolutionary influence on the world's commerce and finance, especially on shipping. The mercantile marine of the Central European powers has disappeared, and that of the European Allies and neutrals noticeably dwindled, while America has made striking progress in shipping within the last two years. Japan also has had her merchant fleet considerably augmented, but it is a "pebble on the beach" compared with the advance made in America. On the whole, while on the one hand there exists at present a serious shortage of tonnage in view of the world's requirements, there is, on the other hand, an unprecedented number of steamers being built, or to be soon built, in America and Great Britain, thus, apparently, creating many difficult problems for those connected with the shipping industry, political economists and other thinkers, as to the future of the world's shipping. In view of this situation, may I be permitted a few words with special reference to the trade on the Pacific?

The abnormal condition of the shipping market, created by the war, may be considered as practically over; we are now in a transition period, and looking forward to the time when the freight market will be governed by the natural law of supply and demand, i. e., by the amount of tonnage to be supplied and of commercial cargo to be offered for transportation. But, meanwhile, we are still facing some abnormalities.

Some Striking Figures

At the time of the outbreak of the great war, the world's merchant tonnage totalled 45,000,000 tons, and till then the annual rate of its net increase was about 5 per cent, or, say, 2,250,000 tons. Therefore, if the war had not broken out, the total tonnage of the world's merchant shipping should have been increased by about 10,000,000 tons by the present time, and should have reached 55,000,000 tons, which, statistically speaking, would be required to meet the world's demand had peace continued.

Now, deducting the loss sustained, and adding the tonnage newly constructed during the war, the total figure at the beginning of this year was 42,500,000 tons, viz., 2,500,000 tons less than at the outbreak of the war, or 12,500,000 tons less than what the world should have possessed under normal conditions of progress. It will thus be seen that in order to adequately meet the normal requirements of tonnage for the peaceful commerce of the world, a large number of steamers will still have to be built. There is another important fact which should not be overlooked. It is that the bulk of tonnage destroyed during the war consisted of large ocean-going vessels, while the vessels newly built comprise a considerable percentage of smaller ones.

Reasons for Optimism

Turning to the actual state of the world's carrying trade, we find that, notwithstanding the practical disappearance of warlike material as cargo and the comparative rapidity of navigation through the restoration to safety of the trade routes, there still exists a dearth of tonnage, and it is difficult to foretell when the hithero belligerent countries of Europe can be adequately supplied with necessaries of life and other materials of immediate need, not to speak of the time when the material for the restoration of devastated lands, industrial plants and dwellings, involving a quantity of incalculable magnitude, can be at hand for practical use. It can thus easily be realized how eagerly supplies of tonnage are being sought after the world over, and that the pressing demand will continue for a considerable time to come, any fear of the excess of tonnage over demand being quite unwarranted by the facts of the situation.

World's Commerce Will Grow

Now, with regard to the point forming a subject of frequent discussion, namely, whether the world's carrying trade will further grow, or will be retarded, as the result of the great war, I am inclined to be optimistic. Let me give my reasons. The erstwhile German and Austrian empires and Russia having entirely lost their extensive foreign trade, with no sign of early recovery in sight, the immense quantity of natural and manufactured products supplied by these countries before the war to their near neighbors—Great Britain, France, Belgium, Italy, etc.—will have to be looked for in regions distant overseas, namely, the United States, Canada, South America, Australia and the Far East, thus requiring far greater tonnage than hitherto for satisfying these European wants. And with the undoubted further development of South American, South African, Australian and Far Eastern, especially Chinese and other hitherto uncultivated markets, I have every reason to believe that with the gradual resumption of normal conditions the demand for tonnage will not only be commensurate with that of pre-war days, but will very likely show a noticeable excess.

It will, therefore, be seen that there is no cause for pessimism over the future of the shipping trade, and, further, that the often heard prognostications about the coming competition in the ocean trade are beside the mark. Some writers in Europe, especially in Great Britain, appear to put much stress on the sudden and immense strides which are being made in the United States in shipbuilding, and express fear of severe competition, but I am of the opinion that such views are unjustified. If those writers, instead of confining their observations to the increase of American shipping particularly, critically examined the tendency of international trade and the probable future supply of tonnage of the world as a whole, they would find no ground for fear of anything like an international rate war on a grand scale, unless, of course, state interference, such as the shipping control system of various countries during the war, should be reintroduced.

Japan and America

Let us now look into the commercial relations between America and Japan. During the year preceding the outbreak of the great war, exports from Japan to America amounted to $100,000,000, which, during 1918, had jumped up to $265,000,000, while exports from America to Japan, which before the war amounted only to $50,000,000, showed in 1918 the enormous figure of $315,000,000—a tremendous growth, being 150 per cent on exports to, and 530 per cent on imports from, America. Such a remarkable increase in American exports to Japan has no parallel in the history of her trade with any other country! While Japan sells to America a fair quantity of raw silk, tea, vegetable and other oils, porcelain, etc., she buys from America an enormous quantity of raw cotton, steel and other metal products, machinery, petroleum, etc. The recent increase in Japan's purchases of American cotton, steel and machinery is simply breaking all records, with prospects of further developments, thus ensuring closer ties in the relations of both countries. This, coupled with the further increase in American trade with other parts of the Far East, especially China, should dispose of the often entertained fear of shipping competition on the Pacific. It is to be hoped that the merchants and manufacturers will make greater efforts than ever to secure the still further growth of this great trade, and that the shipowners on both sides will co-operate with each other with this important aim in view, thus to enhance the prosperity and happiness of the nations.

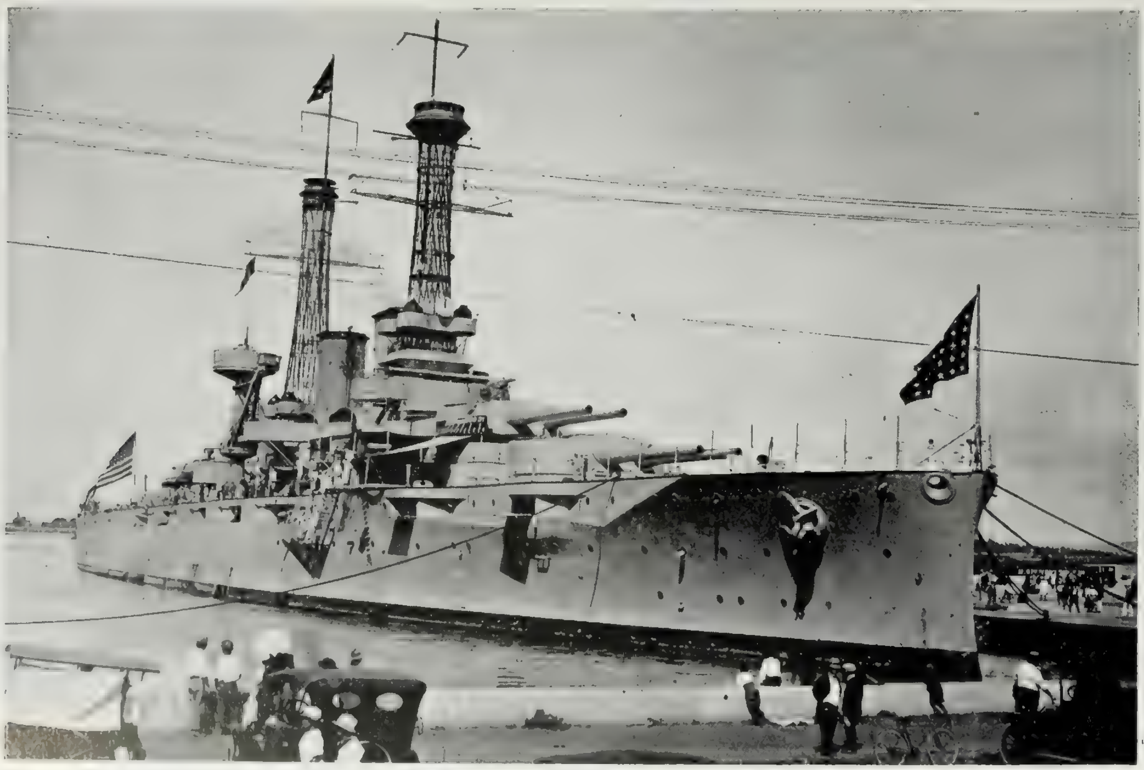
The Nippon Yusen Kaisha, ever since it inaugurated its regular service between the Far East and Puget Sound, twenty-two years ago, has contributed an important share in this record-breaking growth of trade, and has taken its part in the extraordinary development of Seattle, from a small port to a great commercial center with an annual trade of $580,000,000, the increase in the amount within the last ten years being at the almost fabulous rate of 1100 per cent. The Nippon Yusen Kaisha has thus actually co-operated in the progress of the trade and it is to be hoped that it will be given an opportunity to long continue to do so, with increased energy and intensified effort, in the interest of the peaceful progress and welfare of mankind at large.

PASSENGER SERVICE FROM HONOLULU

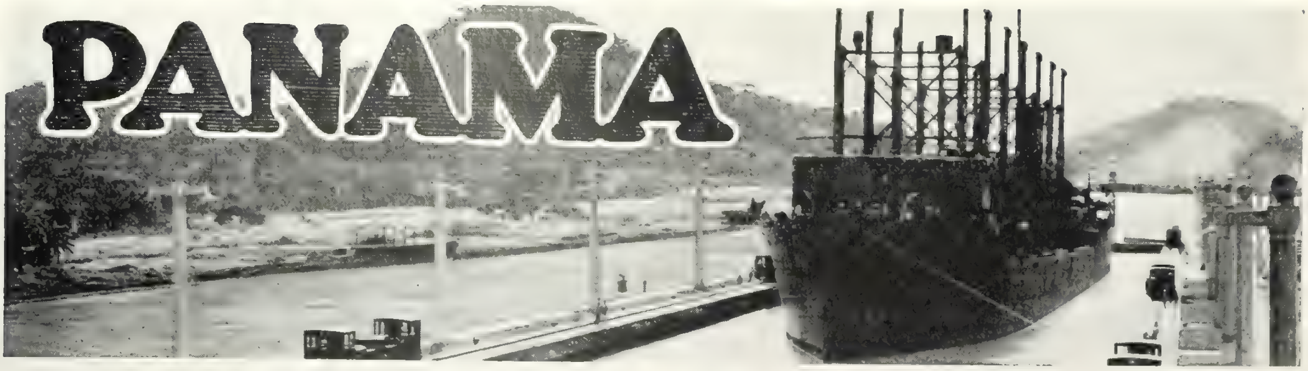
HAWAII shipping men are centering their interest this month upon the controversy now going on over the question of exemption for these islands of the coastwise suspension law, repeal of which is being considered in Congress. The attitude of Congressman Julius Kahn of California, that the $200 penalty should be put in force again, and also that commercial travel should be permitted on United States army transports, is sharply challenged by the Honolulu Chamber of Commerce, and in all quarters the statement of Kahn to the effect that Hawaiians should be willing to pay the $200 bonus for traveling on foreign-built ships between here and the mainland in return for the privilege of being in the Union, has aroused resentment.

The Chamber of Commerce is desirous that the penalty for traveling on foreign-built steamers be fixed at $40, believing this will be ample to protect American coastwise shipping and at the same time allow passengers anxious to depart hurriedly an opportunity to use the foreign vessels at not too great expense. The middle of September the Chamber of Commerce sent a message to George McK. McClellan, its Washington representative, informing him that Honolulu is desirous of overcoming the opposition of Kahn and California interests to the $40 proviso, as otherwise passenger traffic between Hawaii and the coast would be detrimentally curtailed. The chamber further stated that some compromise would be acceptable. If the coastwise suspension can be extended two years or until the former Matson vessels and new ones contemplated are regularly on the run, this will be considered satisfactory.

A glowing future for Hawaii is predicted by R. H. Cooper, traffic manager of the Shipping Board for the Pacific Coast, who spoke to the members of the Honolulu Ad Club, September 11.



United States battleship New York docked at Pier No. 8, Honolulu. The New York was the first super-dreadnaught to tie up to a dock in Honolulu Harbor



THE business of the Panama Canal during the last fiscal year exceeded that done during the previous year, ending June 30, 1918, in spite of the unusual conditions brought about by the war. During the fiscal year ending June 30, 1918, a total of 6,934,565 tons of cargo, carried on 2139 ships, passed through the canal, and during the fiscal year ending June 30, 1919, approximately 7,589,323 tons, on 2089 ships, were handled between the two oceans.

Since the beginning of the operation of the Panama Canal in August, 1914, and up to June 30, 1919, 11,644 ships have passed through the canal, carrying cargo aggregating 29,862,971 tons. The traffic from the Pacific to the Atlantic was heaviest, aggregating 4296 vessels with 17,812,117 tons of cargo as compared with 3674 vessels and 12,050,854 tons of cargo in the other direction.

German Ships in Chilean Ports

The Pacific Steam Navigation Company recently made a survey of the German ships, which had taken refuge in ports of Chile during the war, in order to report the best way of undertaking the necessary repairs, so that the British government could use them as soon as possible for the transport of nitrate to Europe. It appears that nearly all the vessels can be repaired and the fleet will represent a total of 242,742 tons capacity. The report shows the ships interned in the various ports and the damage done them by their crews.

In Pisagua it was found that the steamers Absinnia, Lirigia and Ossoris had their engines so badly damaged that it will be necessary to replace them entirely before the ships can be used. The schooners Garla and Ostara are in good condition and ready for immediate use.

In Iquique only the boilers of the two steamers Holstein and Santa Teresa are in good condition, the rest of the engines being entirely destroyed. The schooners Edmund, Olympia, Passat, Herbert and Lisbeth have only their rudders dismantled and can easily be made serviceable.

In Caleta Buena the steamer Santa Maria has had her engines completely destroyed and they cannot even be be replaced in part. The sailing ships Peiho and Herzogin and Sophie are ready for service at any time.

In Antofagasta the steamers Thessalia, Hathor and Karnak have all been seriously damaged, but it would be possible to repair their main engines, utilizing the material remaining. This work would demand a big outlay, but it would be repaid by the value of the ships. Notwithstanding all the material at hand the work would take at least five months. The steamer Alda is in good condition and only requires scraping her hull to be ready for sea again. The following schooners are undamaged and ready for service: Calr, Flottbeck, Henriette, Marie, Oceana, Osterbeck and Tarpenbeck.

The schooner Herzgovina Cecelia, with plenty of cargo space, has her hull, masts, rigging and steering gear in good condition and needs only a little work to be ready for the sea. The schooner Niobe, also in the port of Coquimbo, will require only minor repairs.

In Talcahuana it was found that the steamer Nitokris suffered only slight damage, which can be easily repaired in Chile, and the Memphis was in good condition. The engines of the Berengar had been totally destroyed and repairs to that ship will be costly. The sailing vessels Mimi and Magdalena Vinen were in good condition.

The steamers Sebara, Rodolphis, Sissac and Rameses are anchored in Corral, all of which are damaged to such an extent that it will take from four to six months to complete the repairs. The frigate Jersbach is in need of some small repairs to the rigging, sails and hull, that can be done cheaply in a short time.

There were five steamers in Punta Arenas, the Amasis, Radames, Tacuman, Turpin and Montevideo, all of which have their engines destroyed, some with their valves and cylinders smashed, and generally in such a condition that it would be difficult to repair them in Chile.

Of course, the largest number of ships were interned in Valparaiso, the principal port. There the steamer Santa Rita had its engines damaged until they were rendered useless and part of them thrown overboard. The steamer Santa Inez had some portions of her machinery damaged, but can be easily repaired in Chile.

The steamer Negada has her boilers in good condition, but other vital parts have been so completely destroyed that it would take more than a year to make necessary repairs. The steamers, Yorck, Gotha, Gottingen, Riol, and Westfalen have their machinery rendered useless, but the repairs can be made in Chile at a comparatively light cost.

The steamers Tanis and Sais could have been repaired easily in Chile, but they were destroyed recently in a storm. The sailing vessels Petchili, John and Pelikan were also wrecked in the same storm.

The other sailing vessels in the port were the Claus, Albertus Vinnen, Pinnas, Oliva, Obortrita, Isebeck, J. C. Vinnen, Pommern, Pecking, Chistel Vinnen, Potosi and Veglinde. All of these vessels were so badly damaged that before they can put to sea it will be necessary to renew a great part of their rigging and all their steering gear. In the sailing ships the work of destruction followed out the same instructions, since it is identical in each case.

The following vessels were interned in the following ports: Nereida in Tocopilla; the Blankenesse and Nereus in Charanal; the Seefater in Gatico; the Louis Pasteur, Leni, Onda, Gustav and Reigel in Mejillones; the Hackfeld, Ophelia, Alexander Isenburg and Nail in Caleta Coloso; the Helios, Gluckstadt, Nesaia, Winterhude and Mozart in Taltal; and the Bertold Vinnen and Omaha in Caldera. All of the foregoing sailing vessels are in good condition and ready for useful service at once.

It is possible that the vessels which cannot be repaired in Chile will be sent to the Panama Canal marine shops, which made a splendid record in rehabilitating the German ships that were interned in Peruvian ports, and are the nearest shops capable of making the difficult repairs.

S. S. Cartagena Disabled

The S. S. Cartagena was towed into the port of Cristobal on July 10 in a badly disabled condition by the S. S. Cacique and immediately placed in the dry dock at the marine shops at the Atlantic entrance to the Canal, where temporary repairs were made. This ship has an interesting history, as it was originally built in Italy for the Sultan of Morocco for his private yacht. Later it was sold to the government of Colombia and fitted out as an armed cruiser. For a number of years it lay neglected on the beach at Cartagena, Colombia, and during the war when anything that would float was valuable it was purchased by Caracanda Brothers of New York and placed in the merchant service. Originally the ship was beautifully fitted, even to luxurious quarters for the sultan's harem.

The Cartagena cleared from New York for Brazilian ports via Santiago, Cuba, and Cristobal, Canal Zone, and from the beginning of the voyage had trouble with boilers and pumps. Repairs were made at Santiago, but the trouble recurred after leaving that port. Ten days out on the way from Santiago to Cristobal, with engines and pumps disabled and leaking until she had made ten feet of water, it was impossible, apparently, to keep her afloat by bailing water and discharging cargo, and everything was made ready to abandon ship and the first life boat had been lowered when the Cacique hove in sight and offered a tow to port. The ship carried a cargo of dynamite and TNT. After arrival at Cristobal repairs to the hull were made sufficient to keep the vessel afloat at her moorings in the harbor there. Later the salvors libeled the ship for salvage and she was taken over by the United States Marshal for the Canal Zone, pending the hearing of the case in the District Court.

Charges for Special Customs Service

In order to facilitate the discharge of passengers from vessels after the usual working hours at the terminal ports of the Canal, effective September 1, the landing of passengers up to 10 p. m. was authorized by the government, providing the payment of overtime for the customs inspectors engaged was made by the ship in question. The charge is made on the basis of $5 for each customs inspector engaged between the hours of 6 p. m. and 11 p. m., or fraction thereof, on any working day, and $10 for each inspector engaged after 11 p. m. and for service on Sundays and holidays, a charge of $10 is made for each inspector engaged between the hours of 6 a. m. and 6 p. m. and 6 p. m. and 11 p. m.

This arrangement will prove of great advantage to passenger ships and will save them both time and money. It is in line with the policy of the Canal to give shipping every possible service both in transit and at the terminal ports. No customs duties are collected in the Canal Zone, but the Canal Zone inspectors protect the revenues of the government of Panama under special treaty provisions. There is no restriction on the discharge of cargo at the Canal Zone and a vessel may begin to discharge as soon as docked at any time of the day or night. Cargo is neither discharged nor loaded under the supervision of the customs authorities.

A GRAIN OF SALT

Of all the wimming doubly blest
The sailor's wife's the happiest,
For all she does is stay to home
And knit and darn—and let 'im roam.

Of all the husbands on the earth
The sailor has the finest berth,
For in 'is cabin he can sit
And sail and sail—and let 'er knit.
—Wallace Irwin.

United States Submarine C-3 in the Panama Canal

Panorama of Pearl Harbor

New Naval Base at Pearl Harbor

By G. Campbell Arnoux

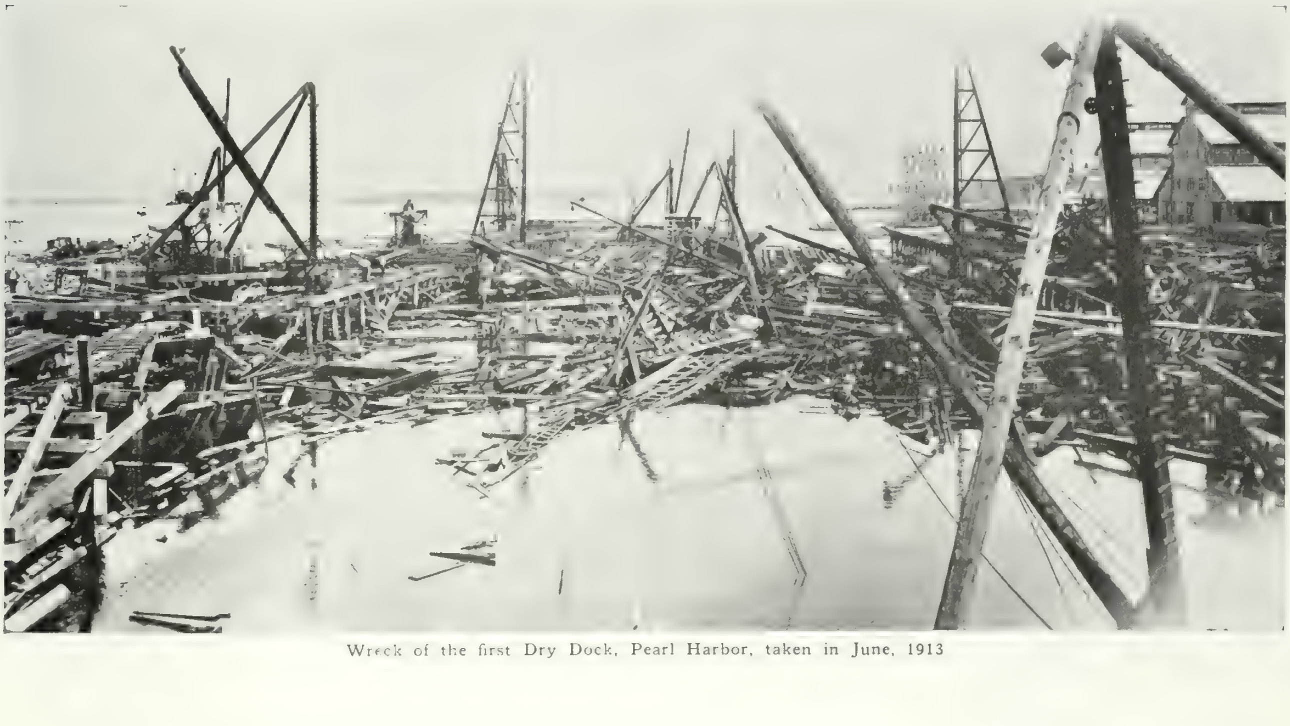
FAR out in the strategic center of the Pacific was completed this month a mighty naval establishment, second only to the Panama Canal in importance to the security of the West, and co-ordinating with the Canal to give to the United States a pre-eminent position on the western ocean—the Pearl Harbor Dry Dock and Navy Yard. With the arrival on August 20 of Secretary of the Navy Josephus Daniels, and his formal inspection of the great structure, the last work was accomplished and the big dock stands ready for its business of caring for the United States fleet.

Pearl Harbor may appropriately be called the marine Verdun of the Pacific. The mere fact of its existence has served to move the first line of America's defense of its western coast line a full 2100 miles toward the Far East and away from San Francisco and the other port cities. By the advantage it gives the United States, it acts as the best insurance for peace in the West that could well be desired. The arrival of the Pacific fleet went far to consolidate the country's fighting power for defense of the long stretches of shore line and its insular possessions, but without Pearl Harbor, its great dock, immense storehouses for ammunition and supplies of all kinds, the fleet would be sadly hampered by being forced to remain comparatively dependent upon its mainland bases.

Thus Pearl Harbor stands today a success after a decade of uncertainty and toil, a grim message in ponderous steel and big guns to the rest of the world that "they shall not pass" should future events bring with them an aggression upon America's western shores. In the massive locks of the harbor has been turned, so naval men say, the key to the Pacific, and like a far-flung out-post, Hawaii, with its chain of fortifications and the largest dry dock and yard on the entire Pacific, offers a salient for defense that should make the people back on the mainland sleep easier.

The last stroke of the carpenter's hammer resounded and the last block of cement was molded some days before the arrival of Mr. Daniels and the fleet, and all that remained in the interim was the cleaning up of the premises and marking time for the big celebration that was to be in itself an epoch-marking event in United States naval history.

Back in the early summer of 1846 there sailed into the harbor of Honolulu the historic frigate Constitution—"Old Ironsides." On board was a young lieutenant, L. W. Curtis, to whose far-seeing vision must be credited the first grasp of the possibilities of Pearl Harbor as a naval citadel. Somewhere in



Wreck of the first Dry Dock, Pearl Harbor, taken in June, 1913

150 ton floating Pontoon Crane with two concrete head blocks for Dry Dock

the musty archives of the Territory may still be found his report to the King with recommendations that Pearl Harbor was the site pre-eminent for fortifications. "Allow me to call your attention to the importance of Pearl Harbor," he wrote; "its perfect security, the excellence of its water, the perfect ease with which it could be made one of the finest places in the Islands. While the harbor is clearing out, fortifications could be built, troops could be drilled and storehouses erected. The money to be expended would be but a feather in comparison with the almost incomparable amount of wealth that will result upon the completion of these works."

The cost of the dock now stands at $4,512,466.29, and the warehouses, ammunition dumps, submarine bases, and the like, run into millions more, but the cost is truly but "a feather" in comparison with the benefits gained.

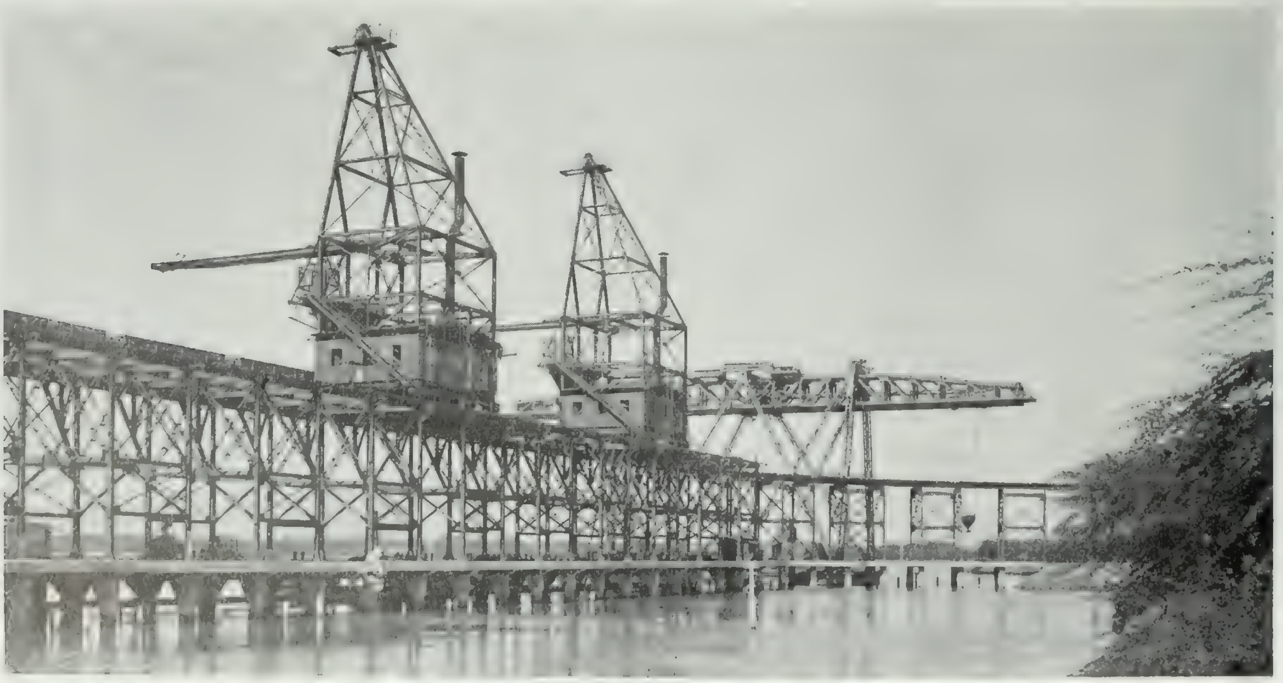
The words of the lieutenant fell on fruitful ground, and were carried out almost to the letter, although not by the Hawaiian government. In 1876, American naval authorities, realizing the great value of Pearl Harbor, obtained possession of it from the King. For a few years the development lay dormant, but in 1901, just fifty-five years after the prediction of Lieutenant Curtis, actual preliminary work began. That work has gone forward ever since, with now and then a delay, but always being pushed slowly and steadily through to completion, until today the job is done and years of effort are crowned with success.

With the draining of the dry dock last March, shortly before it was declared finished, occurred a picturesque incident of the old Pagan life of the past.

When the site for the dock was first selected, years ago, and the big dredgers began eating out the coral with their steel-tipped fangs, ancient Hawaiians shook their heads and muttered dire predictions of disaster that would surely overtake the builders. For centuries, they said, the dreaded and powerful shark-god had made his lair in the harbor and his wrath would know no bounds when he was disturbed in his immemorial possessions.

Four years after the work was started an attempt was made to pump out a coffer dam and the dock "blew up" from hydrostatic pressure from beneath. The old-timers shook their heads and said: "I told you so."

Last March, as the big dock was being pumped out for its final test, extreme precautions to prevent accident were being taken, and supplications were made by the old Hawaiian residents to appease the god's anger. A white chicken and pig were selected and placed apart from the other pigs



General view of the Coaling Tower

and chickens, and the following day were sacrificed with prayer to the dread god of the shark. This, they then predicted, might prevent accident.

When the dock was finally empty of water and the operation was declared an entire success, the dead body of a great man-eating shark lay stretched out on the bottom. The sway of the powerful shark-god thus gave way to the power of the forty-eight stars and all will be well with the dock, according to the belief of the devout old natives.

Dredging on the dock was first commenced in 1909 and by 1913 a coffer dam had been constructed to aid in the work. The dredging out of the basin was done entirely under water. The first disaster in the construction came at this time, when the dock collapsed. In pumping out the coffer dam the hydrostatic pressure from underneath upheaved the whole mass helter skelter, tearing the wooden work into match wood, breaking the long piles with which the floor had been reinforced, and thus destroying in a few moments the painstaking work of years.

Nothing daunted by the disaster, the next two years were spent in developing ways to meet this unexpected difficulty, and finally, in January, 1915, construction began once more. This time a fleet of sixteen pontoons was employed, each one being practically a big box of concrete containing 3000 yards of material. Each pontoon was floated out into the dock and lowered to the bottom. They rest on a rock fill over a foundation of piling.

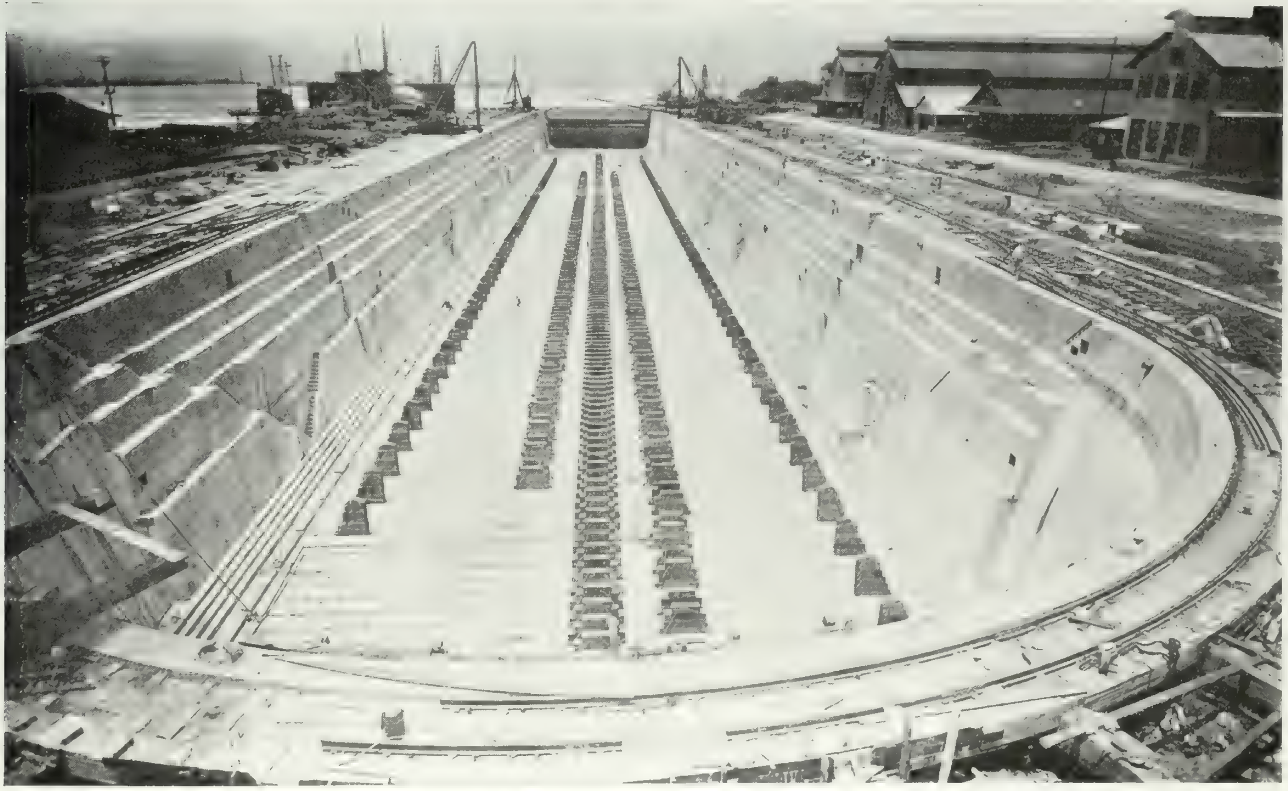
The great scope of the dry dock construction is apparent from the fact that the curved inner end of the dock had to be treated separately. Huge monoliths of concrete, each one weighing 150 tons, were swung into position by the powerful naval crane and then locked into their places.

The dimensions of the new dry dock, among the largest in the world, stand at 1001 feet in length in the clear from head to side of caisson, 32½ feet in depth from mean high water to keel blocks; 114 feet wide at the bottom, and 138 feet wide at the coping or upper margin.

The dock is surrounded by copings on which railroad tracks are laid and operating cranes will be part of the regular equipment. The well pump, located at the left of the entrance, is an engineering marvel. The excavation is 601½ feet deep, 96 feet long and 45 feet wide. Looking down into its darkened depths is like looking over the parapet of the Woolworth building. Owing to the depth of the excavation which was filled with water, the work of putting in the concrete walls and bottoms had to be done by means of a floating dock. The combined structure was floated off the dock and submerged to its proper position; the side walls were next poured into the molds; next the bottom and sides were sealed with 4600 cubic yards of concrete, 225,000 pounds of reinforcement, and 17,000 pounds of structural steel.

The well is now driven with four 54-inch electric pumps and two 15-inch pumps. Three emptying conduits lead out from the dock, each one 6 feet square; the dock is filled by three intake conduits 4½ feet by 6 feet. These great pumps will empty the dock in two hours' time, and after a warship is cleaned and ready for sea, the dock can be filled again in the same period.

No story of the Pearl Harbor dry dock would be complete without mention of Francis B. Smith, the man on the job, who has been hard at work on the project from the time the first scoop full of rock was taken from the dock site until it was declared complete and ready for business. Mr. Smith has dedicated ten years of his life to welding the great dry dock into shape, and his reputation as a builder of big things will gain added luster through his perseverance in the face of difficulties which made the construction take a full decade instead of the five years originally estimated for the work. He stayed with the game and finally overcame all the impediments that came up from time to time to delay things.



Dry Dock at Pearl Harbor Naval Base, July 31, 1919

Japanese Maritime Notes

By Special Correspondent

JAPAN'S pessimistic views regarding shipping and shipbuilding a few months ago are in singular contrast to the realities of today. Each day brings forth new developments of advantage to both branches of industry: freight and charter rates continue to rise and the builders are so busy that they are represented as being unable to book any new orders until 1920. The formation of the new Kokusai Kisen Kaisha and the American Shipping Board orders, however, unquestionably steadied conditions greatly, and now come other factors making for prosperity.

Of particular importance is the announcement that the Osaka Shosen Kaisha intends to build up a passenger fleet. During the war, Japan turned her whole attention to freight vessels, and no additions of importance were made to her passenger liners, so that the end of the war finds travel across the Pacific in either direction beset by great difficulties of securing cabins in American, Japanese and British steamships. The Nippon Yusen Kaisha also is considering the construction of three large liners. The O. S. K.'s additions to its fleet, both freight and passenger, will total about 100,000 tons. President Hori stated, at a stockholders' meeting that the 8,000 tons to be added by the end of the year could be paid for without touching the depreciation funds, and this after a 40 per cent dividend had been declared. The dividend for the preceding term was 60 per cent. Mitsubishi and the Osaka Iron Works will build the new vessels.

As freight offerings become larger, rates continue to increase. From an August rate of yen 150 to Marseilles, the N. Y. K. advanced its charges to yen 180 for September; and, from $5 in March for North America, the rate rose to $15 in August. Other than the subsidized liners of the T. K. K., O. S. K., N. Y. K., only seventeen vessels of 132,900 tons deadweight were being operated between Japan and North America in August—a small enough fleet when it is considered that American freighters were few and far between until the Admiral Line began its operations in the late spring.

Japan charter rates have been higher than those offering in Europe for corresponding voyages, which is due to the shortage of available tonnage in the Orient. The diversion of many vessels to Europe in the late spring and summer forced charters steadily higher. From April to July, rates for large vessels rose from yen 9.50 to yen 25, and for medium-sized vessels from yen 7 to yen 14.

Forty-four steamers of about 250,817 tons, all told, were to be released from charter in September; thirteen, totaling 89,902 tons in London; but even this large tonnage thrown upon the market was not expected to affect rates greatly, for it was held that they easily could be absorbed. Seven steamers of the Kawasaki Dockyard, six for the Uchida Kisen Kaisha were among the forty-four.

New services projected include one by the Taiyo Kaiun Kaisha (Ocean Transport Company), to Europe. A subsidy has been granted for a line between Northern Japan, Northern Korea and Vladivostok, the prefectural authorities of Toyama and Ishikawa to give yen 30,000 each and the government-general of Korea yen 40,000 a year. There will be a semi-monthly service by the Maruni Kisen Kaisha. Several reports have been published to the effect that the government would subsidize the South American lines of the N. Y. K. and O. S. K., but nothing definite has been announced. These services were opened during the war and are from Japan to the East Coast of South America by way of the Cape of Good Hope. It is in the wind, too, that the Taiyo Kaiun Kaisha has become reconciled to the N. Y. K., O. S. K. and East Australian Steamship Company, with which it recently was engaged in a rate war on Australian freights, and that it will join the conference, maintaining a monthly service with the others.

No reply has been returned by the government to the request of the three trans-Pacific lines to be permitted to raise passenger fares by about 25 per cent.

With the withdrawal of steel vessels from the Japanese coasting trade for Europe, wooden vessels again are being used, after being idle for several months.

The steamship Aikoku Maru, which arrived at Yokohama the end of July, was the last of twenty-three steamers chartered by the United States government in 1918 to be returned. The average time of charter was between nine and ten months and, at forty shillings and sixpence, the American government paid about $14,500,000. In addition, the Japanese government paid about yen 8,150,000—yen 4,060,000 for part of the insurance premiums on subsidized vessels; 2,970,000, to make good part of the difference between the charter rate offered by America and those obtaining in Japan, and 1,120,000 for reinsurance of unsubsidized vessels. Two steamers were lost while under charter.

During the first six months of 1919, Japanese shipbuilding yards launched sixty-nine vessels of more than 1000 tons gross, totaling 293,433 tons. As compared with the first six months of 1918, this is a decrease of fourteen vessels but an increase of 65,218 tons. The launchings of 1918 included twenty-seven vessels of more than 3000 tons; this year's, forty-five. The Kawasaki Dockyard built twenty vessels, 112,317 tons, and the Asano yard was next with five of 30,260 tons. The two yards of the Osaka Iron Works, however, together launched seven of 45,600 tons. Nine vessels exceeding 1000 tons gross, totaling 45,021 tons, were launched in July—13,111 tons more than in July, 1918.

The seamen's organizations of Kobe have been agitating for wage increases. At one meeting, which was attended by about 300 men, resolutions were adopted demanding a minimum wage of yen 25, maximum of 80; extra allowances of 50 per cent; an eight-hour day, overtime to be paid for double. Steamship owners the world over will watch this and similar movements closely, as likely to have an important bearing upon Japanese competition, but, at the present, there is nothing by which to judge the probability of the men meeting with success, and, in any event, it is improbable that they will get increases of sufficient size to affect Japanese lines greatly.

Excluding Korea and Kwantung, there were 2770 steamers of more than twenty tons, totaling 2,539,848 tons, under the Japanese flag at the end of May, 1919. The greatest tonnage, classified, was between 5000 and 6000 tons gross. There were six steamers exceeding 10,000 tons, and eight between 9000 and 10,000. By the end of June the number of vessels had increased to 2793 and the tonnage to 2,583,400.

At the end of June all vessels of more than 1000 tons registered in Japan and colonies numbered 709, 2,207,571 tons gross, an increase of six over May. Coasting and the "near-sea" trade took 370 of these ships, and 318 were in deep-sea service, twenty-one being under repairs. The principal dispositions were: Japan-North America, 21 vessels, 112,455 gross tons; Japan-New York, 11 vessels, 64,643 gross tons; Japan-Australia 34 vessels, 122,490 gross tons; South America, East Coast and Japan, 12 vessels, 74,581 gross tons; South Seas, 73 vessels, 210,109 gross tons; Europe, 83 vessels, 456,377 gross tons; Japan-India, 21 vessels, 86,504 gross tons; Japan-Mediterranean, 18 vessels, 59,649 gross tons; Hongkong-Japan-North America, 16 vessels, 147,691 gross tons.

Osaka business men, headed by Koreichi Morimoto, are organizing a 2,000,000-yen dockyard company at Tarui, Sennan-gun, Osaka prefecture. Land has been bought and permission of the authorities to reclaim more land is sought.

The following yields of some of the better-known marine stocks are taken from a newspaper report:

	Price Yen Aug. 1	Dividend Per Cent Aug. 1	Annual Yield Per Cent Aug. 1
N. Y. K.	279.00	50	8.96
T. K. K.	118.50	30	12.66
O. S. K.	185.00	40	10.81
Tokyo Marine Ins.	340.00	32	2.35

The grand average of net yields, as announced by the Hypothec Bank of Japan, is 6.64 per cent. The basis of calculation was spot quotations on the Tokyo Stock Exchange, August 1.

Norway, France and America are inquiring for vessels of Japanese builders, it is reported, but what business has resulted is not known. For delivery in 1919 the price is about yen 350, and for 1920 about yen 300.

The latest of the Japanese marine insurance companies to enter the American field is the Teikoku Kaijo Unso Kasai Hoken Kabushihi Kaisha (the Imperial Marine, Transport & Fire Insurance Company, Ltd.), which has appointed Willcox, Peck & Hughes as its agents in New York and elsewhere and has made the required deposits.

The Imperial is one of the oldest of the Japanese companies, having been founded in 1893, fourteen years, however, after the organization of the Tokyo Marine, which has become the Tokyo Marine & Fire Insurance Company.

Japan's Oldest Engine Works

By Andrew Farrell

IN the third year of the Meiji era, which being interpreted means in 1870, an Englishman founded the Yokohama Engine and Iron Works. That, as regards modern industrial Japan, was long ago; in fact, this was the first engine works of the empire, and it endures today as one of the parts of the Uchida Shipbuilding and Engineering Company, Ltd. There were several changes in ownership, inasmuch as the company was private, not stock, until, in the fifth year of Taisho, or 1917, Dr. Keita Shin bought the plant; and a few months later Nobuya Uchida invested new capital and the company was incorporated and capitalized at yen 1,000,000. Prior to this incorporation, the Yokohama Engine and Iron Works had engaged largely in repair work and in the construction of small steam engines, for such craft as launches.

That brings the history of the company fairly up to the great shipbuilding boom. In 1917 the present shipbuilding yard was organized and the engine works enlarged; within a year, in April, 1918, the capital stock was increased to yen 2,000,000, which is the present figure; and with the increased capitalization the shipbuilding ways were enlarged and new equipment purchased, giving an annual capacity of about 40,000 tons deadweight.

Because the older plant of the Yokohama Engine and Iron Works is not on the bay, being, instead, on a canal, there are two establishments, some two miles or so apart, the engine works at Yamashita-cho, Yokohama, and the shipyard at Chiwaka-cho. There is water communication between the two, either by the canal or, preferably, by the canal and bay, which renders the different locations less of a handicap in moving engines and other heavy machinery.

The Uchida yard has two contracts with the United States Shipping Board — for the Eastern Glade and Eastern Glen, both of 8500 tons deadweight capacity; 400 feet long, between perpendiculars; 54 feet 6 inches molded beam and 30 feet depth molded to the upper deck. The keel of the Eastern Glade was laid April 15; that of the Eastern Glen May 15; and the probable dates of launchings are October 15 and November 15. These vessels will have triple-expansion reciprocating engines, one screw propeller and three Scotch boilers; and an estimated speed of ten and one-half knots an hour on a mean loaded draft of 24 feet 6 inches. The yard numbers are 5 and 6. The gross tonnage will be about 5700 tons.

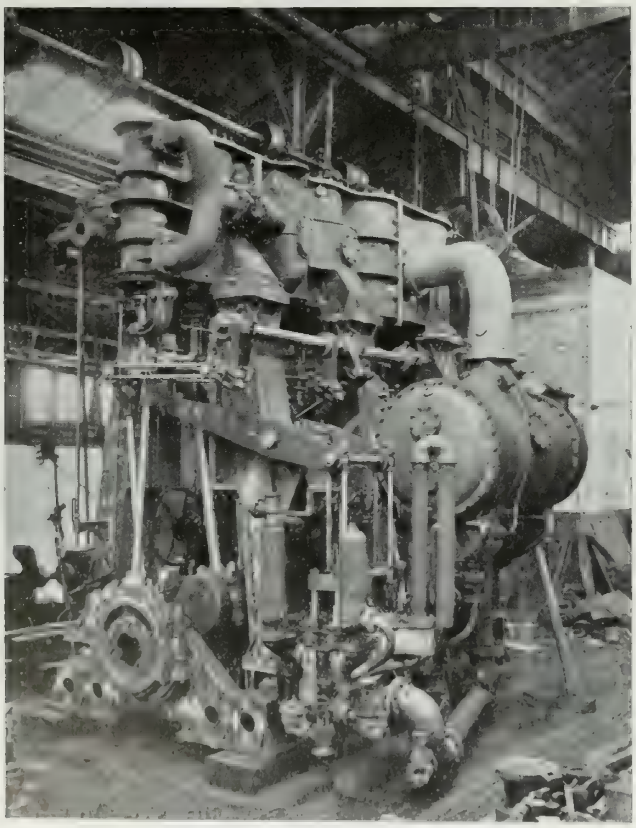
Six vessels have been launched by the Uchida yard, none, however, of the type of the Eastern Glade and Glen. Yard No. 1, 1900 tons deadweight, steel, was launched May 8, 1918, and was sold to the Uchida Steamship Company, an allied corporation, for the coasting trade of Japan. On June 4, 1918, No. 2, 1900 tons deadweight, was launched for the Uchida line, but was sold to the Nagasaki Kaiun Kaisha. No. 3 was launched October 3, 1918. She was of 3500 tons deadweight, 2200 gross, and was sold to the Uchida line. No. 4, a sister to No. 3, except that she was built to the first class of the Bureau Veritas, was launched November 18, 1918, and, owned by the Uchida line, was chartered to the French government.

Nos. 5 and 6 are for the United States Shipping Board. No. 7, a sister to the Eastern Glade and Glen, is being built for the Uchida Steamship Company, the keel having been laid May 28. No. 8, a sister to Nos. 3 and 4, will be begun after the launching of the Eastern Glade. She will be for builders' account, and both she and No. 7 will be of American material obtained under the exchange basis of steel for ships.

No. 9, the fifth vessel launched, was of 3500 deadweight tons, for the Kita Nippon Kisen Kaisha, and, as was No. 4, was built to first class, Bureau Veritas. She was launched December 25, 1918. No. 10, a sister to No. 9, was sold to the Uchida Steamship Company.

To summarize: Six vessels have been finished—Nos. 1, 2, 3, 4, 9, 10; the keels of three have been laid—Nos. 5, 6, 7; and the keel of one, No. 8, is still to lay, waiting upon the launching of No. 5, the Eastern Glade.

As other yards are doing, the Uchida Company is looking forward to a more settled state, when there will be much less new work, and is planning to compete for its portion of the repair jobs. It also contemplates the construction of a drydock at Chiwaka-cho, near the shipyard. Permission has been asked of the government to reclaim land and the necessary authority is expected by July or August, 1919. The tentative plans for the dock were for 400 feet in length, at least, and of more than 8500 tons deadweight capacity, the company's officials holding that that size of vessel might fairly be considered a standard. However, some two or three years will be required for the completion of the dredging, filling and construction, once permission to reclaim has been given. With the Yokohama dock already well equipped and contemplating new docks; the Asano yard also planning to build docks, and the Uchida yard, in addition, about to enter the field in the near future, it appears that there will be some lively competition for repair work at Yokohama.


Marine triple expansion engine built by the Uchida Shipbuilding and Engineering Company, Yokohama

There may be other new construction at the Uchida yard. As regards equipment, it is not so well off as others, the Asano and Yokohama Dock, for example. It lacks cranes at the shipways, in one noteworthy particular; but it is not the intention of the company to remedy this so long as materials are so expensive. Instead of cranes, it has thirteen derrick-posts, in all, for the three ways, each of three tons' capacity, and each served by a five-ton electric winch. Some of the derricks have two booms and others one. It is true, of course, that the yard was built hastily, when construction material was difficult to get, and expensive to boot.

However, the ways are concrete, as many are in Japan. They are 500 feet long, capable of being extended about fifty feet in length, and the width is thirty feet, the bilge blocks extending ten feet out on each side. Should contracts offer, the yard probably would be able to build a vessel of 12,000 tons deadweight. The first and second ways are on wood piling; the third on concrete piling; and there was a steady increase in cost, from yen 60,000 to 70,000 and 100,000, as prices of materials and labor increased.

A lack of scarphing machinery has forced the Uchida yard to use many liners on the Shipping Board vessels. Of the plates that are scarphed, some are finished at its own plant and others at the Asano shops. It has been necessary, too, to do flanging of heavy plates by hand, a slow task, accomplished by an enormous expenditure of labor, but a new flanging machine has been received. It was made by the Kawasaki Iron Works, Osaka, as were two manhole punching machines. Seven punching and shearing machines were manufactured by the Kubota Iron Works, Osaka. The scarphing machines are American made. There are a mangler, an edge planer; six hand cranes in the machine shop; three Osaka-made locomotive cranes, one five-ton and two three-ton; and a fifty-ton motor-driven crane in the boiler shop, built, as were the locomotive cranes, by the Ajikawa Iron Works, Osaka. The pneumatic machinery is largely American, although some was made in Japan. Most of the plates and shapes came from America, some being Japanese.

At Yamashita-cho, stationary engines for factories, as well as marine engines, will be made in the future; and pipes and turbines for hydro-electric generators are an important output. Of the six vessels launched, two were fitted with old boilers, because there was no time to manufacture new; boilers for four were made by the Yamashita-cho plant, which manufactured also the engines and auxiliaries for all the six steamers. The Ishikawajima Shipbuilding & Engineering Works, Tokyo, is building the engines for the Eastern Glade, Eastern Glen and hull No. 7. The Uchida yard is building those for No. 8.

Nobuya Uchida is president of the works. Seitaro Uchida and Dr. Keita Shin are directors, the latter devoting himself principally to shipbuilding, although he also is an engineer; and Teiji Yagi is managing director.

The younger naval architects and marine engineers are, for the most part, graduates of the Imperial University and the higher technical schools of Osaka and Tokyo.

The Mitsubishi Steel Works

By Andrew Farrell

JAPAN'S first attempts to supply herself with steel, the raw material of vessels, were principally governmental, the first fruits of which was the establishment of the steel works at Wakamatsu in 1898. After twenty-one years she remains in a state of dependency upon other countries. How long this condition will obtain no one knows; but private enterprise has begun to bestir itself and is meeting with some success, although not in a degree that makes independence likely within the immediate future.

Among the more noteworthy of the recently-formed corporations is the Mitsubishi Seitetsu Kaisha (in English, the Mitsubishi Iron & Steel Manufacturing Company, Ltd.), a 30,000,000-yen corporation, paid up, which has a plant at Kenjiho, Korea. At the present time its output of plates and shapes goes almost exclusively to the Mitsubishi Zosen Kaisha, a sister company, which has shipbuilding yards at Kobe and Nagasaki and a repair plant at Hikoshima, Japan, so that it offers other Japanese builders little relief. Its output is about 100,000 tons of pig iron a year (and some pigs are sold to other Japanese companies), 62,000 tons of steel ingots, 30,000 of angles, 13,000 of ship plates, and 30,000 of thicker plates.

About ten years ago the Mitsubishi Goshi Kaisha, the parent company, contemplated establishing an iron and steel works somewhere in Japan, which had few plants of importance. Prospecting engineers were sent to various parts of the empire to investigate and report upon iron mines, and, at the same time, the company sought for a plant site where operation would be economical and where transportation of raw materials and products would be cheap.

Kenjiho, Korea, was chosen because there were iron mines scattered throughout Korea. Ground was purchased and material for construction ordered, under the iron foundry branch of the Mitsubishi Goshi Kaisha. In November, 1917, when the different departments became separate corporations, the Mitsubishi Seitetsu Kaisha had its birth and took over the foundry and all other businesses thereunto conducted by the Goshi Kaisha foundry branch.

It was early in June, 1918, that the first of the blast furnaces, having a capacity of 150 tons a day, was placed in operation. The second furnace, of the same capacity, was opened late in July, 1918. With these two furnaces the company produced 300 tons of pig iron a day, until the signing of the armistice disorganized business. Pigs had been worth as much as yen 540 a ton (about $270). Pigs are worth about yen 135 a ton now, delivered in Japan, freight included, which is a decline of 75 per cent; and the Mitsubishi Seitetsu Kaisha reduced its output about 50 per cent, inasmuch as the cost of production did not decrease with prices, but, instead, rose.

Approximately one-half the ore used at the Kenjiho plant is from the Mitsubishi mines in Korea, and the remainder is from the Chinese fields near Nanking, whence it is transported to the works by water. Six chartered steamers are used between the plant and Kobe and Yokohama, and no less than 122 lighters for delivering metal to deep-sea vessels, inasmuch as the plant is some twenty miles from the mouth of a river.

The equipment of the plant is:

Iron foundry: Two 150-ton blast furnaces; eight hot-blast furnaces; two electric cranes; one 1500-horsepower turbo-blower.

Coke oven and by-products: Fifty coke ovens; one tar distillery; sulphuric acid and sulphuric ammonia also made. The output of fire brick is about 6000 tons a year; of slag brick, about 25,000 bricks a day; of slag cement, 50,000 barrels a year.

Plate mill: Gas-producing ovens, six, with five more to be installed; one 200-ton mixer; three fifty-ton Siemens-Martin basic open-hearth furnaces, one not yet complete; ingot plant, six ovens; soaking pit.

Blooming mill: One blooming roll; two re-heating stoves; three gas-producers; two rolls; one soaking pit. Besides, there are physical and chemical laboratories; six repair shops and two gantry cranes.

Power equipment: Four Babcock & Wilcox watertube boilers, 4020 square feet heating surface each; two B. & W. boilers, 1265 square feet each; four Miki boilers, 2000 square feet each, for the iron foundry, and twenty for the steel works; three 1000-kilowatt alternating current turbo-generators; one 250-kilowatt direct current; two 3000-kilowatt alternating for the steel mill; two 300-kilowatt for the steel mill.

Water supply: 250 cubic feet a minute; watertube diameter, 19 inches; wooden tube, extended for nine miles.

Of the annual output of about 100,000 tons of pig iron, 50,000 goes to the steel works. The 120,000 tons of coke produced each year is used for the blast furnaces. The production of sulphuric acid is about 2000 tons a year; sulphuric ammonia, 1800 tons; pitch, 4000 tons; heavy oil, 400 tons; medium oil, 200 tons; light oil, 60 tons; naphthaline, 360 tons; steel ingots, 62,000 tons; steel angles, 30,000 tons; ship plates, 13,000 tons, and heavier plates, 30,000 tons.

The first plates were rolled in June, 1919, and the first angles six weeks later. A Lloyd's inspector is at the plant.

Plates are rolled up to 1 inch thick, 8 feet broad and 24 feet long; plain angles up to 5 inches by 5 inches by0.7 inch, and bulb angles up to 9 inches by 3½ inches by 0.6 inch.

Within the compound there are ten miles of standard gauge track, and twenty-two miles outside. The area of land within the compound is 270,000 tsubo (one tsubo equals thirty-six square feet), and without the compound, 250,000 tsubo. The land owned at the principal mines — Kenjiho, Ginzanmen, Taiho-men—totals 15,330,000 tsubo. There are one office building, one hospital, 180 residences and 1000 homes for workmen. At the head office, No. 1, Itchome, Yaesucho, Kojimachi-ku, Tokyo, there are 93 employes; in the offices at the plant, 293. The workmen, not including miners, are: Japanese, 1483; Koreans, 1037; Chinese, 118.

The president is Kusuyata Kimura, Tokyo; and the other directors are: (managing) Hyakutaro Miyagawa, Minoru Umeno, Baron H. Iwasaki, Baron K. Iwasaki, Teijyo Eguchi, Yozo Tsumaki. The auditors are: Shoichi Kirishima, Kikuo Aoki and Manzo Kushida.

European Marine Notes

Exclusive Correspondence of Pacific Marine Review

ONE of the very prominent figures in the British shipping business died on August 16 in the person of Lord Inverclyde. The illness was a sudden one, his lordship being at business up to Thursday, August 14; he was dead two days later. Sir James Cleland Burns, fourth baronet and third Lord Inverclyde, who was in his fifty-sixth year, was the second son of the first baron, to whose unwearying energy and unrivalled business ability was largely due the success of the Cunard Company, of which his father was one of the founders. The second Lord Inverclyde followed the traditions of his family, and held the chairmanship of the company till his death, his period of office covering the great Atlantic rate-war with the International Mercantile Marine Association and the German lines.

The peer who has just passed away was educated at Repton, one of the leading public schools in this country, and at the age of seventeen entered the office of G. & J. Burns, shipowners, of Glasgow, established in 1824 by his grandfather, George Burns, and his grandfather's brother, James Burns. George Burns was one of the crowd who watched the Comet, the first steamship on the Clyde, steam away from the quay, and he lived to see his son own a steamship through whose funnel the Comet could nearly have passed. The concern had developed to a remarkable extent, and the late Lord Inverclyde passed through every grade of the general shipowning business, of which he eventually became the principal director, as well as director of the Cunard Company. He early showed a sound grip on shipping matters, shrewdness and tact, and his business ability was recognized by his election as president of the Chamber of Shipping soon after he had passed his thirtieth year. He several times presided over the operations of the Clyde Steamship Owners' Association and had been chairman of the Glasgow Shipowners' Association since 1900. He took a very wide and keen interest in all questions which, in one way or another, were connected with shipping. His advocacy of a reform of the shipping laws derived the greater weight from his practical knowledge of the matters involved, and he took an active part in the work of the advisory committee on the management of lighthouses.

Sir Herbert Rowell Tells Us

Sir Herbert Rowell, who is a member of the advisory committee of the Ministry of Reconstruction, returned to this country August 3 on the Aquitania after his extensive tour of the United States, Canada, Japan and China. As with all the shipping men who come back from the United States, he declares that he was wonderfully impressed by the way in which America is taking advantage of the commercial position created by the conclusion of the war. American shipowners have been, and still are, placing orders for vessels for the coal trade, and especially for the export trade to Europe. A number of steamers which are being built are especially designed for service to Europe, and Americans hope to complete their commercial triumph by exporting coal to British ports, as they have already captured South American trade. So keen is the desire for shipping facilities that Sir Herbert himself received inquiries from a large number of shipowners in the United States as to whether any vessels were to be purchased from British yards. One gentleman, well known in American maritime circles, told him that those American citizens who were British born, and had risen from the bottom rung, sincerely regretted Britain's "decline in commerce," although as Americans and business men they were out to take the fullest advantage of it. This reads all right, but it also looks a little as though somebody on your side of the Atlantic had been pulling Sir Herbert's leg, as we say in the vernacular.

White Star Resumptions

The White Star Line announce that they are resuming their Southampton-New York service, as in the days before the war, during the present month, August. The ships to be employed at Southampton in this service at first are the Adriatic and the Lapland. The former is due to arrive at Southampton about August 22, and will inaugurate the service shortly afterward, while the Lapland is expected a fortnight later. Both vessels will call at Cherbourg on the outward journey and at Plymouth and Cherbourg on the return trip. The Olympic, at present at Liverpool, will shortly go to Belfast to be reconditioned and will resume her sailings from Southampton about the end of February or the beginning of March. The White Star Line is busy building new vessels, which, I understand, are optimistically intended to capture the cross-Atlantic trade, but particulars are not yet available.

The American line will also shortly resume operations at Southampton. The steamship St. Paul, it is expected, will be ready for the ordinary service from Southampton to New York some time in October, and the other three American liners will be available in November or December.

Cunard Chairman on Prospects

Sir Alfred Booth, chairman of the Cunard, has been calling his shareholders' attention to the fact that the company's income and expenditure for 1918 were both less than in 1917. The following remarks by Sir Alfred might be quoted verbatim: "Except for the Havre business, which has been carried on as usual with chartered steamers, our income for last year consists of hire received from the government for the Cunard steamers, dividends and interest from our investments, and organization expenses due from the government under the liner requisition agreement. Freight, passage money and mail moneys have been credited direct to the government, and on the other hand voyage expenses have been debited to them. The balance transferred to profit and loss account is greater than that of 1917, mainly because during 1918 the Mauretania and Aquitania were employed for the whole year. In the profit and loss account you will notice that depreciation is less than it was the previous year, because we have unfortunately had fewer ships. After transferring $427,015 to reserve and paying all dividends, we are able to carry forward $866,185, against $787,760 in the previous year.

"In the general balance sheet the figure which leaps to the eye is the creditors and credit balances of nearly $50,000,000. The reason for the abnormal growth of this item is explained in the report. But in this figure are also contained various internal reserves, including the surplus above book value of ships lost or destroyed during the war. At December 31, 1917, these internal reserves amounted in all to about $12,500,000. This figure has now grown to about $22,000,000 on account of the heavy losses sustained during 1918, but of course our liability to buy or build tonnage at the present extravagant prices has correspondingly increased."

New British Shipyards

Two new shipyards are being constructed on the river Tyne, at Hebburn and Hebburn Colliery. The promoters are George Renwick, M. P., and R. S. Dalgliesh. The depth at this point of the river is ample for any class of modern shipbuilding, and there is a river frontage of about 700 feet for the Hebburn Colliery shipyard. While the natural advantages of the new yard are such that the largest vessels could be built, a shipping writer in the London Times declares that the work will be mainly confined to smaller tonnage. A great deal of levelling work has to be accomplished, but the arrangements are so well forward that it is hoped to lay the first keel this year. John Crass, of Newcastle, is the principal in the shipyard to be started on an eighteen-acre site at Hebburn. Three berths have already been laid down, and it is believed that ten will be eventually available. The river frontage is about 1600 feet, and a drydock of 450 feet is one of the features.

Most of the Tyne yards are busy with Scandinavian orders. The ships on the stocks at Armstrong, Whitworth's Walker yard are of mostly the tank steamer and small passenger vessel class, although Cunard and Peninsula and Oriental vessels are also under construction. At Swan, Hunter and Wigham Richardson's Neptune yard the most interesting job in hand is the conversion of the famous hospital ship Karapara into a British India liner. Admiralty orders have been cancelled to a certain extent. The North-Eastern Marine Engineering Company's works at Wallsend and Sunderland are very busy. Although there are still a number of standard vessels to be engined, there is an appreciable increase in the number of orders for other types, which suggests a speedy return to the pre-war character of engine building.

On the river Wear the yards are very busily engaged in completing standard ship orders and in getting to work on the large mass of Scandinavian tonnage which fell to the lot of Wear shipbuilders. The Wear yards, given reasonable freedom from internal trouble, have nothing to fear in the way of slack time for many months to come. Nearly sixty vessels are on the stocks. There are rumors of a new yard being started up river to the west of the Egis yard, but they are perhaps an intelligent anticipation of events due to the fact that a start must inevitably be made somewhere with extensions in view of the large volume of shipbuilding coming to the river.

On the Tees there is a good deal of work going on in the shipyards, but the trouble in the engineering world is handicapping the steel trade, and the shortage of finished steel which will assuredly follow will be reflected in shipbuilding.

Why Docks Are Congested

The British Ministry of Shipping says that it cannot be blamed for the congestion at the ports which is delaying the clearance of ships, and leaving goods for export piled on the quays of London and Liverpool, while foreign customers complain that they cannot take British bills of exchange until they receive consignments of merchandise. The blame is thrown on the recent dock strikes, and on the fact that dock laborers now work shorter hours, but do not work any faster. What the Ministry of Shipping does is to decide as it thinks best, the ports at which vessels shall load, and very often also the goods which they shall carry. Thus, all vessels from Canada just now have to bring a part cargo of timber. The Ministry of Shipping has power to do this, and more, for a year after peace is ratified. If it chooses, it can break charters and commandeer tonnage again, and did so lately when coal was needed urgently on the river Mersey. It has no intention of reviving this power for general use, but it is about to devise with the minister of transport means by which some of the heavy traffic now congesting the railways shall be forced to go by coastwise steamers. It is also endeavoring to divert to the smaller ports some of the overseas shipping now congesting the Thames and Mersey.

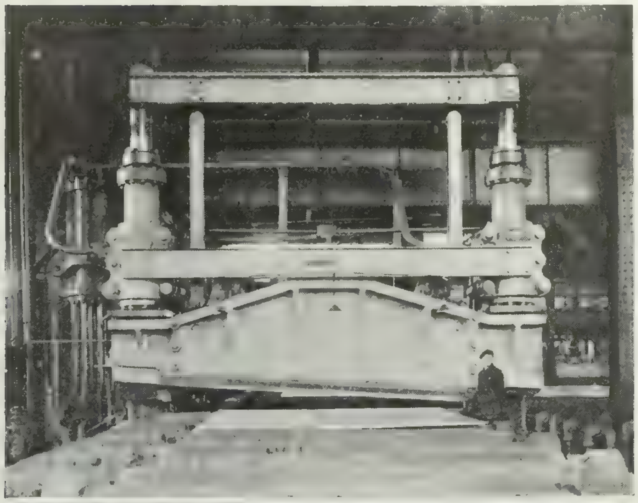
Thefts From Ships

In view of the attention drawn through cases in the law courts to the extensive theft of goods in transit by rail, it is curious that comparatively little knowledge appears to exist generally regarding a similar state of affairs in connection with shipping. Perhaps the crime is more difficult of detection, and of course it may be committed quite as frequently, if not more frequently, at an outport than at the home port. In the past there was a good deal of pilfering and petty theft from cargoes, but I am assured that recently matters have become much worse. The losses used to be taken with a certain amount of philosophy by merchants and underwriters, but thefts are now so extensive as to be serious. While some shipping companies have to admit that goods under their care have been stolen, it is possible for them to avoid liability by means of a protecting clause in the bill of lading. This course, I am informed, is sometimes allowed, with the result that the consignor or the consignee, if not insured, has to bear the loss. Sometimes that amounts to a case or a bale at a time. One consequence is that insurance rates are rising considerably, and that, of course, means higher prices for the commodities to the purchasing public. Another consequence is that there is a call for shipping companies always accepting liability for goods consigned to their care. The merchant thinks that this would cause the shipowner to take more precautions. On the other hand, the shipping company takes a different view.

NAVAL ARCHITECT BUSY

Theodore Ferris, the well-known naval architect and marine engineer, is now engaged in a vast amount of work preparing designs, plans and specifications for various merchant ships, consisting of cargo ships, passenger ships, colliers and bulk oil ships, exceeding in value $50,000,000 when constructed. Also, several large reconstruction and alteration propositions for passenger ships and some fifteen coal-burning ships to be converted to oil-burning vessels.

The Largest Steel Plate Mill in the World

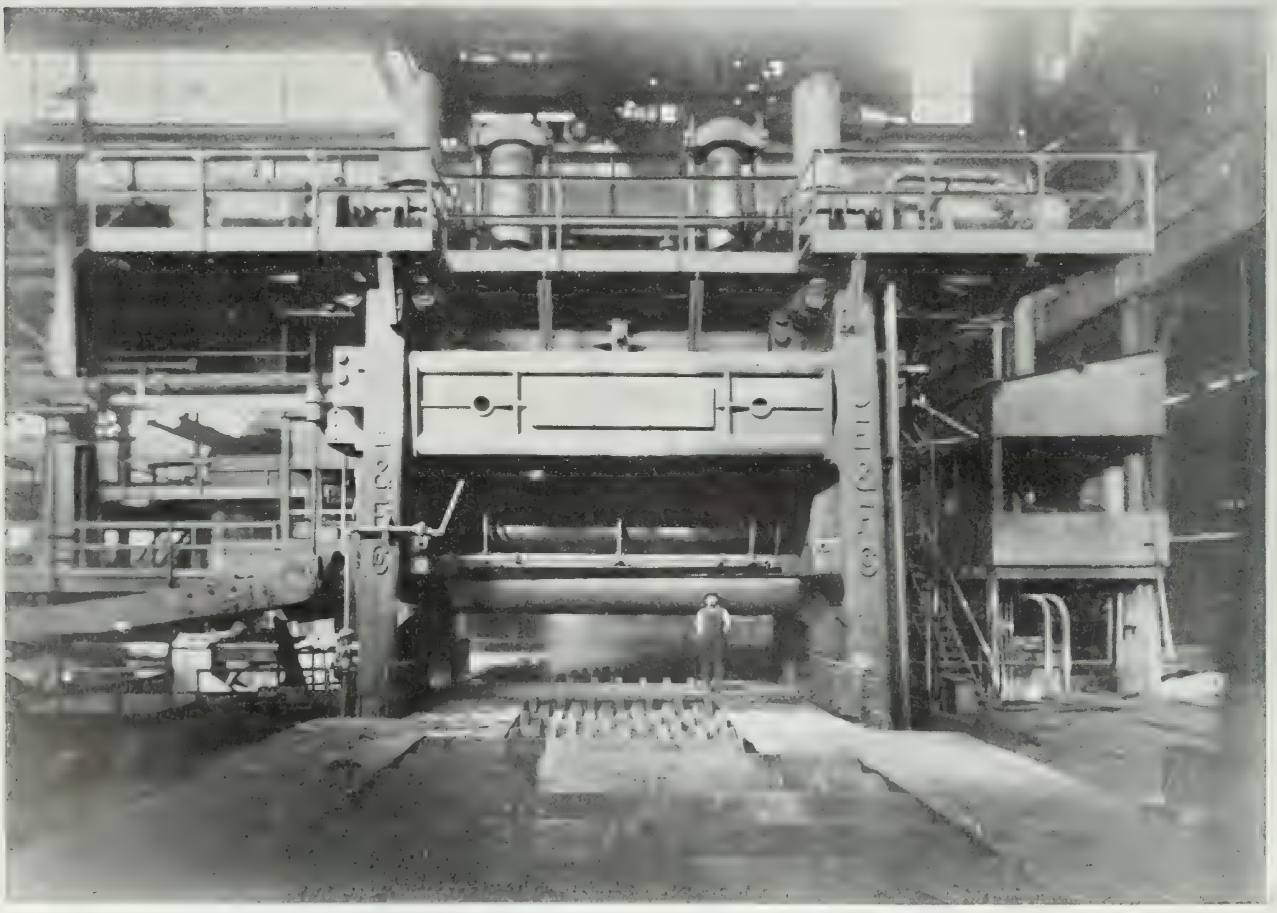


Hydraulically operated Plate Shear, Lukens Steel Company

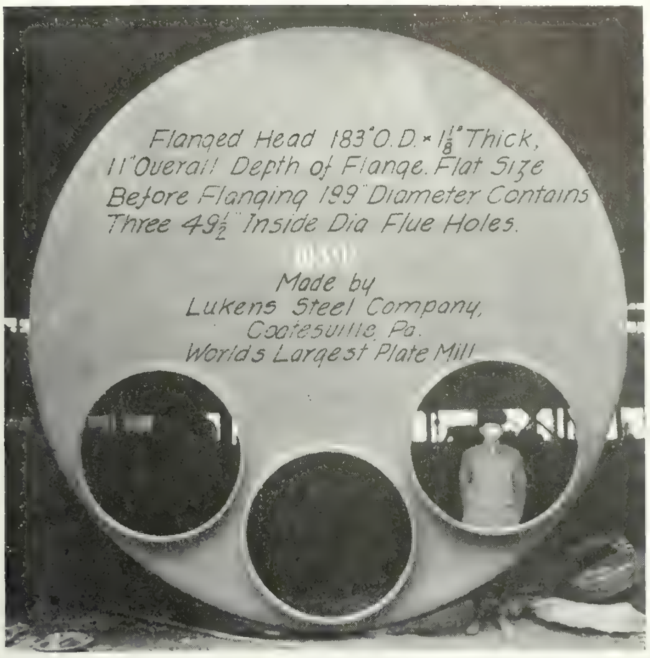
IN 1820 the Lukens Steel Company of Coatesville, Pennsylvania, rolled the first boiler plate made in America. This plate was 44 inches in width and the finished product was hauled by team to Philadelphia, a distance of forty miles; fuel for the blast furnace was hauled to the works, a distance of forty-two miles. From that early time to the present day, the Lukens Steel Company have been leaders in the rolling of heavy plate for locomotive builders, for ship builders, and for marine boiler makers. This firm has just completed the erection of a steel plate mill of the four-high reversing type with rolls 204 inches wide. This mill is capable of rolling rectangular plates up to 192 inches in width and circular plates a few inches wider. These figures give it a wide margin over the 178-inch mill of the Witkowitz Works in Austria and the 168-inch mills which are the present limit of the two-high plate stands in the British Isles. This mill is especially interesting to marine engineering circles on account of the facility with which circular plates for boiler ends are rolled and flanged in one piece which gives a perfect job for the ends of Scotch marine boilers. The following figures on the mechanical details of this huge mill will be of interest to our readers:

It is built on the principle of the two-high reversing plate stand commonly used in Great Britain with the exception that the two finishing rolls are backed by two large supporting rolls whose purpose is to stiffen the mill and prevent springing of the operating rolls when rolling wide thin plates. The operating rolls are 34 inches in diameter by 204 inches' working face, and are of chilled cast iron with 27-inch necks. These rolls weigh about 30 tons each. The backing rolls are 50-inch diameter of cast steel with 36-inch necks and weigh about 60 tons each. With this construction, it has been found possible in practice to roll heavy plates up to 192 inches wide with practically no difference in thickness throughout the width. In fact, in the work so far done, it has proved to be the stiffest mill ever built in this country.

The housings of the mill are built up of steel in four parts—two side pieces, a top bridge piece containing the screw box, and a bottom bridge piece



The world's largest steel rolling mill, Lukens Steel Company


Flanged Head 183" O.D. × 1 1/8" Thick,
11" Overall Depth of Flange. Flat Size
Before Flanging 199" Diameter Contains
Three 49½" Inside Dia Flue Holes.
Made by
Lukens Steel Company,
Coatesville, Pa.
Worlds Largest Plate Mill

Flanged head for Scotch boiler rolled in one piece

in which is located the seat for the bottom rolls. Each housing weighs over 400,000 pounds. The mill stands about forty feet from the top of the screw cover to the bottom of the shoes, and its overall dimension is slightly over 42 feet. The foundation is concrete placed on solid rock.

The screw-down rig, of the well-known worm and worm wheel design, is driven by two 150-horsepower motors, one on top of each housing. These motors act as a roll release in case of a stall in the mill. The rolling capacity of the mill is 4000 to 5000 tons a week, and with this addition the estimated annual total capacity of the Lukens Steel Company will be about 500,000 tons of steel plates.

The mill is driven by a 46 by 70 by 60 twin tandem compound condensing engine fitted with jack shaft and a gear ratio of one to two. Steam for operating this engine is obtained from Babcock & Wilcox waste heat boilers located on top of the open hearth and re-heating furnaces and operating at 160 pounds' pressure and 100 degrees superheat. These engines drive the mill through a set of double helical cut-tooth pinions, the backing rolls being driven through a friction clutch for greater safety. The mill is fully equipped with plate tables arranged with mechanical appliances for handling the heaviest plates. The run-out table from the mill carries the plates to the straightening rolls, from whence they pass to the cooling tables and the tilt device for inspection. This device is operated by hydraulic cylinders and tilts the plates up for inspection of the bottom side.

After inspection the plates proceed to the shear run-out table through the cut-off shear, which is hydraulically operated, and has a 210-inch gap.

It is possible on this mill, which has a slack-up of 40 inches, to roll ingots up to 60,000 pounds in weight and all the machinery is constructed with a view of handling these heavy ingots and plates.

"COME INTO MY PARLOR," SAYS THE UNDERTAKER TO THE SAILOR

LONGSHOREMEN have always admitted that undertakers had a vested right in their remains, but heretofore sailors have enjoyed a gratifying feeling that they had at least a chance to dodge the body snatchers; and when the common warning has been spoken to them—viz., "the undertaker will get you yet!"—they have been wont to distend the fingers from the nose outboard, wink the eye and say, "Not me; I have a contract with Davie Jones."

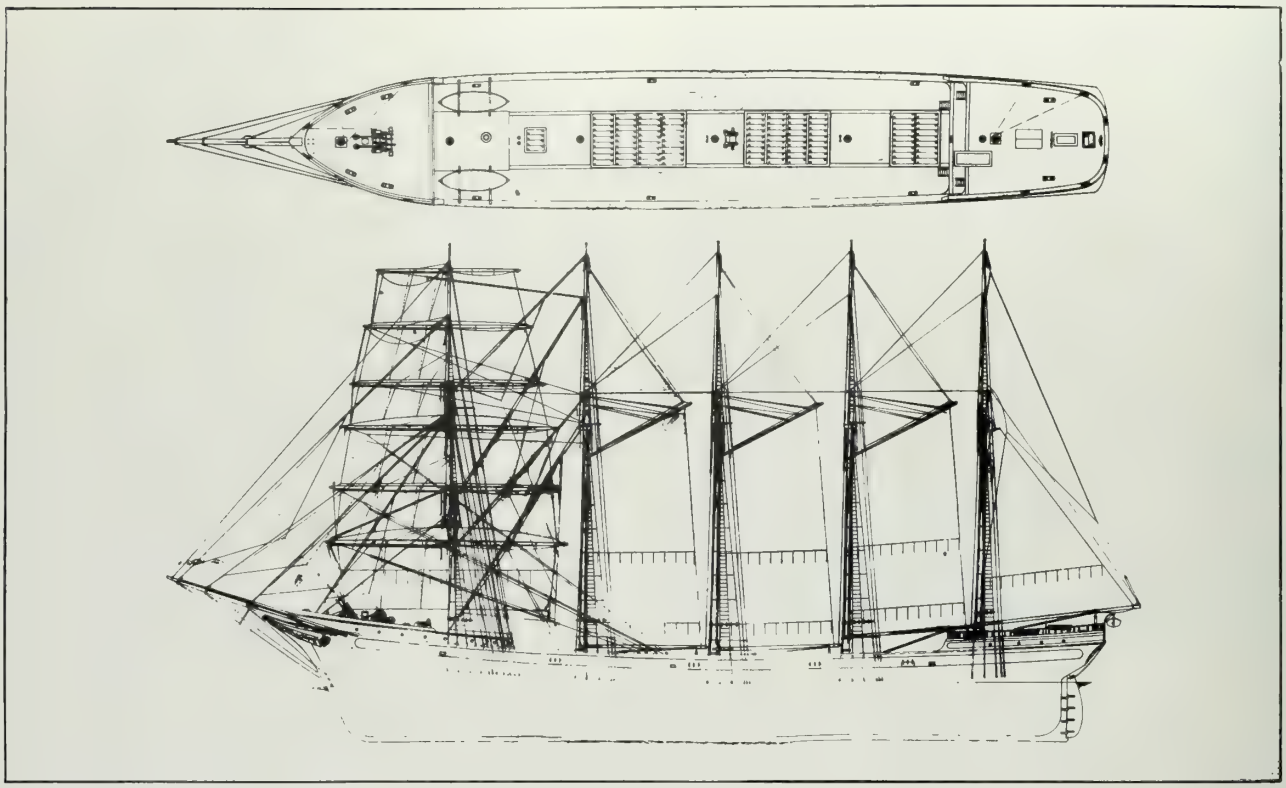
Do you know, Mr. Sailor, the Senate is about to investigtae your contract with Davie; it is going to determine whether you have any right to cheat the undertaker in any case at all. If the proposed bill be passed, the undertaker will rate a bunk on your wagon; his business will be to stay aboard and wait for you to go below for the last time. If you should see a gent with a lofty smokestack hat, twin-screw coat and white gloves come over the gangway and snoop around the ship, do not imagine that he's an old-time confidence man with a shell-game in one pocket and lottery tickets in the other, looking for a live one—he's the **ship's embalmer,** looking for dead ones.

This is how he operates: Suppose Sailor Johnson passes out between lettin' go and makin' fast alongside. The body-snatcher grabs the corpse, gives it a hair-cut, shave and talcum, fixes it up pretty and pumps it full of brine. (The brine they use is practically the same stuff they used to keep the salt beef and salt pork in on the windjammers; and I want it understood that, inasmuch as said beef and said pork, embalmed as aforesaid, were not fit for human consumption, I'll keep out of print what I would have to say of the individual that would shoot my helpless corpse full of such pickle.) Well, the ship comes alongside, and the sea-going undertaker takes the corpse over the gangway and gives it a horizontal joy ride to his brother-in-law's parlors. The remains are then put into an Oregon pine casket (shaped like a paint skiff with a lid on), stained like and called Circassian walnut. (These come at $3.50 a piece and sell for $150; and, by the way, you would certainly laugh if I told you how they make Circassian walnut caskets down near San Jose by inking a beautiful piece of the real wood with a stain, picking up the print on a big roller, and then transferring the grain onto a piece of pine.) The remains are dressed up in a suit that has the seams glued instead of sewed; a paper collar is hung around the neck, powder and paint are liberally applied, and the folks are called in and asked they don't think he looks very natural. Of course, the folks have to purchase a lot, piece or parcel of land for Johnson, and this, with the body-snatcher's loot, amounts up to about six or seven hundred dollars. The folks get two big shocks that will last for a long lifetime—first, the deceased as they saw him; second, the bill.

Seems to me I would rather carry out my deal with Davie Jones, and let the folks spend the six or seven hundred dollars on themselves.

I guess that the next bill will be for putting dog catchers, probation officers or wet nurses on cargo steamers.

C. LAWYER.



Plan and Outboard profile of five-masted Barkentine

Five-Masted Barkentines

By John F. Blain

REVERTING to the original source of energy for the propulsion of ocean-going vessels, the Grays Harbor Motorship Corporation of Aberdeen, Washington, with a foresight peculiar to the type of men associated together in that enterprise, have designed and are now constructing the first four of the fleet of barkentines primarily for operation on their own account in the lumber and bulk cargo trade on the Pacific.

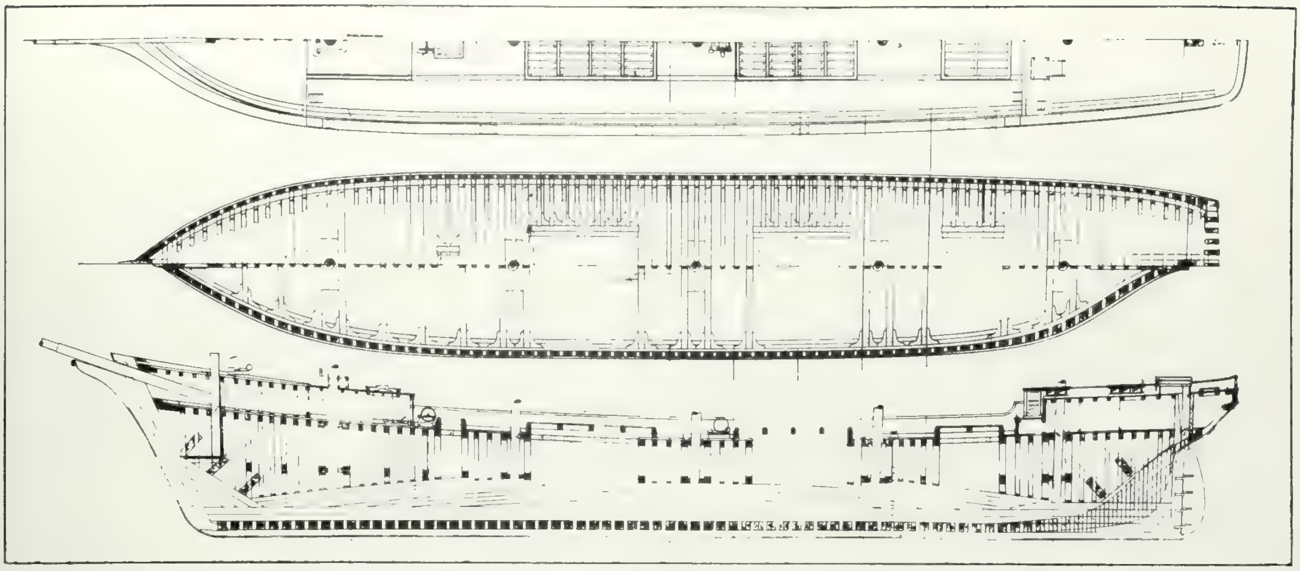
These vessels are the design of the builders and owners, and particular pains have been taken to make a composite design of all that was best in the various vessels that have been designed and constructed by the leading men in this particular line in the country.

After carefully considering all pertinent parts, taking into account operating trade requirements, necessary under deck cubic for bulk cargo homeward, without sacrificing the on-deck capacity for the outward lumber cargo, and at the same time giving the vessel a maximum sailing quality, there has been conceived a type of five-masted barkentine, the general dimensions of which are, length over all 260 feet, length between perpendiculars 240 feet, extreme beam 44 feet, and depth molded 21 feet 6 inches, and an estimated lumber capacity of 1,600,000 feet, deadweight cargo capacity of 2500 tons, vessels having 123,260 cubic feet of space under deck.

No expense has been spared to make these vessels the best possible tools for the purpose intended. Their longitudinal strength is preserved by the built-up arch keelson peculiar to the Grays Harbor type of vessel, and in addition to this an innovation has been incorporated in them in the shape of angle irons on every third frame secured to both frame and ceiling, these angle irons extending over the turn of the bilge to insure maintaining strength at that point in the vessel.

Within the past few years many experiments have been made in a wood ship design, and generally speaking, vessels so built have shown an earning capacity to their owners, but this is due principally to the high rates prevailing during this period. We have had auxiliary power installed in both old and new sailing vessels of various types, but to the minds of many it has been demonstrated that two sources of energy, neither of which is complete in itself, is not satisfactory or economical in the operation of ocean tonnage. Therefore, future construction is going to be the all-sail vessel or the full-powered vessel without sail, and the future of either of these is almost assured, but it has been demonstrated that a combination of both is not practicable.

With the development of the internal combustion engine, I believe that any of the existing types of engine are subject to material improvement. New departures, and successful ones, will be made in the construction and operation of motorships, especially for moderate speed carriers. The price of fuel required for such motorships, and for the existing steam vessels where power is generated by either oil or coal, is going to be the governing factor in oversea rates, and inasmuch as the price of the necessary energy for mechanically propelled vessels is going to remain high, this must be the determining factor in establishing the oversea rates, and it goes without saying that the rates on the all-sail vessel will remain a small margin below the prevailing rates on mechanically propelled vessels, notwithstanding the fact that there has been no in-



Half-deck plan, Framing Plan and Inboard profile of five-masted Barkentine

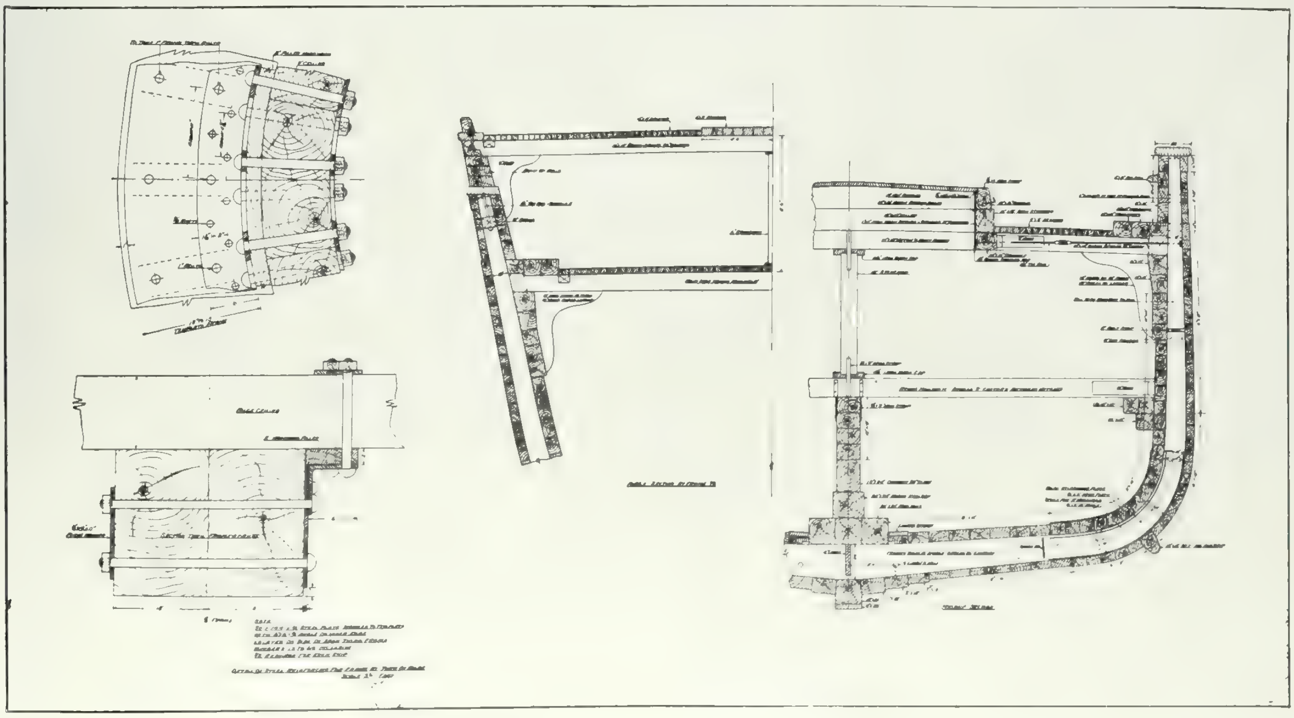
crease in the price of energy propelling the sail vessel, as the only increase affecting this type of vessel is the original cost, which automatically affects the insurance and the cost of crews' wages and their subsistence.

To meet this condition the Grays Harbor type of barkentine has brought about, as an assured success, one innovation which will particularly appeal to the operators. This is the fact that these vessels are designed with hatches and cargo-handling gear that will facilitate their dispatch to the extent that their port dispatch will approach that of a steamer, as their hatches are equipped with steam winches for the handling of cargo with the promptness of the modern steamer.

As before stated, special attention has been given to the lines of the vessel to insure smart sailing qualities, and every means, including gas engine hoists, have been provided for the handling of sails with the minimum amount of energy and crew, and every precaution taken in the construction to keep the cost of maintenance at a minimum.

Another item that is so often overlooked by the builders of new vessels is the superior accommodations which have been placed in these ships to care for the crew.

A certain degree of sentiment has entered into the naming of the first four of this fleet of barkentines, as the name "Forest" is in all cases to be the prefix. The launching date for the "Forest Pride" is set as September 13, following which will come the "Forest Dream," "Forest Friend" and "Forest Nymph," and the Grays Harbor Motorship Corporation are going to continue the prefix of "Forest" in naming their entire fleet. As proof of the fact that their organization and location in the very heart of the long timber-producing section of the country is an advantage, this concern is the only one at present in this district that is continuing its plant in wood ship construction. Further, the very fact that the men associated in this shipbuilding concern are building the first four ships for their own account demonstrates the confidence that their convictions are fully warranted.



Details and transverse sections of five-masted Barkentine

The Industrial Problem

An Address by Charles Piez

President of the Link-Belt Company

DURING the most prosperous period in our history, with the highest wages ever paid, with abundant opportunities for employment, with a universal public acknowledgment of labor's rights to a fuller and better life, and with an Administration and a Congress most responsive to labor's demands, we are confronted with a spirit of unrest which threatens the foundation of our social and political, as well as our industrial, structure.

The great war brought with it such an enormous demand for labor that privileges and concessions that had been the subject of controversy for a generation were granted without hesitation, simply to insure that continuity of industrial processes necessary to victory. For it was victory we were after, even though we had to sacrifice industrial efficiency—yes, the very industrial system itself—to win it.

Our problem was output regardless of cost, and we got it at the sacrifice of those safeguards and restrictions which competition usually imposes on the management of business. Is it strange that with the unlimited opportunities opened up to labor by the war, it should have become conscious of its political power and its economic strength? Is it strange that labor should decline to surrender any advantage gained by the war, but should press for the control of industry itself?

The Plum Plan

If the Plum plan is any gauge, then nationalizing the railroads, nationalizing the mines and the industries, does not mean government ownership and operation in the ordinary acceptance of the word, but purchase out of public funds, with an absolute surrender on the part of the public of every form of control and direction to the employes without power of revocation. I am referring to the Plum plan as a symptom rather than as a possibility, but it shows the character of the malady. And when organized employes of the railroads tie up traffic in four states, and subject the public to loss and discomfort merely for the purpose of influencing a decision in a trolley strike with which the Railroad Administration was in nowise affiliated, it indicates that popular government, if its representatives lack courage, can be absolutely under the domination of an organized, selfish and unscrupulous minority.

I commend the President of the United States, and the Railroad Administration, highly for the sound and courageous attitude taken in the Southwestern railroad strike. But I regret that his position was coupled with a promise to raise wages if the Administration's efforts to reduce the cost of living proved futile. If the high cost of living is due to profiteering by merchants, manufacturers, employes, farmers or workers, then the government ought to be able to reduce it. But if, as is more likely, investigation proves that the high cost of living is due to economic causes beyond the control of this nation, to world-wide reduction of output to a point far below present world demands, then it will be unwise, to say the least, to meet the situation by a general wage increase, unless that increase is justified by a corresponding increase in effort and output. For if our premise is correct, then the only way out of the difficulty is to produce more and consume less. Nothing else will do.

Organized Labor

The railway organizations have evidently abandoned the fairness and consideration of action which characterized them for years, and have forgotten that the control of great power carries with it corresponding responsibilities. The railway employes, no matter what their number, or their power, are not superior to the public and its government, and means along the lines suggested by the Illinois Manufacturers' Association, and covered in our resolutions, should be incorporated in pending railway legislation to protect the public from the results of wanton abuse of the great powers now resting in the hands of these organizations.

I am opposed to government by coercion, by threat and intimidation, because it is subversive of the popular will. I am opposed to the general strike, that un-American instrument of labor oppression, because it attempts to win its point, not by its merit, but by putting an entire community to such inconvenience, trouble and loss that the public will insist on a settlement rather than submit to further pressure.

Certainly such procedure has no place in a democracy, and it will have no place if Mayor Hanson's methods at Seattle be used as a precedent.

New terms have crept into our language that carry with them a threat and a menace. Bolshevism, the dictatorship of the poletariat, the direct actionist, the Soviet, the solidarity of labor. They are of foreign origin and receive but scant hospitality from American-born workmen. I have no fear that Bolshevism will take root here, but I do feel that even the American-born workman subordinates himself too readily to the domination of his union leaders, and that he is working on the theory that loyalty to the union, and not loyalty to the public interest, is his first duty.

The union is supposed to be a form of democracy, controlled by the will of the majority; but there are few cases, indeed, in which the free and unrestricted views of the majority prevail. Meetings are subject to the same plays and tricks as political meetings, and rumors of packed meetings, coercion, intimidation, and other misuses of power, are by no means rare.

The meeting hall of the Boilermakers' Union at Seattle is reported to hold nine hundred men. The membership of this union is said to be fifteen thousand. The vote to strike was taken last January at a late hour by men present in the hall, so that a majority of approximately 6 per cent of the membership determined the policy and action of the other 94 per cent. And such is the loyalty, or the habit, of the members that the 94 per cent accepted the vote as binding, although private polls of several large groups showed a large majority against the strike. I believe there is no doubt that the Seattle strike was decided upon and enforced by a minority; that it was not the result of a free registration of the will of the majority, after a full discussion. Members of unions will learn sooner or later that it is through such action as that, that confidence in their responsibility to carry out an agreement is lost, and that unionization of industrial processes is looked upon as a step toward business demoralization and ruin, by many employers.

It is to the interest of the sane rank and file of the unions to see to it that pledges and agreements be kept in both spirit and letter; that methods and practices like systematic reduction of output be discarded, so that public sympathy, which heretofore has been unstintingly given to the aims and aspirations of labor organizations, be not forfeited through wrong and harmful methods.

Reduced Output

The unsettled conditions incident to the war, and the general desire on the part of labor to get a large share of the profits of industry, have resulted in some marked reductions of output. I have it on good authority, in two of the large cities of the country, and we may assume this condition to be fairly general, that while formerly from 1500 to 2500 common brick laid in the wall per day, depending upon the kind of work engaged in, represented a fair day's work for a bricklayer, today it is impossible to obtain more than from 500 to 1000 brick laid under the same conditions. While this reduction has taken place over a number of years, the heaviest shrinkage in output has occurred during the past year and a half. And this reduction in efficiency is by no means confined to bricklayers, but is characteristic of some of the other building trades as well.

The complete unionization of the clothing industry is being accompanied by an abolition of the peace rate system and by a reduction in the daily output per worker as well. Is it not timely to suggest a national investigation to determine to what extent a reduction of average output has tended to raise the price of certain commodities?

With such evidence as this before us, can we doubt for a moment that the insistence on the continuance of the "open shop" principle in industry is made in the public interest?

Greater production, greater thrift and frugality are the most effective factors in reducing prices, but increased production cannot be achieved unless wages be based on output instead of on hours worked.

The last two years have witnessed a wide extension of the eight-hour day, and if that has carried with it a corresponding reduction in output, and a proportionate increase in pay per hour, a very considerable increase in cost of commodities is accounted for.

Just Compensation

I recognize, of course, that the objection of certain unions to piece work is well justified because of past abuses of this method of wage payment, but there can be no question of the fairness and soundness of paying a man for the amount of work turned out, providing the unit or piece rate of compensation is fairly and equitably determined, and its permanency guaranteed. To meet the present urgent demand for increased production we can hardly leave it to the individual operator to determine what output a fair day's work shall represent; for we will sink inevitably to the capacity of the least experienced and least ambitious for our standard.

Wages based on output, under safeguards that will correct and prevent abuses, should be accepted by organized labor in industries where this practice has been discarded.

There is no doubt that a considerable part of industrial unrest, and its companion, industrial shirking, grew out of the exaggerated notions of profits which the intense industrial activity during the war was supposed to yield. No account was, of course, taken of the outlay for buildings and special equipment which had to be paid for out of profits, nor of the heavy inroads which Federal taxes made on the gross return. During the Seattle strike, agitators stated in open meetings that the largest shipyard in Seattle was earning $60 a man per day, out of which the man received $6. The statement was, I was told, widely accepted as representing the exact situation, and yet the facts were these: The yard employed 15,000 men, who, according to the statement, earned for the yard the small sum of $810,000 profit per day, or $250,000,000 per year. This represented over four times the total annual output of the yard, and more than two and a half times the value of the contracts held by it. Publicity of the facts is not a bad remedy to apply in such a case.

War Rhetoric

Another and not an inconsiderable part of present day unrest is due to the non-fulfillment of expectations growing out of the winning of the war. It was predicted that victory would bring in a new order of things, new social conditions, new relations between employers and employes in industry. Statements of this character were largely idealistic, and referred to an extension of rights and privileges to the downtrodden races of Europe, rather than to any promise of an increase in material advantages to our own citizens. But many people built high hopes on this rhetorical groundwork, and there is naturally keen disappointment that the armistice was not followed by an immediate improvement in the status and income of the individual. This was to be expected. To change from the excitement, the intense interest and the stimulus of war to the commonplace and comparatively humdrum conditions of peace, required a mental readjustment of our people that could not be accomplished without manifestations of discontent and distrust. It will take time to complete the change, but in the meantime we have a much more critical industrial body to placate and satisy, and we must look for a remedy to allay unrest and convince the workers they are receiving their fair share of the profits of industry.

While this conference has not had the time to devote any considerable thought to the industrial problem, it may not be out of place to put before it certain reflections on some of the remedies which are today receiving either consideration or the test of application.

Let us admit in the first place that the industrial problem is a complicated one that will yield to no particular formula, and that where there are so many suggested remedies there is probably no single and specific remedy.

Competition

The democratization of industry is glibly spoken of as one of the remedies, and the interpretation placed on this phrase ranges from the establishment of shop committees with authority in matters affecting the employment relations, to the complete control of the industry by the employes. I am not at all impressed with the idea that by democratizing industry we can solve labor difficulties and maintain the health and prosperity of the enterprise as well.

Competitive industry isn't a social or charitable affair; it is a conflict, and leadership is required to bring success. Just as the nation realized that arbitrary power must be concentrated in the hands of the President of the United States to make the nation's resources and facilities effective in time of war, so to keep industry strong and sound it is necessary to place in the hands of the individual that runs it, positive and complete authority. No competitive business that I know of was ever successfully and profitably run by an executive committee or other form of divided authority. Democratization that goes so far as to inject a foreign and discordant element into the management of an industry, that reduces and splits up the authority of the executive (and I believe those to be the aims of the proponents of this suggestion), will either kill industry or reduce it to so moribund a condition that it will have to be kept alive at the public expense.

Profit Sharing

Another suggestion to improve the employment relationship has been profit sharing, and new experiments are being tried at every hand. I am highly interested in the results, but as a means of allaying unrest and satisfying the worker, I am afraid most of these experiments are foredoomed to failure. The schemes that succeed will succeed because of the personality of the man behind them, and not because of the merit of the schemes. Profit sharing as it is usually applied involves payment to the deserving and the undeserving; to the ambitious, energetic, useful employe, and to the laggard who succeeds in just getting by. It is apt to result, therefore, in general dissatisfaction, and a lowering of the standard of efficiency. Many plans have been tried, but a small fraction survive. The profits of the average industry are rarely sufficient to make the amount distributed to the individual large enough to stimulate and retain his interest, and only exceptional industries like that of Mr. Ford can continue to make really effective distribution. I like Mr. Ford's plan, for it consists in paying high wages and insisting that the employes earn them. My own convction is that the best system for profit sharing consists in the opportunity for earning liberal wages for a standard amount of work performed, and that extra effort and output or extra quality ought to entitle the man to earn wages in considerable excess of the prevailing rates. This gives the man an immediate additional return on work, that is within his own control, and does not force him to wait until the end of the year for an indefinite share in an uncertain profit.

Partnership

The idea of taking labor into partnership is offered as another remedy. It sounds alluring, but, like profit sharing, is another one of those schemes it is difficult to make workable and permanently effective. In the first place, the average industry, with an investment of, say, $2000 per employe, rarely earns in normal times as much as $1 per employe per day. When the return for capital invested is set aside and provision is made for necessary additions and extensions, there is little or no cash to divide, and there is general disappointment among the partners. If any division is made it must be made in stock, or its equivalent—it can't be made in cash.

Interest in the ownership of a business undoubtedly has a steadying, stabilizing effect, but this interest must be earned through thrift and sacrifice, and not demanded as a right. I will not admit that the success of the industry I am at the head of has been gained at the expense of our wage-earners, that its continued growth has been due wholly to them, and that its capital and surplus have been accumulated by withholding from the men a part of their just earnings.

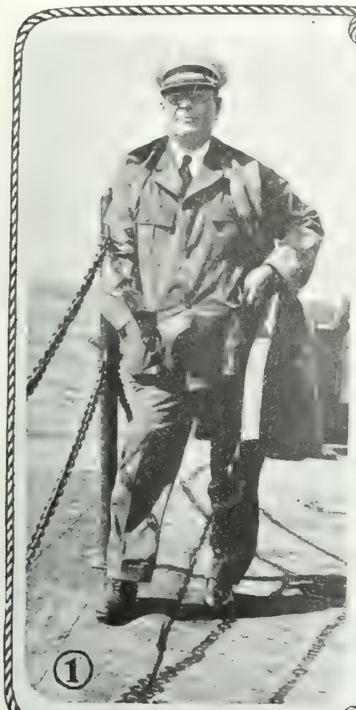
Our industry, like many other American industries, started through the ingenuity, inventiveness and business sagacity of men who entered a new and untried field. It grew through the thrift and energy of these same men. They weathered its storms, stayed with it through its discouragements, and kept it in the van by the constant addition of new and useful developments, and by the addition of capital for the use of which they mortgaged their future. There are no wrongs to be righted, no redress to make, and no moral justification for turning over title to part of our business to our present wage earners. I say this in full recognition of the splendid and valuable services rendered by some of our employes, because I feel that full compensation was given, not only for daily tasks performed, but for suggestions and extra services that were useful to the corporation.

And yet I am strongly convinced that a real pecuniary interest by the employes in an industry is a good thing, provided that interest is paid for. Partnership must carry with it a sense of responsibility in the pecuniary success of the venture, and cannot be helpful or effective if it represents an association in which one partner is purely interested in securing all he can for himself, without thought of the continued strength and success of the venture. I am in favor of opening up the opportunity for acquiring a stock interest in an industry to every workman whose length and character of service justifies it, and who has the nerve to assume the responsibility to pay for that interest in cash. And when the stock acquired by workmen and employes reached a proper volume, I would gladly welcome a representative of their choosing, as a member of the board of directors.

I believe that the biggest problem industrial management faces today is the labor and production problem; that it transcends in importance the sales and the financial problems, and that it is worthy of the exclusive and direct attention of the chief executive.

Many of the so-called remedies are but substitutes for that direct contact and attention which the chief executive, amid the pressure of other duties, is unable to give. My suggestion to the executives of the industries is to get back in touch with employment, production and wage problems, until a solution, applicable in your case, is found, and delegate to others the supervision of sales, finance and general policies which now absorb all available time.

AMERICAN BOYS FOR AMERICAN SHIPS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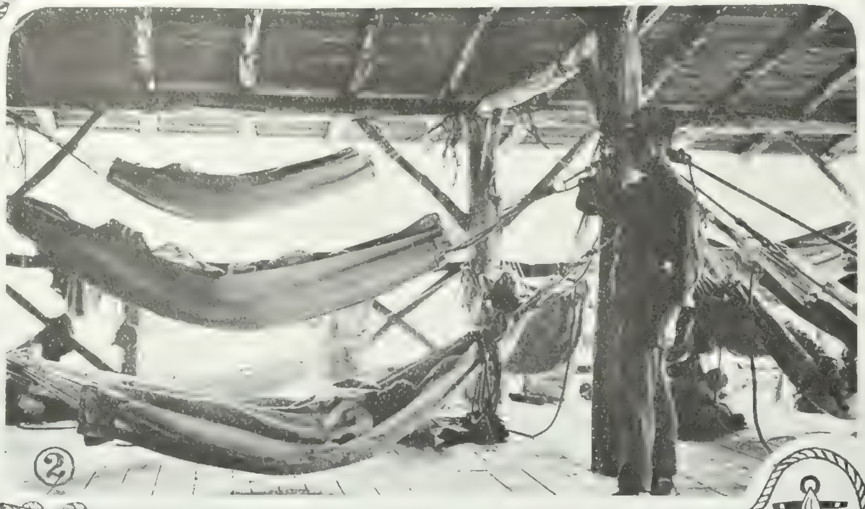
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1. James A. Wilder, Chief Sea Scout.

2. Bosun on the Sea Gull whistling "Rise and Shine."

3. Sea Scouts putting off in the boats from the Good Ship Sea Gull.

Sea Scouts of America

WHAT if the good ship Seagull must lie at her moorings forever? What if crests of trees rustle and sway above her quarter-deck, and bushes and grass adorn her fo'castle? Aye, what if a big black bowlder juts above her taffrail? She's as staunch a craft as ever knew a bosun's whistle—as proud a vessel as ever sheltered a hardy crew.

For the Seagull is the ghost of the Flying Cloud, the Dreadnought and other clippers of prouder days—a ghost come back to life. And although she's but an island, a wooded spot on Lake Kanohwahke in the Bear Mountain reservation—an hour's ride from New York—she's a super-ship in the eyes of the old sea-dogs, and a veritable Queen of the Deep with thousands of boys watching her progress eagerly.

The Seagull is a big adventure. If what is being done on this island proves successful, and every indication at present points in that direction, hundreds of similar "ships" will be established all over the country, and sea-scouting will become **the** thing for thousands of older scouts who have passed the first-class grade.

Her crew of pioneers is picked, representing some of the best scout material in the East, including boys from Ohio, Pennsylvania, Massachusetts, New York and New Jersey. No less a personage than the chief sea scout himself, James A. Wilder, of Hawaii, is its skipper and its officers include "portmasters" and "commodores" and "mates" and "bosun's" who have seen service in the navy and merchant marine and happily combine a knowledge of boy-training with an understanding of the sea and its mysteries.

For instance, there is the national portmaster, Herbert G. Horton, who is a licensed chief mate eligible to act as first officer of any ocean-going vessel, and who, too, served in the navy as an enlisted man and commissioned officer. Then, again, there's Portmaster Robert J. Taylor, also a navy man and an expert engineer, and Portmaster Charles B. Shaler of Pittsburg, one of the most efficient scout leaders in the country; Sloopmaster C. Rolland Green of Vermont and Assistant Executive E. R. Vanderhoof, who also served Uncle Sam at sea.

She has been rigged out like a sea-going vessel from "top-mast to keel," and flies her ensign proudly. To a landlubber the whole thing would be "just an island," but to a seafaring man, or to a boy with lively imagination, one end of the spot is her "bow," the section that faces east is her "stern," and all in between is the main deck, quarter deck, fo'castle, bridge and other parts that go to make up a ship that takes to water.

Here the boys learn how to care for the vessel and her equipment; how to tie and apply the various knots and splices sailors use; how to swing their hammocks and take them down; how to throw a life-line, follow a chart and box a compass; how to send and receive wireless messages; how to semaphore and wig-wag and do a thousand and one things that are essential in the manning of a ship.

The sea-scouting program aims to bring out the long dormant love of sea in American boys; it promotes a deeper understanding of ships and the men who man them; and it develops a keener interest in maritime affairs; for, as Wilder says, "a million sea scouts today mean a million citizens tomorrow who will have an intelligent viewpoint on the merchant marine and will be able to voice their opinion on this phase of American life, which, unfortunately, has so long been neglected."

Training Marine Turbiners

A class of turbineers at the Westinghouse school

WHEN the United States, through its Shipping Board, entered seriously into the shipbuilding industry, and its seagoing cargo vessels began to be very numerous, the operating division of the Shipping Board was confronted with great difficulty in securing properly trained officers, especially in the engine rooms.

A large proportion of the ships under construction were to be engined with steam turbines working through reduction gears, and it became necessary, in order to secure properly trained engine room forces for these ships, to give a special intensive course in the design, construction and handling of steam turbines to men who were already more or less skilled as engineers with reciprocating engines. The Shipping Board, therefore, made arrangements with the leading manufacturers of steam turbines in the United States to establish classes at their manufacturing plants. The first of these classes was opened at the Westinghouse Works, East Pittsburg, in the summer of 1918. The next class was opened at the General Electric Company's works, Schenectady, New York. These schools were under the official direction of the Shipping Board's recruiting service with headquarters at Boston, Mr. Henry Howard, a Boston business man and chemical engineer, being the executive of this department of the board's work.

After these schools had been in existence a short time, they were placed under the direction of Mr. Gathmann as supervising engineer of turbine training. Mr. Gathmann was a man of enthusiasm and a thorough marine engineer, and he deserves great credit for making this part of the Shipping Board's work the wonderful success that it is.

Turbineers studying a Control Valve, Westinghouse school

The course of instruction averages about six weeks. The students receive liberal shore pay, traveling expenses and an allowance for subsistence. Upon completion of his course and the showing of satisfactory average marks, the student is awarded a diploma which has no official status, but is considered ample evidence that the holder is qualified to operate marine turbines. Over 250 students have so far been enrolled in these schools. All students take the courses at both the Westinghouse school and the General Electric school with three weeks at each place. Students who are to handle some other make of turbine in the immediate future are then transferred to the plant of that particular manufacturer and given a short course in the handling and construction of the type of turbine manufactured there.

The average class consists of sixteen men, ranging from twenty-four to fifty years of age. As these men have usually had years of sea experience, they often are able to give valuable suggestions to the engineers of the manufacturing plants and they certainly at all times keep these engineers on the alert to answer their very practical questions.

The Westinghouse Company's school is under the direction of Mr. A. W. Kirton, who is officially in charge of the contract inspector's department, and Mr. Kirton has been very active in following up this work in the actual experience of these turbineers at sea. The students in the classes are invited to visit the works whenever they are on shore in order to keep themselves up to date on all changes in design, and they are kept in close touch with Mr. Kirton by correspondence, so that he may be informed about any problems that may develop on board ship. In a number of instances the follow-up system has been instrumental in making successful the operation of a vessel where otherwise there might have been disastrous failure.

Among old practical engineers at sea the chief objection to the turbine has always been that they could not see (using the word in a literal sense) how the thing worked. The turbine being entirely enclosed, it does not evidence internal trouble to the eye as a reciprocating steam engine does. The schools described have been able to remove a great deal of this prejudice in the minds of the men, because they are now able to understand exactly the construction and to see in their mind's eye the actual working of the turbine itself under steam.

How the Camera Aids Recruiting

WHEN the United States Shipping Board first started recruiting for its sea training service, Mr. Jerome A. Erickson enlisted along with a great many other young men as an ordinary "Gob" in the ordinary way. Mr. Erickson prior to enlisting had considerable experience in the art of photography in all its branches, and being an ambitious and resourceful young man, he soon saw that it would be possible to stimulate greater interest in the work of the Training Bureau by assisting its publicity with his pictorial art. On his own initiative he began applying himself to this phase of the sea training service and it was not long before his superiors began to recognize the worth of his talent and give him greater opportunities to use it.

The picture shown above, which is also used on our cover this month, is but one of many staged by Mr. Erickson. His latest efforts have been devoted to the moving picture field and several of his films illustrating life aboard the ships of the Recruiting Bureau of the United States Shipping Board have been shown on the various circuits of the big producing companies. The testimony of recruiting stations everywhere is that these films stimulate the interest of the young men of the community to a remarkable degree.

Pacific Marine Review wishes to express its appreciation of the good work of this young man and to thank him and his superiors for the courtesy extended in the use of pictures.

The appeal to the mind through the eye by means of pictures staged as Mr. Erickson can stage them is much more potent than any appeal through the printed word, and, in the interest of the recruiting service, we would respectfully suggest that this method be given a much wider opportunity.

Electric Welding in Steel Ship Building

By George R. Cooley

President, George R. Cooley Electric Company

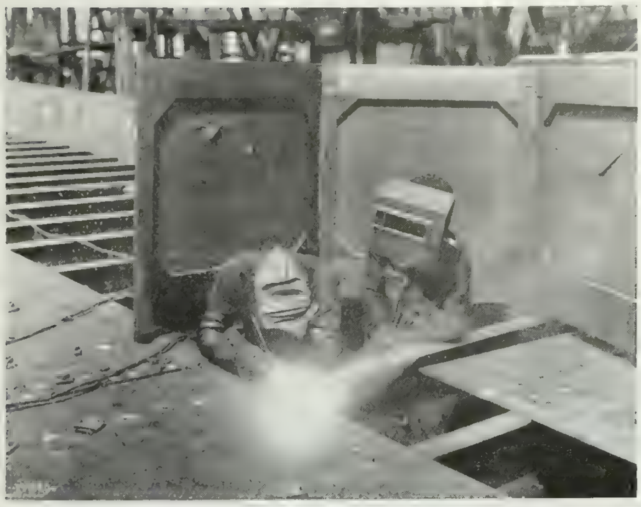


Figure 1.—Behind the Screen

THE original artificer in iron found that in order to join two pieces of iron together, both must be heated until they were soft, pressed firmly together, and then hammered. The skillful mechanic could thus join two pieces of iron together so that the joint was as strong as any part of the completed work.

When the shipbuilder abandoned wood in the construction of large ships for the more durable ships of steel, it was merely a problem of shaping and fastening pieces of steel together. The shaping was accomplished by the draftsman and the mechanic, but the ancient welder and his primitive methods could not be expanded to meet the requirements of the builder of steel ships. He was required to resort to other means, so he punched a similar row of holes in the two pieces to be joined and filled the holes up with red hot pieces of iron, battered in, and called it riveted; and the best job he could do was to make his joints 70 per cent as strong as the pieces joined, so that his competitor, the welder, was 30 per cent in the lead.

Modern requirements, urged on by the absolute necessity of the highest efficiency to meet war-time conditions, have been largely instrumental in developing electric welding, so that now the steel shipbuilder can join his parts of steel together and equal the work of the ancient welder by "doing it electrically."

J. F. Duthie & Company, quick to appreciate the possibilities of electric welding, have installed the equipment and placed at the head of their work an experienced electric welder and thirty or more expert men, and while now their work is only considered in its infancy—all over their yard, in the shops, and on the ships under construction, or in the ways and in the water—the flash of the electric arc is ever present, and the visitor, as well as the other workmen, are constantly reminded by appropriate signs not to look at the welders work on account of the danger to the eyes.

Electric welding is divided into two distinct classes—arc welding and spot welding. Arc welding is now very widely used in shipbuilding, but it is predicted that when suitable apparatus is developed, spot welding will come in for its share of the business.

If one side of an electric current is attached to a sheet of steel or other metal, and the other side is connected to a piece of steel wire, and the two are brought together and then drawn a short distance apart, an electric arc is formed between the two. If the two pieces of metal are held in this position for a few seconds, the point of the large piece of steel where the arc strikes will become white hot and the heat of the arc will cause the wire to melt and the liquid metal will drop down on the heated part of the steel plate and the two will run together as one piece of metal. If, how-

Figures 2 and 3.—The start and the result of ten minutes' work welding angle iron corners

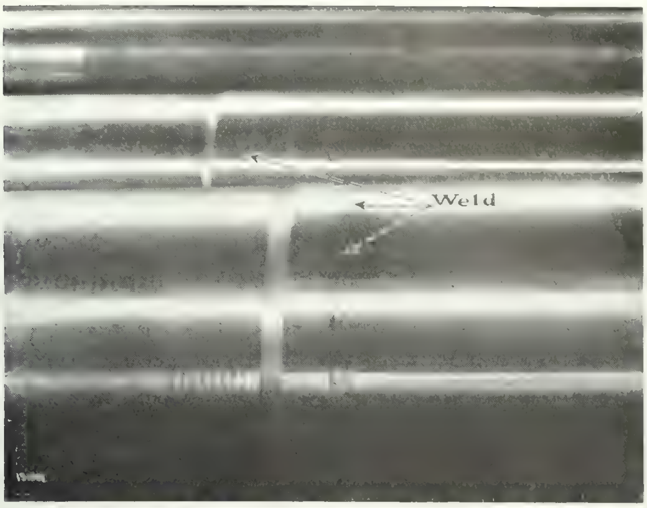
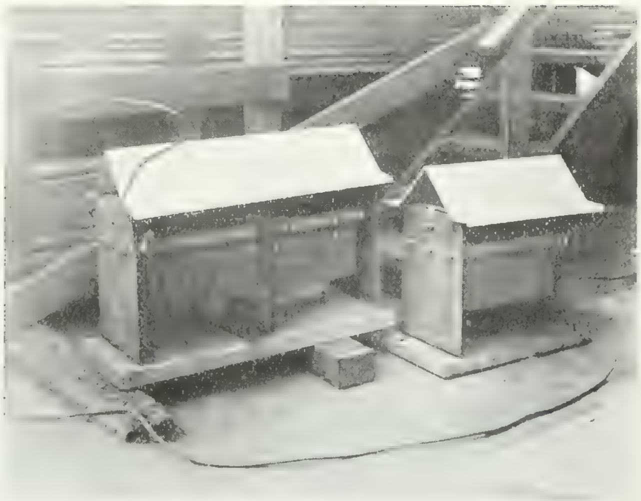


Figure 4.—Welds on bronze sleeves for tail shaft



Successful adjustable rheostats developed by Mr. Stull, chief electrician of J. F. Duthie & Company

ever, two pieces of steel are held close together and both connected to one side of the current, and the molten metal from the arc is allowed to drop on both of these, it adheres equally to both, and the two pieces of steel are permanently made as one piece. The ancient artificer's work has been done by the same principle and equally as well, but the method is vastly different.

If two sheets of metal are placed together and then tightly pressed between two points of copper and a strong current of electricity passed between the copper points, the two sheets of iron will become very hot on account of the resistance they offer to the current, and if the current is shut off and the pressure remains on, the two sheets of metal will be welded together. This is spot welding.

The current used for arc welding is ordinarily direct current, though alternating current has been successfully employed. At the plant of J. F. Duthie & Company, direct current is generated at 90 volts; this is reduced to from 20 to 60 volts, for each workman operates with an adjustable resistance or rheostat to suit the work at hand, each arc requiring approximately 150 amperes. The development of these rheostats took considerable study and experimenting on the part of Mr. Stull, chief electrician, before a satisfactory article was turned out, there being nothing suitable on the market.

The scope of electric welding at this plant is varied and the amount of work done is only limited by the electrical machinery installed, additional machinery now being on order.

Figure 1 is a "behind the screen scene" of an operator and his helper filling holes in plates that have been punched in the wrong place. This is a very simple operation, quickly done, and the plate is left in perfect condition.

Figure 2 shows an operator starting to weld two pieces of 8-inch angle iron together at right angles and Figure 3 shows what was accomplished in ten minutes' work. The whole job is finished in thirty to forty minutes.

The job of welding two sleeves of bronze together, that are slipped over 16-inch tail shafts, perplexed the operator for some time, but has been successfully accomplished, and J. F. Duthie & Company is the first concern in this country to have perfected an electrically-welded tail shaft sleeve that would meet the rigid requirements of both the American Bureau of Shipping and Lloyds' Register of Shipping. Considerable time and labor were expended by their shop mechanics in experiments on this piece of work and many obstacles had to be overcome before satisfactory results were obtained.

Figure 4 shows two examples of this work.

The intense light emitted from the arc is very dangerous to the eyes and has the same effect on the skin as sunburn. It is necessary, therefore, that the operator be amply protected, as shown in the picture, both for his eyes as well as his face and hands. Screens are erected around the work under way and ample warning given to other workmen not to look at the light.

Another very important use of arc welding employed at this plant is that of filling flaws in castings. What would otherwise be a worthless casting, with a very little work is now made perfect by an operator at an inconsiderable cost. Flaws in forgings are likewise filled. Under cuttings in lathe work are also made to full size by the same method.

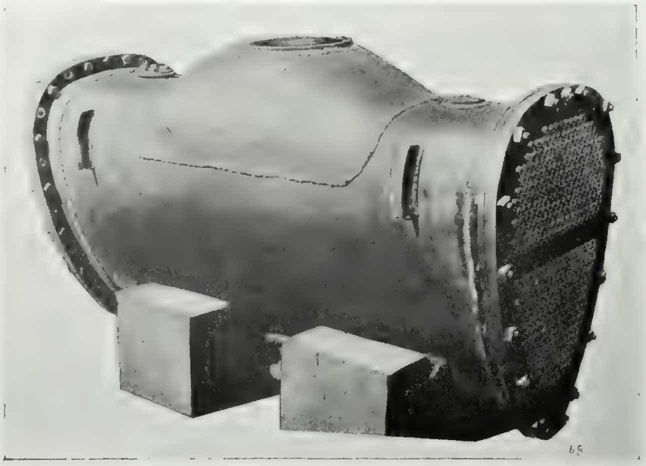
Plastic-Arc Welding—Its Past and Future in Ship Repair and Construction

By J. O. Smith

WHEN the matter of welding in connection with ship construction is considered, immense possibilities immediately suggest themselves. It has been definitely determined by exhaustive technical study and experiment that welding can be satisfactorily employed in ship construction, that ship plates joined by welding will be as strong as, or stronger than, the original metal at the welded joint, and that welding can be employed for ship construction work at a saving of 25 per cent in time and 10 per cent in material, as compared to riveting.

In actual figures, as determined by experiments of the Emergency Fleet Corporation's electric weld-

Arc Welder and his equipment



Condenser frame welded by plastic arc

ing committee, it was determined that by welding in the case of a 9500-ton ship the saving in rivets and overlapped plates would amount in weight to 500 tons, making it possible for the ship to carry 500 tons more cargo on each trip than would be possible if the ship plates, etc., had been riveted instead of welded.

An investigation by the electric welding committee of the Fleet Corporation has definitely established the following points:

> That electrically-welded ships can be built at least as strong as riveted ships.
>
> That plants for ships designed to be riveted can easily be modified so as to adapt them for extensive electric welding, and thus save considerably in cost and time for hull construction.
>
> That ships especially designed for electric welding can be built at a saving of 25 per cent over present methods and in less time.

An electrically-welded ship is credited with many advantages over a riveted ship. In a 5000-ton ship about 450,000 rivets are used. A 9500 deadweight ton ship requires 600,000 or 700,000 rivets. By the welding process the saving in labor on the minor parts of a ship is reckoned at from 60 to 70 per cent. On the hull plating and other vital parts, the saving in labor, cost and time of construction by welding is conservatively placed at 25 per cent.

That electric welding will some day largely replace riveting is also the judgment of the electric welding committee, which is composed of eighty-two of the leading experts in both the electrical and metallurgical branches of the welding field.

Considerable investigation of the subject of welding instead of riveting has been made in England by Lloyds' Register of Shipping, particularly with regard to formulating rules for application to the electrical welding of ships. As a result of the investigations and experiments by the society's technical staff, it was determined that the matter had assumed such importance as to warrant the formulation of provisional rules for electrically-welded vessels, and these have been issued for the guidance of shipbuilders by Lloyds' Register.

The experiments conducted in England followed three well-defined lines of investigation: Determination of ultimate strength of welded joints, together with their ductile properties; capability of welded joints to withstand alternating tensile and compressive stresses, such as are regularly experienced by ships; and miscroscopic and metallurgical analyses to determine if a sound fusion was effected between the original and added metal.

It was determined that the tensile strength of the welded joints was from 90 to 95 per cent of the original plates, as against a strength of from 65 to 70 per cent in riveted joints, showing a margin of 25 per cent increased strength in favor of the welded joints.

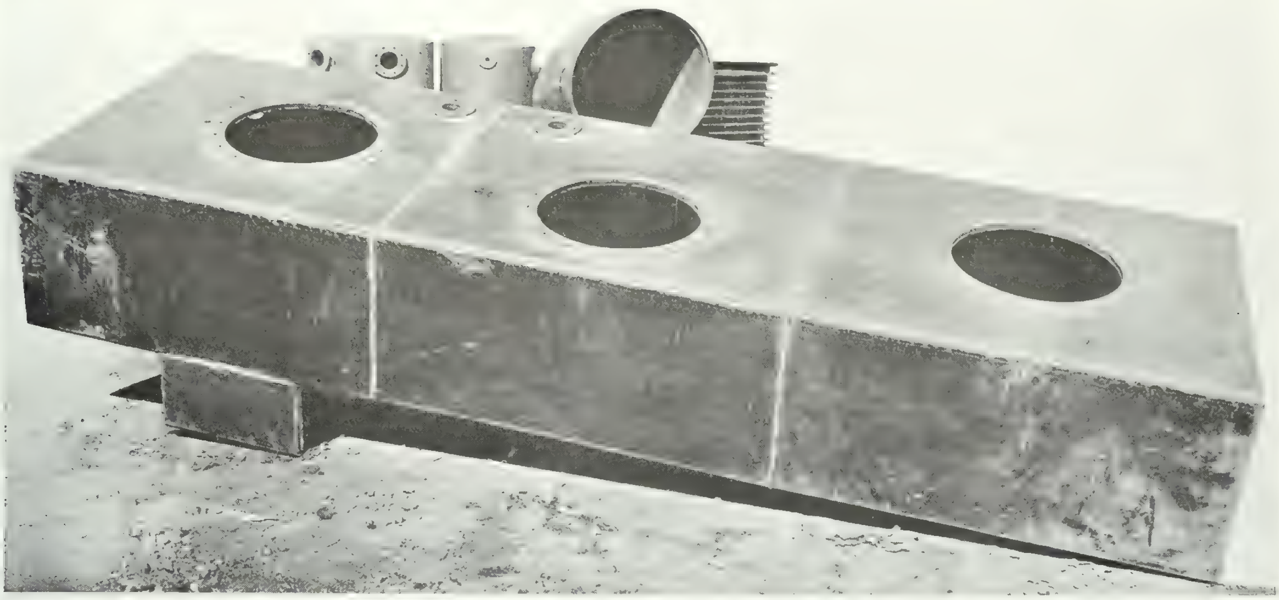
The result of the tests of the elastic properties of welded joints determined that there was a slight difference in favor of the riveted joint, but the art of welding has made such great strides recently that it is now believed entirely possible to make a welded joint in ship plates that will stand as great a number of reversals of stresses as a riveted joint.

Microscopic and metallurgical analyses have determined definitely that a good, solid, mechanically-sound weld was made between the original and the added metal, the two metals having been fused together so perfectly that no line of demarcation could be seen.

The rules so far promulgated by Lloyds have been necessarily of a tentative nature and will no doubt be modified and enlarged from time to time, in view of the experience that will be gained after a few welded ships have been in service for a time.

It does not require a great deal of imagination, however, to enable anyone to form the opinion that the shipbuilding industry is on the eve of great modifications in constructural lines, and the guidance given the shipbuilding industry by the tests and comparisons so far made will undoubtedly lead to important, radical departures and developments in the industry.

In addition to the increased cost of riveting as compared to welding, it is practically always true that there is a certain percentage of imperfectly-fitted rivets, and these have done nothing more than add weight to the ship. The main purpose of a rivet, of course, is to bind two or more thicknesses of plate together, but if the rivet is bent, loses part of its head in the riveting process, or otherwise



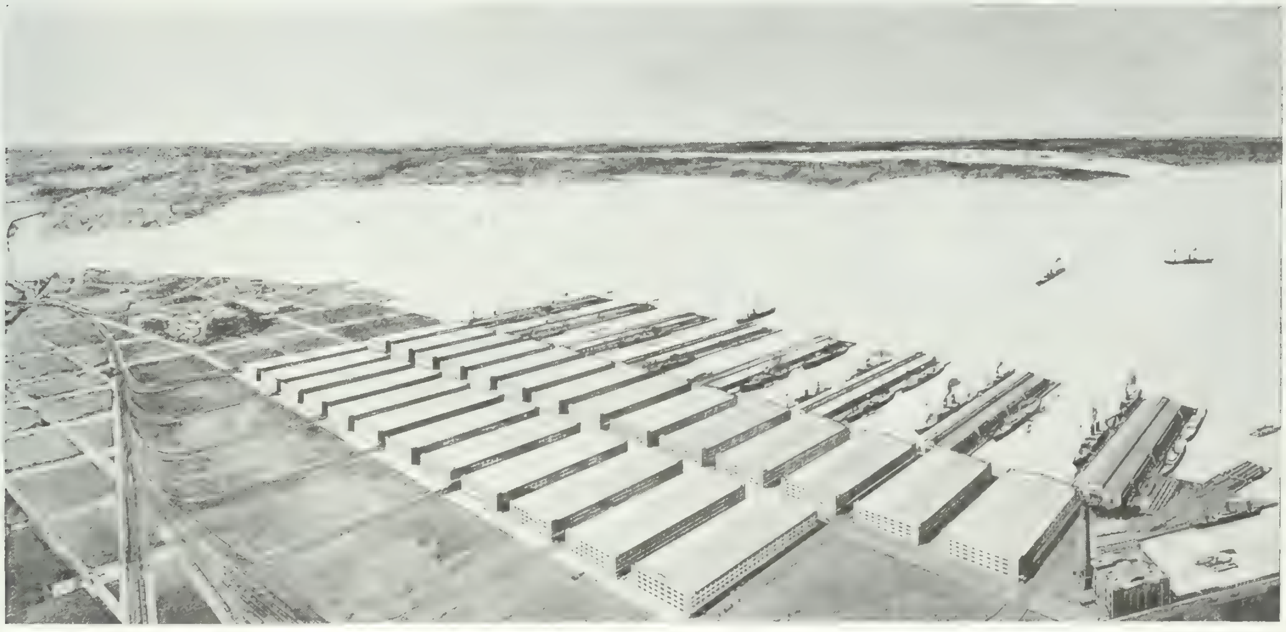
Oil tanks for destroyers welded throughout

fails in its proper purpose, there is no method by which such faults can be corrected after the rivet cools. It must be removed entirely if the importance of the riveted part requires a perfect joint, and this is frequently a time-killing, expensive course to follow. When it is considered that a 5500-ton ship requires approximately 450,000 rivets to bind the various parts and plates and also that many of these rivets are not fulfilling the purpose for which they were put into the ship, it is evident that practically every ship is burdened with a good-sized load of dead, useless weight. Such defective rivets are, in fact, more than a useless weight, in that they are a menace to the ship, for while they have been built into the ship for a purpose and are supposed to be fulfilling that purpose, there is no telling how much the ship has been weakened structurally by their failure.

In many cases, when such leaky rivets are discovered, the present-day method is to weld such defective spots, and this immediately brings up the natural question as to why the plates should not be welded in the first place.

The fact that a welder using a direct-current, low-voltage arc with automatically-regulated current is able to make sound mechanical welds in cramped, confined spaces on overhead or vertical walls—in fact, anywhere a man and a wire can go—naturally suggests that welding ship plates together should be the primary operation in shipbuilding.

Port of Baltimore Expansion



In order to enable Baltimore to take advantage of the expected expansion of export trade, certain financial interests of Baltimore have had plans drawn for a terminal which is to be built on the south side of the Patapsco River, within the new city limits. The Terminal Company controls two miles of undeveloped waterfront, having a total area of approximately 700 acres. Plans have been drawn so far for eight piers, 1800 feet long by 300 feet wide, with 400-foot slips between them. The piers are to have double-decked sheds with complete equipment of electric cranes and conveyors, with five railroad tracks serving each pier. Investigation has shown that approximately 30 per cent of the cargo moving over the pier goes through the warehouses; hence it was found that two warehouses, of the size shown, are necessary for each pier. It is anticipated that actual construction work will begin in a comparatively short time. Mr. F. W. Kassebaum, Junior, has been the engineer in charge of the development of the terminal.

THE WORLD'S LARGEST MARINE TERMINAL WAREHOUSE

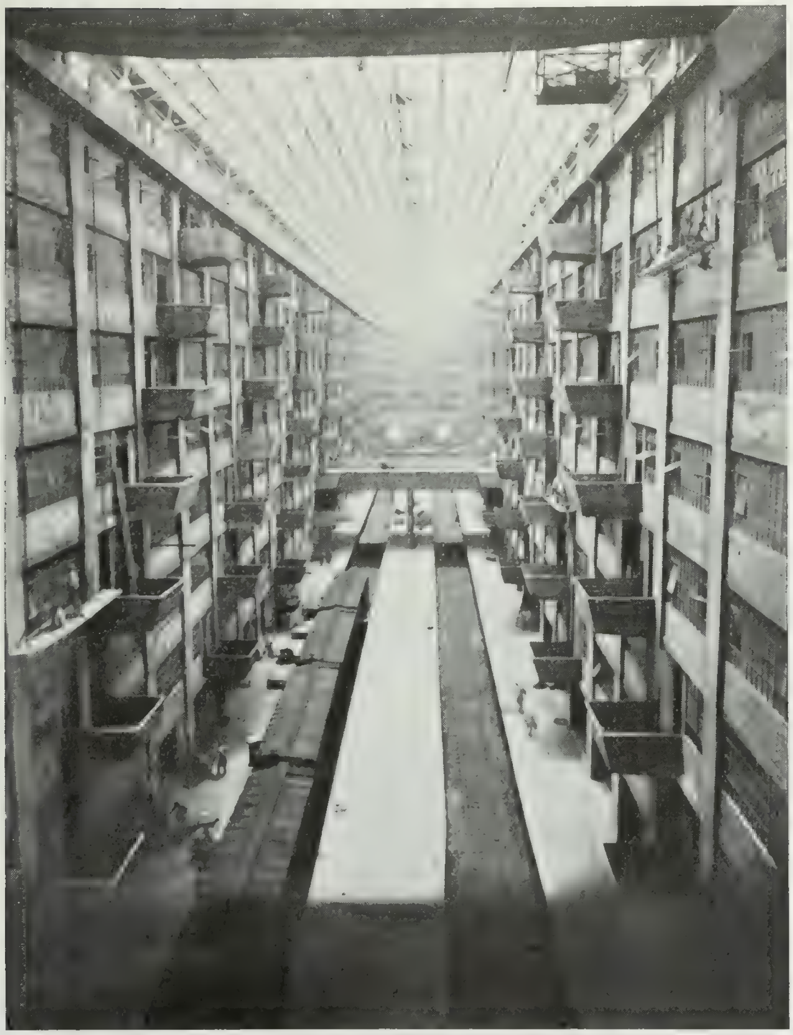
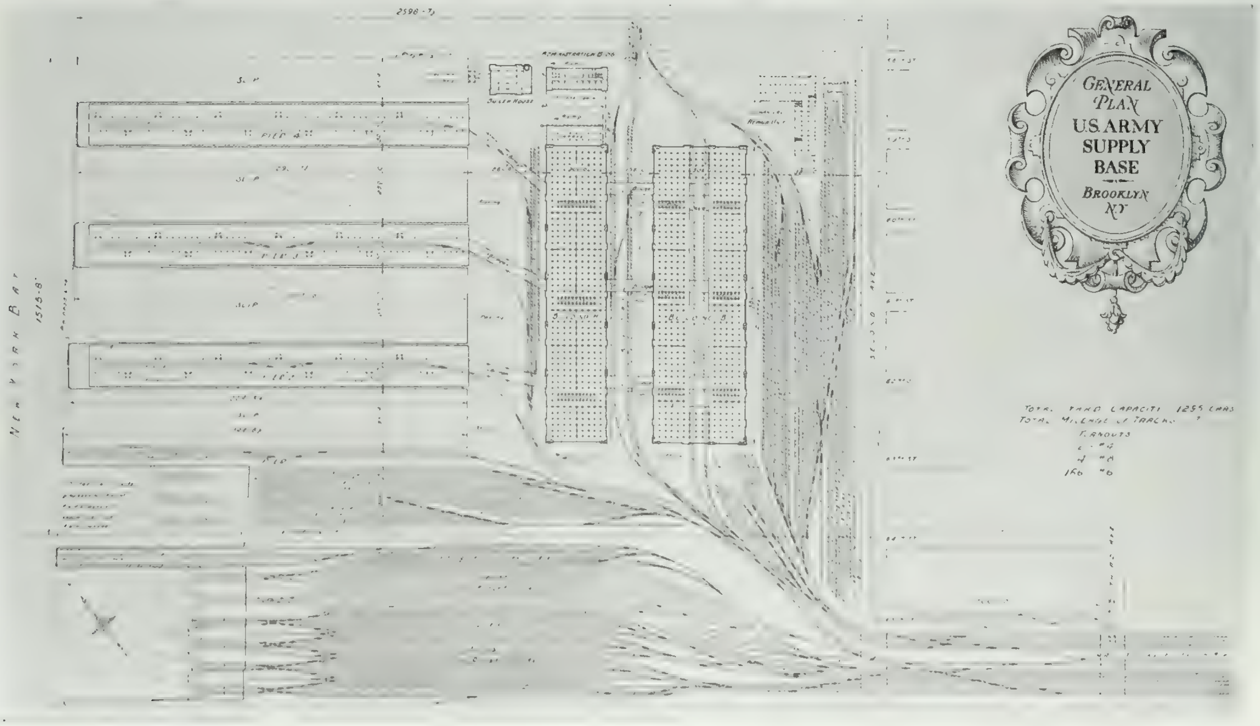


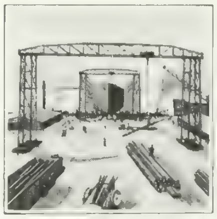
Illustration herewith shows the interior of a central bay of the great Army Supply Warehouse at the Brooklyn Terminal. This central bay is spanned by an electric overhead crane. Note on each floor the numerous balconies onto which trucks can be backed for receiving goods from this crane. The double depressed tracks with loading platforms on each side make possible the handling of enormous amounts of freight without congestion. The following figures give some idea of the immensity of this building.

Length: 980 feet.
Width: 306 feet.
Center Bay: 66 feet.
Net Width: 340 feet.
Height: 9 stories.
Floor space: 50 acres.
Elevators: 48.

Designed for a capacity to handle 15,000 carloads or approximately 350,000 tons of freight on a 30-day turn over basis, the electro-mechanical equipment of this warehouse is one of the most marvelous engineering productions of the war period and will well repay a close study on the part of all interested in the designing and construction of marine terminals from an investment standpoint. We urge all shipping men to read carefully the following article describing in detail what engineering science can accomplish in handling general cargo.



Material Handling



The World's Largest Marine Terminal

RISING in impressive magnitude on the waterfront of New York Bay, constructed under the stress and secrecy of war, is the world's greatest single terminal and distributing warehouse plant. It is known as the United States Army Supply Base, Brooklyn, and is the largest of the government's great receiving and distributing bases which have been erected at Brooklyn, Boston, Port Newark, Philadelphia, New Orleans, Norfolk, Charleston, Newport News, as well as in Chicago, St. Louis, Columbus, Ohio; Jefferson, Maryland; Pittsburgh; New Cumberland, Pennsylvania, and Schenectady.

The Brooklyn Army Base embraces about 100 acres from landward line to pierhead, over fifteen miles of railroad tracks, which include storage for 1300 freight cars, and 8000 feet of available stringpiece intended for loading simultaneously a dozen deep-draught ocean freight carriers.

There are two main warehouse buildings, "A" 200 feet by 980 feet, and "B" 240 feet by 980 feet; a mechanical and repair building; a four-story administration building, and three transfer sheds or pier houses, 150 feet by 1350 feet each, which function in the transfer of freight to and from the water carriers.

The warehouse floors contain over four million feet of floor space and the transfer sheds one and a quarter million feet, or a combined total of 116 acres. Including the transfer sheds for transient use, this affords actual storage space for about 15,000 carloads of goods.

Handling 15,000 carloads, or 300,000 to 400,000 tons of freight, on a thirty-day turnover basis, particularly in these times of labor shortage, requires the utmost possible conservation of time and effort. The whole handling system of the Brooklyn plant is calculated to meet those big problems in freight and merchandise handling which begin and end at the shipside or car door and involve loading, unloading, plant movement both horizontally and vertically, and tiering.

Unique Equipment and Methods

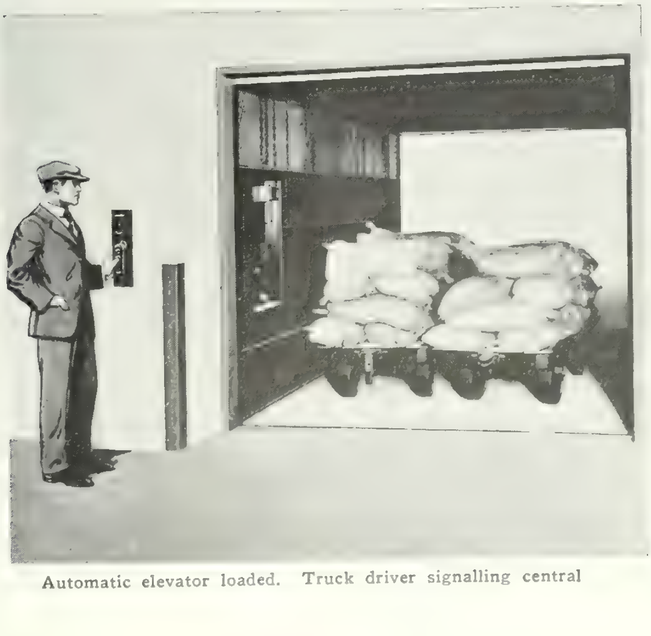
In addition to the size of the plant, there are several outstanding features which mark a great advance in merchandise and freight handling equipment as well as in methods employed, and the progress in the art of vertical transportation as applied thereto.

The utmost practical utilization is made of various devices for the reduction of manual handling. These are automatic elevators, cranes and derricks, lifting trucks for picking up whole loads with one single operation and shifting to other locations, trailer trucks and both gravity roller and portable power conveyors.

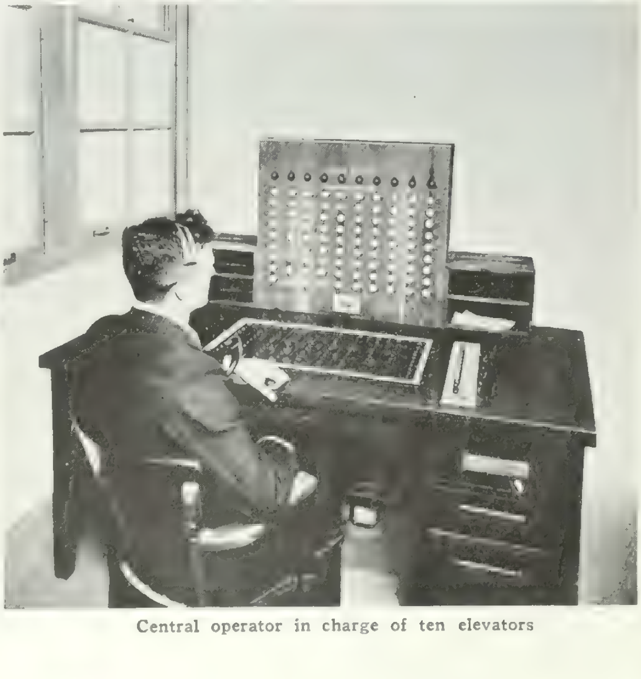
It is an old warehouse maxim to "keep the goods moving," and here, too, they are kept going between shipside or car door and the storage piles. However, not only keeping them moving, but "keeping the goods on wheels" is a fundamental and distinctive feature of this plant.

The Trackless Train

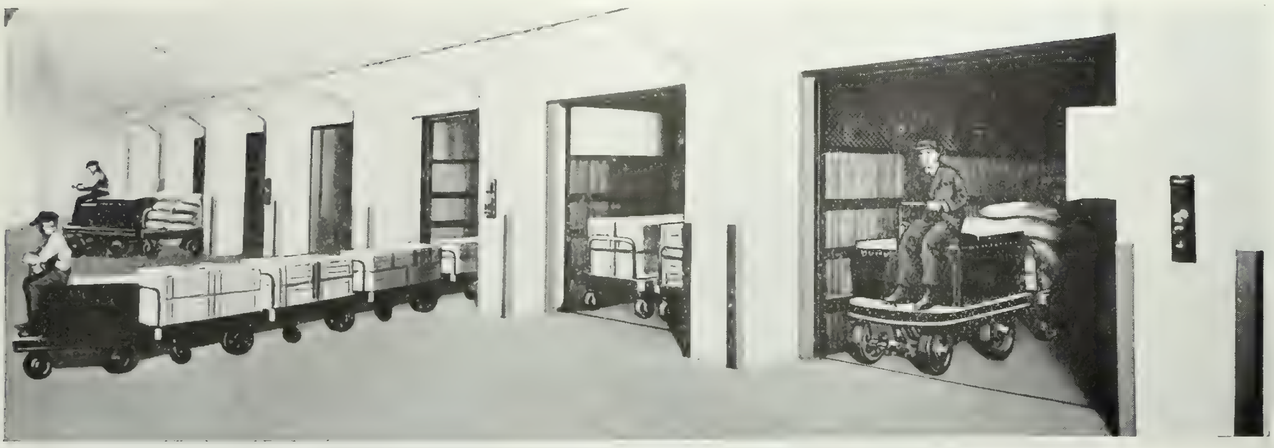
In this modern development everything is carried on four-wheeled trailer trucks, and here the



Automatic elevator loaded. Truck driver signalling central



Central operator in charge of ten elevators



General view of ten automatic freight elevators with trackless industrial trains unloading at an upper floor

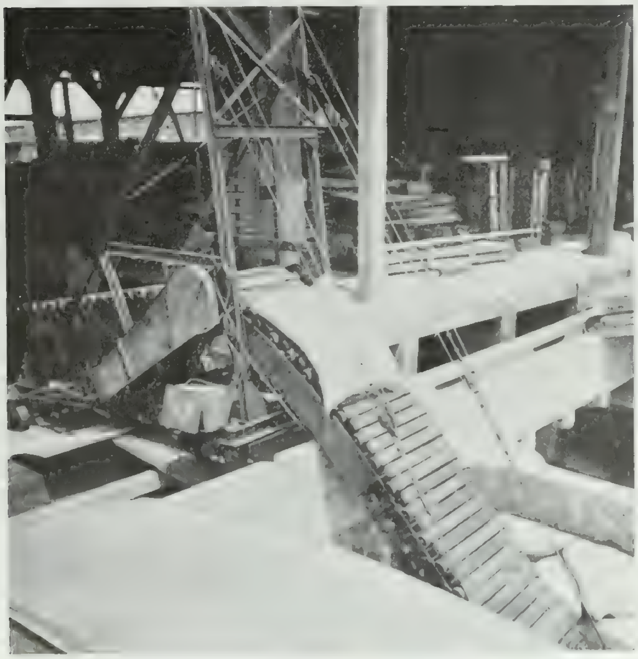
goods which are carried across country by the trainload are also handled by the truck trains through the plant.

The trailers are moved horizontally by industrial plant tractors and vertically by means of one of the most original and highly efficient elevator installations ever devised. Goods are kept on the original trailers from loading point to destination, and handling is reduced to a minimum. The trailers are usually moved in trains of from four to five if loaded, and six to eight if light, and one man with a tractor handles the train. This should be contrasted with the string of handlers which would be necessary to move an equal tonnage with the old two-wheeled baggage trucks.

The tractors and trailer trucks are, of course, narrow gauge, and the trains are easily handled in the aisles and around the turns. For short trailer movements tractors are not used, as one man readily handles on a four-wheeled truck two or three times the average load of a two-wheeled hand truck.

The whole plant is laid out in definite one-way traffic lanes, carefully calculated to afford maximum access and minimum congestion.

In addition to the yard movement, this traffic system includes communication between the transfer sheds and warehouse "A" via three bridges which connect the second pier level with the third warehouse level, while additional bridges and subways under streets connect warehouses "A" and "B." This practically eliminates the necessity for tractors and trailers to cross the railroad tracks in the yard or streets, as the goods moving between the first pier shed level and the warehouse floors travel via the pier elevators, the bridges, subways, and the warehouse elevators.



Automatic conveyor unloading sacks from lighter at pier

Vertical Transportation

Speeding up and controlling the horizontal movement on one level, however, is not the most serious problem confronting most plant and warehouse managers. Comparatively few executives conceive the extent to which indifferent elevator service affects plant turnover, but as a matter of fact, as the number of levels or stories increases, the elevators become more and more as the spout of the funnel and their efficiency the measure of the rate of the flow of goods.

This fact was given a great deal of consideration in planning the Brooklyn Army Base, with the result that an elevator plant with many original and ingenious features was devised.

There are in all ninety-six elevators, of which ninety are for freight and six for passenger service.

Ninety Operatorless Elevators

The ninety freight elevators are of 10,000 pounds capacity; eighteen are located in the pier sheds, serve two floors, and have a speed of 100 feet a minute; seventy-two are located in the warehouses, serve nine floors, and have a speed of 150 feet a minute.

The elevator platform is 9 feet 4 inches by 17 feet in the clear and intended to carry four trucks. Automatic stops are accomplished wherein the elevator platforms invariably register accurately with the landing sills by means of an automatic leveling device, and the landing or hoistway doors are opened automatically when the elevator reaches the floor to which it has been dispatched. Operators on the cars are not used.

Elevators Arranged in Groups

In a few old-time office buildings and hotels, one finds the passenger elevators scattered about individually or in pairs, but modern practice groups them to secure the minimum waiting time between departing cars and to facilitate supervision. This same reasoning unquestionably applies to freight service, and the advantages of grouping elevators in industrial plants is conclusively demonstrated in the Brooklyn Army Base.

From seven to ten cars make a group which serves a "section" of some 325 feet in length, of each building unit, and out of such a group one is reasonably sure of getting some one car to serve his needs without waiting for any particular elevator. In other words, with ten cars in a group, the average waiting time will obviously be just one-tenth of what it would be if each car was placed separately.

In the Brooklyn Army Base, each group of elevators is handled entirely by a central dispatcher, who is located in a small office placed for convenience a short distance from the group. Before him is a table not unlike a telephone switchboard, with one upright and one horizontal panel. In the upright panel is a column of white lights for each elevator, each light representing a floor. At the top of each column is a colored light which indicates, when lighted, that all hatchway doors are closed and the elevator can be operated. The operating buttons are placed in rows in the horizontal panel.

The group system, in which the elevators are operated by a central dispatcher, instead of each elevator being placed separately and operated individually, gives the least waiting time and maximum service out of a given number of elevators. A central dispatcher, with a group of elevators under his control and knowing all the requirements, can get better service than can be obtained from the same or even a greater number of elevators placed singly and subject to both the varying intelligences and the loading tendencies of as many individual operators.

General Service

In general or miscellaneous service, which is the most difficult to handle, the dispatcher receives calls for cars from the various floors. As an example, the dispatcher gets a call for a car from the seventh floor to take goods to the third floor. A quick glance at the vertical panel shows that car No. 5 is standing idle at the sixth floor, since its "6" white light is burning. The colored lamp at the top of the row is lighted, indicating that all doors are closed. The central dispatcher then touches "7" button and the white light disappears as the car leaves the sixth floor, and shortly signals arrivals at the seventh floor by means of a light in bulb "7." As the doors open automatically, the colored light is extinguished and the car is out of the control of the dispatcher and cannot be run until some one on the seventh floor touches one of the seventh floor door closing buttons, of which one is on each end of the car and two others alongside the opposite entrances. As soon as the load has been run on and the door button pushed, the doors closed and the colored light again appears, signaling to the dispatcher that all is clear to go ahead. He then touches "3" button, thereby dispatching the car to the third or destination floor.

When certain elevators have been assigned by the dispatcher to regular or fixed service for a time, such as handling a trainload of flour going from the first level to the seventh, individual calls are not needed, for the lights alone tell the story, the appearance of both a colored and a white light in the same panel then indicating that the car is loaded, the doors closed and the elevator ready to be dispatched.

The central dispatcher can readily detach any elevator of his group from the operating board. It then can be operated directly from the car switch provided therefor, and still retain its automatic door opening and automatic leveling features. Until disconnected from the central board, however, the car switch remains inoperative.

Excepting for convenience, or when goods are being sent to a floor where no one is working at the time, no one needs to ride on the elevators for the purpose of operating the elevator or its doors.

The Micro Leveling Elevator

The elevator equipment described in this article is an epoch-making development in the field of vertical transportation. It represents the product of years of experience in elevator design and manufacture, and is the result of the combined genius of engineers and inventors. It is a well-known fact that with an automatic push button elevator, in order to be adaptable for freight service where trucks are used for handling goods, the car platform must be brought to an accurate level with the landing and maintained there under all conditions of loading and unloading.

A push button controlled elevator has recently been developed which stops the car automatically with any desired accuracy and with any load within its capacity. When the position of the car changes during the loading and unloading, due to the lengthening or shortening of the cable, the car is automatically and quickly restored to the landing level. This remarkable accomplishment made it not only possible but more advantageous in this case to operate the freight elevators by a central dispatcher than by individual operators on each car.

This new automatic elevator is known as the "Micro Leveling Elevator."

In the Brooklyn Army Base the main machine is of the worm gear type and is driven by a two-speed alternating current motor giving full and one-third speed. The "Micro Drive" consists of motor, brake and worm gearing about one-tenth of the speed and power of the main machine. The micro drive is mechanically connected to the main machine through the revolving electro-mechanical main brake. The slow motion of the "Micro Drive" through the final few inches of travel in connection with a novel system of control, results in the car stopping level with the landing with any load to the full load capacity of 10,000 pounds. Since the leveling is accomplished at slow speed and by means of the small motor, there is less wear and tear of mechanical and electrical parts than with an elevator of the ordinary type and the amount of power required for leveling is reduced to a minimum. Micro operation is applied to car switch as well as automatic push button control. In this case the operator throws his switch to the stop position on approaching the floor, just as in the operation of the ordinary car switch control. If the car is within the micro zone, the micro drive functions and stops the car level with the floor. Although the micro or leveling zone extends eight inches above and below floor levels, in actual service the average micro movement is usually not more than three inches.

Selective Automatic Door Opening and Closing Machines

The doors are operated by an ingeniously arranged mechanism which automatically opens the doors at the floor to which the car has been dispatched and as the car approaches that floor. As the door operating machine starts to open the doors when the leveling zone is reached by the car, it is obvious that the leveling is accomplished while the doors are being opened and therefore no additional time is required for leveling.

The door **closing** operation operation can be initiated only by touching a closing button either on the car or alongside the door opening on the floor.

Hatchway Doors

The doors themselves represent a radical development in elevator hatchway doors.

Consideration of the trailer truck problem pointed the way to doors of maximum height and rising from fixed sills. Due to the high door openings and limited story height, it was necessary that the door operating mechanism be so arranged as to first move the door horizontally into the hatchway a sufficient distance to clear the sill and door above and then to raise the door vertically to clear the opening.

These doors are made of a steel frame with panels ¾ inch thick of sheet steel and asbestos composition. In case of emergency, the cars can be run with the doors open.

Pier Shed Elevators

Ships are unloaded in part on both pier shed levels, and goods in transit between the warehouse and first transfer shed level reach or leave the latter on trailer trucks via the eighteen automatic elevators with which the sheds are equipped. These elevators are operated individually by means of buttons on each floor and in the car. In all other features they duplicate the warehouse elevators.

The Army Supply Base was constructed for the traffic, storage and purchase division of the War Department. Quartermaster General Goethals, director of said division, appointed Mr. Cass Gilbert architect thereof, under whose direction and supervision the original conception was fostered and developed. The actual construction was carried on by the Turner Construction Company under the construction division of the War Department, under the command of Brigadier-General R. C. Marshall, Jr. Lieutenant-Colonel H. S. Crocker was constructing quartermaster.

Much credit is due both the Turner Construction Company, general contractors, and their many subcontractors, who have made a wonderful record in bringing the plant to a state of practical completion in the limited time at their disposal. The elevator installation was made by the Otis Elevator Company.

While designed and built primarily for government service, a prominent warehouse and terminal operator, who has been identified with the Brooklyn Army Supply Base, has recorded his belief that the solution of some of the most difficult problems confronting operators of commercial enterprises of this class lies in following the government lead here, inasmuch as he considers the Brooklyn base in every way an ideal plant.

This comes from one who has made a life study of handling costs as represented by labor, upkeep and overhead, and was made with the commercial rather than the government viewpoint in mind.

Army section, Boston Supply Base

Boston Army Supply Base

THERE is no group of piers, wharf structures and equipment in the country for the handling of merchandise for ocean transportation, if indeed there is in the world, that excels the new Boston Army Supply Base in South Boston. Boston may well feel proud of this, designed by the Boston engineers, Fay, Spofford & Thorndike, with Lieutenant-Colonel Charles R. Gow of Boston as constructing quartermaster for the Army and the W. F. Kearns Company of Boston as the general contractor. It is held at the present time by the Army and Navy, but it is fitted throughout for commercial work and will probably be available later for the regular business uses of the port.

Some of the figures are surprising, and place the construction, as a whole, among the largest single building projects in the world. There is, for example, over a mile of berthing space for ocean steamships, with thirty-five feet of water for half of this length and the remainder already dredged to thirty feet at mean low water. There are more than sixty acres of floor space within its buildings, with many acres in addition in open storage, platforms, paved roadways and railway tracks.

There are three units which together comprise the Boston Army Supply Base—the portion operated by the Army, that operated by the Navy and the utility group, including administration building, boiler house, electric sub-staton and accessories.

Army Section

The Army portion of the base comprises a wharf shed of two stories and a storehouse of eight stories. These are parallel, and between them are railway tracks and a roadway for trucks. The wharf shed is nearly a third of a mile in length and is 100 feet in width with a floor area of 320,000 square feet.

Alongside, bordering the reserved channel and extending beyond the building in both directions along the channel, is the landing platform, three-quarters of a mile long and thirty-five feet wide, opposite the wharf shed. This bears two railway tracks; the water at its edge is from thirty to thirty-five feet deep, and it is being fitted with the most effective types of freight-handling devices. These include semi-portal cranes for use either from the landing or from a galley on the second floor.

Six bridges connect it at the second story with the third floor of the adjacent Army storehouse.

This Army storehouse is of the same length as the shed, 1638 feet, and has a total floor area of 1,651,000 square feet. It is intended for the purpose of storing merchandise that is to be held for some time, and to supply goods to take the place of those delayed in railroad transportation. For its uses, it has twenty-four elevators, each of 10,000 pounds' capacity, speeded at 150 feet per minute. These are of the latest pattern, automatic in their stopping, self-adjusting to the floors and self-leveling. The general transportation system within the building and in its relations to the freight shed is by electric tractors and trailers, and these may make use of any of the bridges connecting the storehouse with the wharf shed, as well as the street between, thus affording the greatest flexibility in receiving or shipping merchandise or placing it in storage.

Foundations

The storehouse foundations consist of concrete cylinders, one under each column, built in open wells formed by sinking concrete shells, 8 inches thick and 6 feet in outside diameter, into the hard clay stratum. The wells were belled out at the bottom to give sufficient bearing area for the column loads, the diameter of the bells at the bottom varying from 11 feet to 17 feet 6 inches, depending upon the load to be carried. The open well is filled with concrete and a concrete cap at the top distributes the load over the shell and core. The wharf shed foundations are on wooden piles. The interior foundations for the pier shed are Raymond concrete piles; the foundations for the exterior columns on the north and south sides, respectively, of the two buildings are on reinforced concrete sheet pile bulkheads which also restrain the fill.

Navy section, Boston Supply Base

Navy Section

The portion of the base operated by the Navy comprises two freight sheds, each 924 feet long and 100 feet wide, three stories in height, with a floor area of 580,000 square feet. These buildings are connected by four bridges spanning three depressed tracks, and are fitted with elevators.

There are 2200 linear feet of berthing space alongside with thirty feet of water later to be increased to thirty-five feet. There is a landing platform along the water sides, 28 feet in width, fitted with cargo hoists.

Rail Service

The great Boston Army Supply Base is served by the New York, New Haven & Hartford Railroad and has additional facilities for teams, auto trucks, vessels and lighters. There is a special equipment of the highest order for the handling of merchandise delivered in the various ways, or for assembling it from the goods in the storehouse. The latter may be brought conveniently together on the second floor of the wharf shed and can be loaded directly into vessels.

Freight-Handling Equipment

The following machinery is installed for loading, unloading, distributing and tiering freight:

Four electric bridge cranes for the wharf shed, spanning both tracks on the wharf. These cranes are of the semi-portal type and have booms capable of being both luffed and turned. These cranes have a capacity of 2½ tons at 44 feet from the face of the wharf, and can be used to transfer freight between hold of vessel and wharf shed balcony, the wharf, or cars on the wharf. These cranes use 230-volt direct current.

Two steam locomotive cranes—15-ton capacity.

One steam locomotive crane—18-ton capacity.

One steam locomotive crane—40-ton capacity.

Twenty-four electric dock winches. These are of the portable type and can be used in connection with cargo hoists or to operate ship's gear. Eight of these are provided with remote control apparatus. These winches have a capacity of 2500 pounds at 225 feet a minute. Frequent outlets are provided along the waterfronts of the wharf and pier sheds for plugging in of connections for these winches. They use 230-volt direct current.

Eighty trailers; Seattle type; size 4 feet by 8 feet; capacity 5000 pounds.

Six hundred trailer trucks. These have castor wheels at one end, and are equipped to be coupled in trains and hauled by tractors. They are 3 feet by 6 feet in size and have a capacity of 2000 pounds.

Forty storage battery trailers. Each of these is capable of hauling a train of eight fully loaded trailer trucks of the above size.

Two hundred hand stevedore two-wheel trucks.

Six vertical tiering machines, electrically operated.

Five piling machines for stacking bags.

Six storehouse scales; 3-ton, 72-inch by 60-inch platform scales with automatic dials.

One 20-ton platform truck scale.

Estimated Capacity of Equipment

Two hundred carloads — 6000 tons — can be unloaded from freight cars and put into storage in storehouse in a ten-hour day.

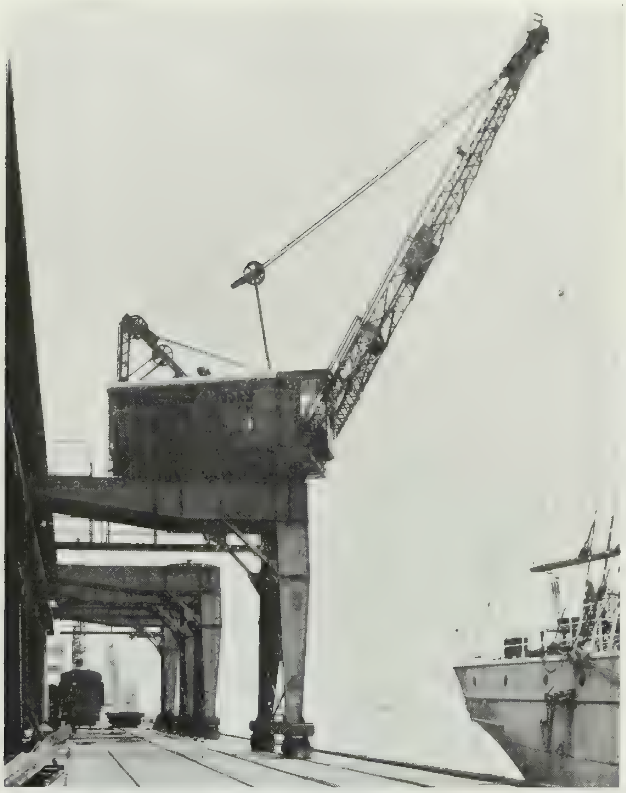
One hundred forty carloads—4200 tons—can be unloaded from freight cars and put into storage in the pier shed in a ten-hour day.

One hundred carloads — 3000 tons — can be unloaded from freight cars and put into storage in lower story of wharf shed in a ten-hour day.

An 8000-ton vessel can be loaded by means of the bridge cranes in about 55½ hours or, say, 2½ days.

Power Supply

All machinery at this terminal is electrically-driven and current is supplied by the near-by Edison Company's L Street Plant across the reserved channel. Alternating current is delivered at site



Semi-Portal Crane at the Boston Supply Base

at 13,800 volts, and is transformed to 2300 volts at substation for distribution about the plant, and again transformed at various points to 110 volts for lighting and 220 volts for power. Direct current from 230 to 250 volts is supplied for use in cranes and dock winches by two 500 kilowatt rotary converters located in the substation.

The Semi-Portal Cranes

Of special interest to our readers is the installation of electric semi-portal jib cranes built and erected by the Wellman-Seaver-Morgan Company of Chicago. There are four of these cranes, the first of which is in operation, as shown in the illustrations. This crane carries a lifting boom operated from a carriage, which in turn is mounted on a semi-portal bridge and arranged to rotate about a fixed axis. The bridge runs on two rails, one located near the face of the wharf and the other supported on brackets carried on the side of the wharf shed.

It will be seen that the crane has four distinct motions — bridge travel along the wharf, trolley slewing, boom hoisting or luffing, and load hoisting. All of these motions are under the control of the operator located in the cab on the rotating carriage.

The crane is designed so that another drum can be added and a two-rope grab bucket operated. The crane is rated to handle 8000 pounds at a distance of 29 feet from the face of the capsill at the rate of 200 feet a minute and 5000 pounds at a distance of 52 feet at 250 feet a minute. It will, however, take care of occasional loads of 8000 pounds at 52 feet from the center of rotation without any undue stress in any part of the crane.

The principal dimensions of the crane are as follows:

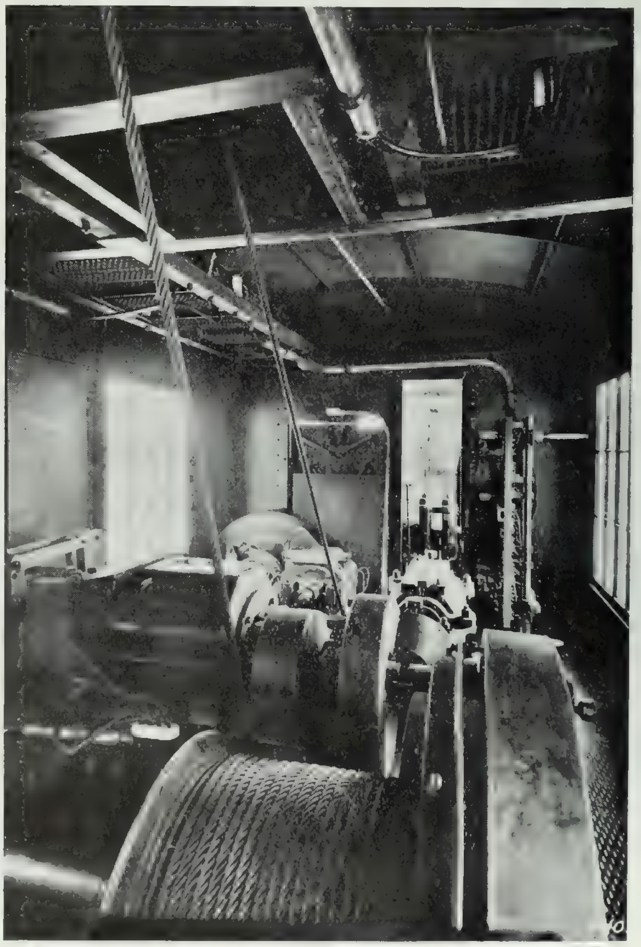
Horizontal span, center to center of runway rails, 26 feet 5 inches.

Maximum reach of boom from face to capsill, 44 feet.

Minimum radius of boom, 29 feet.

Angle through which boom may be slewed equals 360 degrees.

Control stand in operator's cab, semi-portal cranes



View in operator's cab showing hoisting motors. Note control rheostats stowed in ceiling

Concrete counter-weight required, about 3 cubic yards.

Speed

The various motions of the crane have approximately the following speeds under full load:

Hoist 5000 pounds, 250 feet a minute.
Hoist 8000 pounds, 200 feet a minute.
Boom hoisting or luffing, 125 feet a minute.
Slewing, 2 rotations a minute with 5000-pound load at a maximum radius.
Bridge travel along the wharf, 200 feet a minute.

The different mechanism is so arranged that the motion of either hoisting or luffing can be operated simultaneously with both rotating and traveling motions.

Electrical Equipment

The electrical equipment is designed for a direct current of 230 volts. The motors, controllers and magnetic brakes are General Electric Company's standard make. The motors are of the following frame and horsepower:

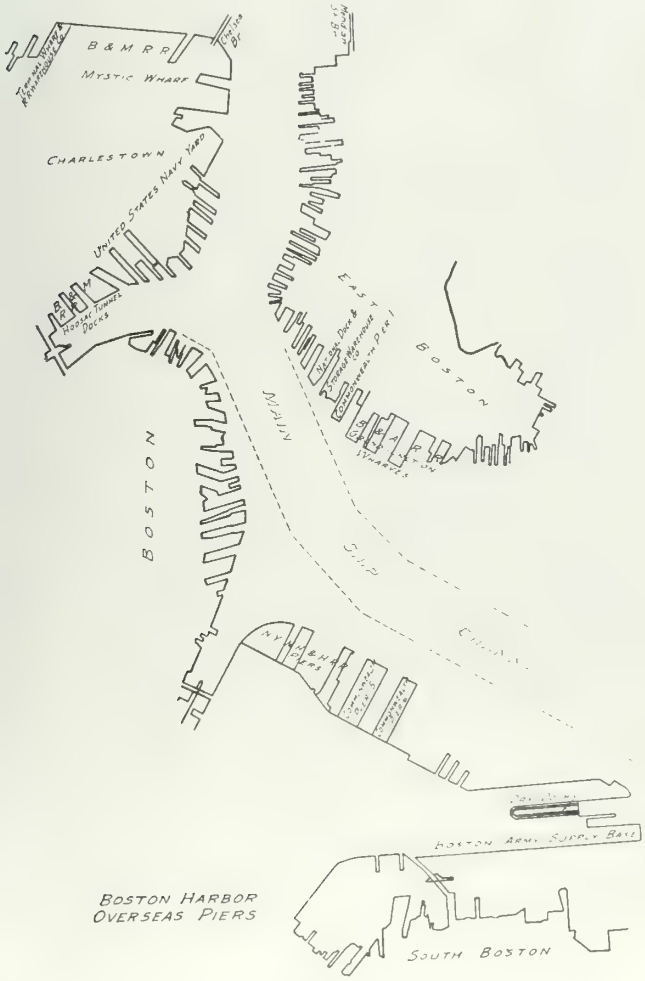
1. Main hoist and luffing, one 65-horsepower.
2. Slewing, one 15-horsepower.
3. Bridge travel, one 25-horsepower.

The controller for the hoist and luffing motor is of the reversing magnetic switch, dynamic braking type, consisting of a control panel, heavy-duty cast grid resistor and a vertical handle master controller. In connection with the clutch-shifting lever which engages the hoist and luffing gearings with the driving motor, there is an interlocking switch mechanically operated. When the clutch-shifting lever is in central or neutral position, with both clutches disengaged, this switch prevents the operation of the motor. In other words, the function of this switch is to prevent the starting of the hoist motor without any load.

The slewing motor is controlled by a magnetic switch reversing plugging controller, consisting of a control panel, heavy-duty, cast-grid resistor and a vertical handle master controller. The plugging feature incorporated allows the motor to be reversed from full speed in one direction to full speed in the opposite direction without exerting over approximately 180 per cent full load torque.

The bridge motor control is of the magnetic switch reversing type with shunted armature points and consists of a control panel, heavy-duty, cast-grid resistor and a vertical handle master controller. The armature shunting points allow slow bridge speeds and also permit accurate control in case a favorable wind may help the motor in traveling, which would ordinarily give an excessive speed.

All of the above controllers are equipped with series relays for accelerating the motors.



Diagrammatic plan of Boston Harbor, showing relative position of the Supply Base

IMPORTERS AND EXPORTERS INSURANCE COMPANY

M. L. Heide, vice-president; Harold Knox, fire secretary; A. Whelpley, manager automobile department, of the Importers and Exporters Insurance Company, are now in Chicago closing up several important contracts. This is in accordance with the company's policy of personal service to agents, their problems and needs.

The Importers and Exporters Insurance Company has already entered the agency field in about twenty states, establishing many excellent connections, and other states will be entered as soon as convenient. It is already operating a wide publicity campaign which is of direct advantage to its representatives and specializes in agency service along lines of quick handling of policies and prompt and satisfactory adjustment of losses.

The automobile department of the Importers and Exporters Insurance Company of New York, of which A. Whelpley is manager, has arranged for an assistant manager to take care of the extensive operations which the company is planning for that line in the agency field. Arrangements were made last week whereby Lester E. Cate, recently special agent for the Tokyo Marine and Fire Insurance Company, became assistant to Mr. Whelpley, August 1. Mr. Cate is a young man of proved ability in fire insurance and he has had a broad experience in agency work, particularly in the larger centers. Mr. Cate began his insurance work in Chicago under Manager J. J. Purcell, who was then with the Sun Insurance Office of London.

PARTNERSHIP ANNOUNCEMENT

Mr. Daniel H. Cox, a member of the firm of Cox & Stevens, naval architects of New York, from its foundation, who resigned upon the outbreak of the war and became manager of the ship construction division of the Emergency Fleet Corporation, has resumed his position as partner in the firm.

We also announce the admission, as partners, of Mr. Bruno Tornroth and Mr. Thomas C. Landi, who for many years have been associated with the firm, the former as head of our designing department and the latter as manager of the brokerage department.

The wide experience gained by our organization during the war should prove of material advantage to our present and future clients.

On the Shores of Grays Harbor

By Special Correspondent

TO be known as the Forest Line and to be a Grays Harbor product in every sense of the term, the four five-masted barkentines now rapidly nearing completion at the Grays Harbor Motorship yard in Aberdeen form the nucleus of a fleet of vessels to be operated by the motorship corporation in the lumber trade from Grays Harbor. The vessels are of an exclusive Grays Harbor type, designed by Manager M. R. Ward of the yard especially for carrying lumber. They are built of wood from the Grays Harbor forests; the work is being done by Grays Harbor shipbuilders; the vessels will claim Grays Harbor as their home port, and will carry Grays Harbor products to all parts of the world.

The first of the new fleet is the Forest Pride, gliding from the ways the latter part of September. Its three sister ships, Forest Dream, Forest Nymph and Forest Friend, will be launched at intervals of about thirty days. By New Year the first four vessels are expected to be in service. For a detailed description and drawings of these ships, see the article by Captain Blain on another page of this issue.

The motorship corporation won an enviable record in the wooden shipbuilding industry during the war. The Abrigada, a product of its yard, was the first wooden vessel to be launched for the government, and the Aberdeen won the name of "speed ship" by the rapid pace set in its construction.

Although the trolling business is comparatively new on Grays Harbor, at one time this season a total of 117 trolling vessels were operating off the Harbor. Each of these boats represents an average investment of $2000, and most of them carry two or three fishermen.

Captain Aanensen of Norway was on the Harbor several days early in September, looking after the interests of the Robert Isaacson Company, a Norwegian firm, which owns the auxiliary schooners Mount Shasta and Mount Hood and other vessels built at the Matthews Shipyard in Hoquiam and at several yards on the Coast. Captain Aanensen says the Norwegian company has given contracts for vessels aggregating several million dollars in cost to an English shipbuilding concern.

The steamer Claremont, built by the Matthews Shipyard of Hoquiam in 1917, is again back in the Pacific Coast lumber trade after two years' service on the East Coast. The Claremont succeeded in escaping the submarines during the long period it hauled sugar from San Domingo and Porto Rico to Atlantic ports. The vessel belongs to the Hart-Wood Lumber Company.

Three windjammers loaded lumber on Grays Harbor in September for off-shore ports. The Norwegian schooner Washington loaded 1,250,000 feet of lumber for the United Kingdom; the Fred J. Wood took cargo for the Hawaiian Islands, and the barkentine Retriever completed loading for overseas.

Plans for the assignment of some of the vessels of the Pacific fleet for a visit on Grays Harbor after the review on Puget Sound are indicated in the receipt by a Hoaquim bakery of orders for 20,000 loaves of bread for delivery between September 30 and December 31. What vessels will be sent here or the exact duration of their stay is not known.

A total of twenty-one Emergency Fleet vessels so far have loaded cargoes of lumber on Grays Harbor for the United Kingdom or Atlantic Coast ports. Of this fleet nine came under contract of Christensen, Hanify & Weatherwax; ten for the McCormick Steamship Company, and two for the Ocean Lumber Company.

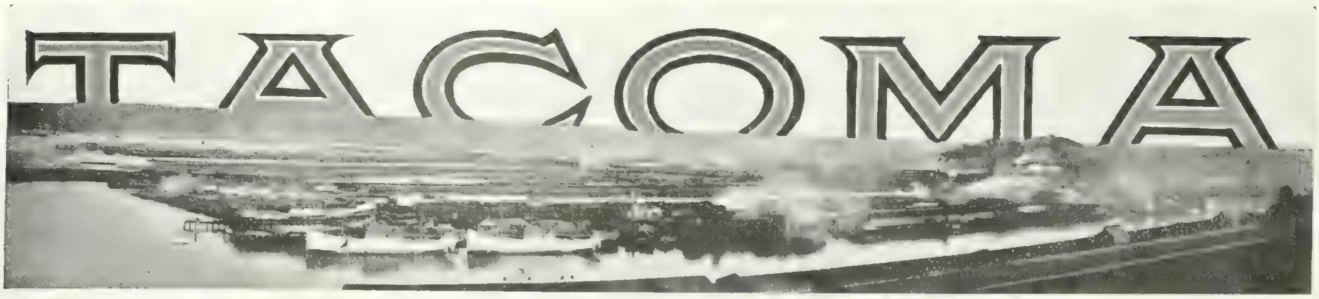
Bids for the dredging of 3000 feet of the shallowest part of the inner Grays Harbor channel near Grays Harbor City have been opened at Seattle by the Federal government. This work will be the first step toward improving Grays Harbor in a program of development being asked by the joint Hoquiam Commercial Club and Aberdeen Chamber of Commerce rivers and harbor committee. Further dredging of the inner channel is contemplated in the near future under the port commission's program. By early next year a port commission fund of $150,000 will be available. There is already about $75,000 in the port commission treasury and the levying of a two-mill port tax on all county property will raise about $70,000.

Through efforts of the Hoquiam Commercial Club a government wireless station of high power is to be established here. Captain S. W. Bryant, acting director of naval communication, has written Senators Miles Poindexter and Wesley L. Jones, recommending such a plant. The donation of an ideal site, within a quarter of a mile of the business center of the city, has been offered the government for use of the radio station, with ample room for housing apparatus and the accommodation of employes.

Colonel J. B. Cavanaugh, corps of United States engineers, was a recent visitor on Grays Harbor, coming to inspect the work being done on the bar by the government dredge Colonel P. S. Michie. This was his first visit to Grays Harbor since his return from overseas, where he won an enviable reputation as one of the most efficient engineers with the American expeditionary forces in France.

That the Navy Department contemplates more frequent visits of its oil-burning vessels to Grays Harbor, and that the Standard Oil Company of California, contemplates extensive improvements that will make this port one of the great oil distributing centers of the United States, are facts made public by Secretary L. G. Monroe of the Hoquiam Commercial Club. The Navy Department has asked for data as to the approximate amount of oil and gasoline kept on hand in tanks of Harbor dealers; also as to methods of delivery, capacity of tanks and lighters and approximate price. The information furnished the department by Secretary Monroe is as follows:

"The Standard Oil Company of California is the only one which handles fuel oil and gasoline in storage tanks, its tank and dock being located midway between Hoquiam and Aberdeen. The wharf has a frontage of 200 feet on water which has a depth of forty feet, and therefore is sufficient to accommodate any vessel entering Grays Harbor. The company's storage capacity is of 33,000 barrels of fuel oil, 4476 barrels of refined oil, 11,057 barrels gasoline, 3234 barrels of distillate.



TACOMA

By Special Correspondent

ONE of the largest cargoes of lumber that has been taken from Tacoma in a number of years, and the first to go from here to China since the war, was cleared in the West Hepburn, Captain Frank M. White, the latter part of August. The cargo amounted to approximately 4,200,000 feet. This was made up of big timbers and the vessel cleared for Taku Bar. The record lumber cargo was taken in the British steamer Vestalia in 1914 and amounted to about 4,400,000 feet. This was an Australian cargo.

Shipping for September looks very light at Tacoma, and unless the Shipping Board vessels feature there will be little cargo movement from here. However, there is a belief that the lumber trade will come in sufficient volume to help out the exporting situation. The Osaka Shosen Kaisha, which had a rush of ships last month, have only one scheduled for September. Oriental cargo is not offering so freely as local shippers wish. Much of the freight formerly passing through Tacoma is now being routed via New Orleans or even New York by the Japanese lines.

In the lumber fleet the Bottineau, one of the Ferris type vessels of 3500 tons, constructed by Babare Brothers of Tacoma, loaded 600,000 feet of lumber here for the United Kingdom. She finished loading at Bellingham.

Tacoma had two launches during the early part of September, featuring a steel and wooden vessel. At the plant of the Todd Drydock & Construction Corporation, the 7500-ton steamer St. Anthony was launched the evening of September 10, while the day following the wooden semi-Diesel powered tender Ambassador was placed in the water at the Tacoma Shipbuilding Company's yard. The Ambassador is the first wooden steamer launched here since the active yard construction for the Emergency Fleet Corporation was finished.

The St. Anthony is named in honor of the town of this name in Idaho, which led in the fourth Liberty Loan drive for its district. The vessel was sponsored by Miss Marcia Woods, the fourteen year-old daughter of Hugh Woods of Spencer. The launch was witnessed by a number of Idaho people, among whom were Lieutenant-Governor C. C. Moore.

The Ambassador was sponsored by Mrs. W. R. Rust, wife of one of the owners of the vessel. The Ambassador will be used in connection with the Chichagoff Mining Company of Alaska, with head offices in Tacoma. The vessel is 110 feet long and designed by Lee & Brinton of Seattle. She is built with a view of meeting the heavy weather encountered along the Alaskan coast and coming through safely with her crew and passengers.

The schooner Spokane is here loading lumber for South Africa. The Spokane, Captain Charles Hagerup, brought a cargo of copra here from Numea for Balfour, Guthrie & Company, by whom she is operated.

President H. F. Alexander of the Pacific Steamship Company was in San Francisco during the early days of September on business connected with the company.

One of the largest cargoes taken out by vessels of the O. S. K. line in several months went out September 5 on the Manila Maru. While the steamers usually go out, especially during the past few years, with capacity freights, the offering in the Manila Maru was back to pre-war days, when a varied cargo was taken. In the freight this voyage was 1,500,000 feet of lumber. Lumber has not been one of the items in the regular line Oriental vessels for several years. There were also several hundred tons of car wheels, machinery hardware, canned milk, and vegetables. The O. S. K. vessels have been carrying heavy cargoes out from New Orleans via Tacoma, but the success of this service is doubtful due to the fact that under the present schedule the vessels do not have much time to do necessary repair work on the voyage. Several have arrived here in need of boiler work and repairs to their auxiliary machinery after making the voyage from home to Cuba and New Orleans and return here. On the homeward voyage they only stop here long enough to take bunkers and supplies.

James B. Van Fossen, chief clerk of the Osaka Shosen Kaisha, and Mrs. Van Fossen left for Eastern points September 7. While the trip is one along pleasure lines, Mr. Van Fossen will visit the different Eastern ports, particularly those where the O. S. K. has connections. Mr. and Mrs. Van Fossen will be away about thirty days.

Captain W. F. Eckert, for three years master of the Garland Line steamer Justin, took the Elkridge, 9600 tons, out from Tacoma recently bound for the East Coast and possibly Europe. The Elkridge is one of the new Skinner & Eddy vessels assigned to W. R. Grace & Company. The Elkridge took about 9000 tons of flour from here. Captain Eckert is one of the youngest shipmasters on the Pacific Coast and locally he is one of the most popular mariners out of Tacoma. Local shipping men were congratulating him on his new command before he sailed.

ASTORIA

By Special Correspondent

FROM March 1 to September 1, 1919, building permits aggregating $1,045,350 were issued to the Port of Astoria for the construction of buildings on the port docks.

Work is progressing rapidly with the extension of the belt line railroad to Astor street, and this part of the system will be complete by November 1. The extension from the McEachern shipyards to the Astoria Pulp & Paper plant has been temporarily abandoned on account of the destruction of the latter plant by fire on August 31.

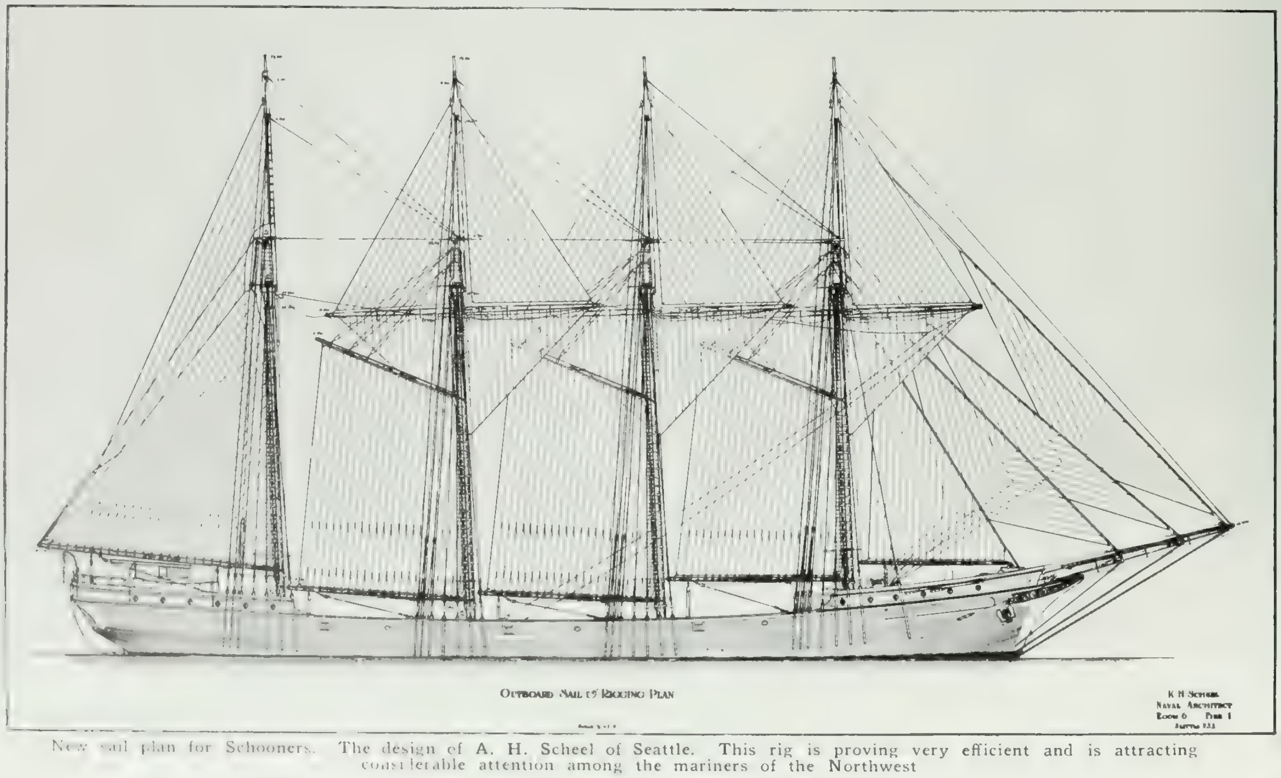
The Columbia River Coal Company is busy filling the bunkers of the United States Shipping Board fleet vessels. Coal is arriving at the rate of sixty cars a week. About forty vessels are yet to be coaled.

The sailing ship Rence of the Columbia River Packers' Association is due to arrive at the port of Astoria dock during the last week of October with a full cargo of canned salmon.

The 1919 crop of wheat is now arriving at the port elevator. Most of it is from the state of Washington, although a few cars are coming from Idaho. Up to date sixty cars of sacked wheat and forty cars of bulk wheat have arrived and the movement will be much faster as soon as more cars are available. In the state of Washington the crop totals 10,000,000 bushels more than the crop of 1918. On July 22, 1919, the steamer West Islay was loaded from the elevator at the Port of Astoria with the first cargo of bulk wheat to leave the Columbia River. She arrived in New York on August 27 after having encountered considerable bad weather in the Caribbean Sea. Her captain, H. Bierd, writes to W. R. Grace & Company of Seattle that the ship behaved beautifully and that upon arrival in New York the grain inspector came on board and thoroughly examined the cargo and stated that he had never seen a cargo in better shape and that the daily records kept of temperature of holds, sea and air and the system of ventilating the holds was the best he had ever encountered.

The Foundation Company contractors in building pier No. 3 have been delayed for some time in their work on account of the unfinished hulls which for over a year have lain on the ways of the Rodgers Shipbuilding Company. They have finally been able to arrange to patch up these hulls with enough boards to keep them afloat, and very recently the first of them was launched and towed to the side of pier No. 2, where it now lies. They expect to have the second hull ready for floating in about thirty days. No definite plans have been made as to the disposition of these ships.

Shipping men at Astoria are very proud of the record of the Great Northern as a transport and are glad to see her back on the waters of the Pacific after strenuous service.



New sail plan for Schooners. The design of A. H. Scheel of Seattle. This rig is proving very efficient and is attracting considerable attention among the mariners of the Northwest

VANCOUVER

By Special Correspondent

HARBOR and shipping interests in this port are generally hopeful that a graving dock sufficient to meet the requirements of the deep sea Pacific traffic will be constructed in Vancouver in spite of the determination of the government to locate the Federal dry dock at Esquimalt. If such a dock is constructed in Vancouver it will get 90 per cent of the commercial docking business that would go otherwise to Victoria.

Conferences between longshoremen's agents and officials of the coastwise shipping interests are now going on with a view of establishing a satisfactory scale for coastal longshore work. The conference of American and Canadian stevedores and shipping operators at Seattle which resulted in an agreement with the longshoremen of Oregon and Washington applied only to British Columbia insofar as it affected deep sea ships. The coastwise scale was left open. Though the negotiations are not yet concluded it is practically certain that the scale determined will be either 75 cents and $1.10 straight and overtime, or 80 cents and $1.05. The men favor the latter figure. The deep sea scale is 90 cents and $1.35.

Lieutenant-Colonel J. P. Mackenzie of the contracting firm of Loomis, McFee, Henry & Macdonald of Winnipeg is in the city preparing bids on the new C. P. R. pier and to arrange to tender on the work that is expected to be laid out shortly by the Vancouver Harbor Board.

The Canadian Robert Dollar Company's new steel steamship Grace Dollar (War Melody) has loaded coal at Norfolk and will discharge at San Francisco, loading then for the Orient and sailing October 15. She will then take up a regular run between Oriental points and Vancouver.

August lumber figures for movements via water transportation show nearly twenty million feet shipped from British Columbia ports. Nearly seven and a half million was sent to England on new French steamers built in British Columbia yards. These vessels are being handled by the C. Gardner Johnson Company, agents for the French high commission. Over twelve million feet was shipped overseas on regular tramp visitors or on new government ships built in the British Columbia shipyards. The majority of this lumber also went to Europe, though some was for Africa, Australia, South America, China and Japan.

Following is the shipping registry for Vancouver, for the month of August: Dollarton, Canadian Robert Dollar Company, Ltd; gas tugboat for harbor work, gross tonnage 26.67, registered 18.14, 44 feet length, 13.75 wide, 6.55 depth.

Canadian Trooper, Dominion merchant marine; gross tons 3179.84, net 1952.52, length 320, width 44, depth 22.

Cloe, Powell River Company, Ltd.; semi-Diesel, gross 28.74, net 10.03, 40 feet 9 inches length, beam, 13.9, depth 6.3.

Mamook, Edward Clapham; gas boat, 40 feet long, 31.91 gross tons.

Giffordtine, Gifford Rutter; gas, 41 feet long, 24 gross tons.

M. W. M. No. 4, McNeill, Welch and Wilson, Ltd; sailing vessel, 228.95 gross tons, length 97.1, beam 33.9, depth 8.2.

Chesley No. 19, Whalen Pulp and Paper Company; sailing vessel, 330.08 registered tons, 138.4 long, 36.7 beam, 9.3 deep.

Chesley No. 20, same owners; sailing vessel, 328.76 tons, 138.1 length, 36.7 beam, 9.3 depth.

An interesting marine accomplishment was the recent tow of the tugboat Masset from Queen Charlotte Islands to Swanson Bay, a distance of about 250 miles, largely in the dangerous Hecate Straits. The Masset took the largest Davis raft ever built on the northern waters, its dimensions being 275 feet long, 85 feet wide, 25 feet deep, containing 1,700,000 feet of logs.

The first vessel to reach this port under the Allied flag is the S. S. Prinzessin, formerly owned by the German East Africa line. This ship was turned over to the Allies according to the armistice terms. During the war she lay in Hamburg. The Allied flag is a sort of international affair designed by the peace convention for the purpose of use on the ships owned by the Allied Council.

According to A. L. Hager, manager for the New England Fish Company, the price of salmon is soaring because such high prices are being offered by United States canners who send representatives to the fishing fleets of independent fishermen (mostly Japanese) and bid for the fish on the grounds.

Mr. T. Hiroto, managing director of the Taiyo Kaiun Kaisha, told a gathering of Vancouver men at a recent banquet in his honor that his company contemplated establishing a regular service to this port. At present most of the thirty vessels owned by the company are on the Atlantic.

When the Wallace shipyards launch the 5100 ton steamship Canadian Raider in October, the ocean will receive the first of a fleet that is expected to cut heavily into the Australian and New Zealand trade. At present this transportation service is carried on practically exclusively by the Canadian-Australasian line, a subsidiary of the Union Steamship Company of New Zealand.

The Canadian Raider, originally intended to be christened the Canadian Scout, is one of the Dominion government merchant marine fleet. The Wallace shipyards have launched two of these ships of somewhat lighter construction. They are the Canadian Volunteer and Canadian Trooper. Both have gone to England with lumber.

The Port of Victoria

By Special Correspondent

As the contract for twenty 3000-ton (deadweight) steamers for the French government is rapidly nearing a close, the Foundation Company's two yards at Victoria are setting up what is thought to be a new record for wooden shipbuilding. The seventeenth hull was launched on September 11 after being on the ways only 50½ working days. For the last three months construction has been speeding up until the climax was reached on this vessel, which was christened the Quebec by Mrs. S. M. Shaw, wife of the general foreman of the Point Hope yard.

It was the privilege of Mrs. J. S. Hines, wife of the publisher of Pacific Marine Review, to sponsor the Foundation steamer Wilfred Laurier, which was launched at Victoria on August 23. The ceremony was under the direction of Edward E. Jenkins, assistant northwest manager of the Foundation Company, who escorted the sponsor to the launching platform. At a signal rung by Mr. Hines the launching triggers were loosed and the fine hull slid to the sea, but not before Mrs. Hines had done her duty with the beribboned bottle. On behalf of the Foundation Company and the French government, Mr. Jenkins presented the sponsor with a gift suitably inscribed.

It was to San Francisco again that the Foundation Company went for the lady to christen the steamer Acadie on September 3. This time it was the wife of Mr. J. J. Haviside, Jr., of the well-known firm of Haviside, Withers & Davis, ship chandlers, sail makers and ship riggers. While Frank Haviside was in action all over the platform with a camera, for he had taken up this hobby with enthusiasm, J. J. Haviside pressed the signal button and the boat went nicely into the water without a hitch.

The peak of employment by the Foundation Company at Victoria was reached some time ago when the payroll contained 4335 names, these being distributed between the two four-way yards and the big fitting-out plant. The payroll at that time totalled approximately $600,000 a month. Statistics gathered in March showed that 63.1 per cent of the men were married, and it was calculated that 11,000 men, women and children were directly dependent upon the Foundation Company of British Columbia for existence. The labor turnover at the contract's peak was only one per cent and never exceeded 10 per cent, a wonderfully good record.

It is planned to launch the last of the twenty steamers for the French government on October 10. There are no further contracts as yet for the yard. The assembly plant is expected to keep busy until the first of the year.

Of the Foundation steamers that have run their trial trips the two fastest have been equipped with engines built by Hutchison Brothers of Victoria. The Winnipeg, the record boat, made an average speed of 13.52 knots, and for two miles made an average of 14.16 knots. The contract speed is 11 knots.

The framing crews of the Foundation yards have beaten any records made by United States yards working on Shipping Board boats. When the United States program drew to a close the record for the continent was claimed by the Grant Smith-Porter shipyards of Aberdeen, Washington. As the number of men working to a crew at Victoria and in the United States differed, the results of Victoria and Aberdeen were worked out in man-hours and showed that the Grant Smith-Porter plant made and erected frames at the rate of 19.363 man-hours a frame, while the Foundation Company built and erected them in 16,875 man-hours each.

When Secretary of the Navy Daniels came to Victoria on September 11 on the battleship Arkansas, accompanied by Admiral Rodman on the New Mexico, he inspected the ship repair plant of Yarrow's, Limited, at Esquimalt. Mr. Daniels was particularly interested in the repairing of the Curtiss aeroplane Pathfinder, owned by the Aerial League of Canada, which came to grief some time ago, and which Norman Yarrow generously offered to repair in his shops. Mr. Yarrow is very much interested in flying and has been in the air on several occasions both at Victoria and Seattle.

The steamer Princess May, which operated in the British Columbia coastal service of the C. P. R. for many years after coming to this coast from China, has been purchased by a New York firm and will be operated to that port from the West Indies in the fruit trade. She has been rebuilt inside for her new work, and a more up-to-date system of oil burning has been installed.

The Cholberg shipyard of Victoria has obtained the contract for the completion of three wooden hulls as barkentines. These were originally built for the United States Shipping Board by Pacific Coast yards and were to have been 5000-ton wooden steamers. With the ending of the war, however, work on them was stopped and they lay in Lake Union, Seattle, until the Universal Shipping & Trading Company purchased them and three others.

The three hulls will be towed to Victoria and will be completed as barkentines with an unusual rig that has been designed by Mr. Chris Cholberg, head of the Cholberg yard, who is an expert in sail. The work on the hulls will cost approximately $150,000 each and is expected to take from four to five months.

The unique Cholberg sail plan will make the three vessels different in that respect from any other craft afloat. They will be 4500 tons deadweight and will be the largest wooden sailers in the world. Of the four masts, only the foremast will be rigged in accordance with established barkentine methods. This will carry the usual squaresail. The main and mizzen will have the barkentine's schooner rig, surmounted by "raffees" in place of the regular topsails, while three-cornered lower topsails are also an innovation. The jigger will carry a muttonleg spanker and ringtail topsail. Each of the vessels will carry 47,000 square feet of canvas. The barkentine Columbia River has probably the nearest approach to this sail plan of any ship afloat. Unable to place this boat's arrangement of sail mariners call it a "jackass" rig.

The Cholberg yard was building three wooden schooners of 1500 tons for Norwegian interests. One of these, the Gunn, is on her way to the United Kingdom with lumber. The Washington is loading, and the Vancouver is still on the ways.

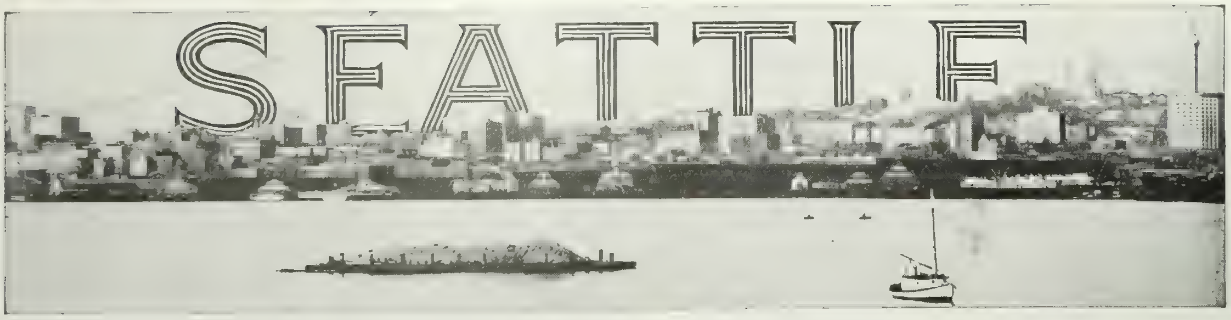
In addition to the Foundation Company's two wooden shipbuilding plants and that of the Cholberg Company, there is one steel yard at Victoria, operated by the Harbor Marine Company. This firm has the contract for two 8100-ton vessels for the Canadian government. Progress has been held up considerably by delay in the arrival of material. A feature of the yard is the employment of ex-service men and munition workers almost exclusively.

Newcomers to Victoria stare in wonderment at a vessel that lies in the Inner Harbor, which looks like a cross between a warship and a freighter. It is the sloop-of-war Algerine, over twenty years of age, recently purchased by the Pacific Salvage Company and converted into a salvage steamer. With funnel set forward of amidships and with a heavy mast fitted with derrick booms for the lifting of many tons, the vessel has a most unusual appearance, which is further enhanced by the old painted figurehead of an Algerine that looks out ahead from the sawed-off bowsprit. The Algerine still has her old battleship grey, and above her cabin door at the stern there is lettered in brass, "England Expects Every Man to Do His Duty."

For many years the Algerine was used by the British Admiralty on the China coast. She was then brought to the Esquimalt naval base at Victoria and the first year of the war was laid up. She remained unused until the war ended when she was offered for sale. The Pacific Salvage Company bought her. With a copper skin, backed by teak and steel, the old hull is still in beautiful shape and all her equipment is wonderfully well made. She was fitted with sail and steam during her naval service. The Algerine has been rebuilt somewhat inside and makes twelve knots now on steam alone.

She went out on her first salvage job in September, reaching the Japanese steamer Shinbu Maru as she was sinking in the Straits of Juan de Fuca, after striking Bentinck Island, near Victoria. Working thirty-six hours without sleep, the salvors succeeded in saving the vessel and taking her to Seattle. The new salvage ship is fitted with the most up-to-date equipment and carries a complete machine shop.

The Wilfred Laurier ready for launching at the yard of The Foundation Company, Victoria, and her sponsor, Mrs. J. S. Hines



By Special Correspondent

SEATTLE with its public terminals valued at more than $10,000,000, is preparing to handle the greatest wheat movement in the history of North Pacific commerce—4,000,000 bushels, enough to fill 3200 cars, which, if coupled into a single train, would extend a distance of thirty miles. This huge amount of grain will be received at the Hanford Street terminal and half of it will be forwarded coastwise and overseas before the end of the season, according to estimates prepared by Captain Inar A. Pedersen, traffic manager of the Port of Seattle.

"The Port Commission has contracted with various grain shippers for handling 1,850,000 bushels of wheat up to the present time, compared with 900,000 bushels last year," said Captain Pedersen. "Of the 1,850,000 bushels contracted for, 1,000,000 bushels will be bulk grain and 850,000 sacked grain. Last year practically no grain moved from Seattle by water because of the war, but this year large shipments will be dispatched via the water routes."

Captain Pedersen has just signed an agreement with the United States Grain Corporation providing for wharfage and handling rates for the season. The wharfage and handling in rate will be $1 a ton with five days free storage. After the expiration of the five days' time, the storage rate will be 20 cents a ton a month. The trucking and handling out charge will be 35 cents a ton. Last year the storage rate was 15 cents a ton a month and the wharfage and handling in rate $1 a ton, including thirty days' free storage. The trucking charge to the ship's side last year was 20 cents a ton and the trucking charge to cars 25 cents a ton.

Construction work is now well under way in Plant No. 1 of the Skinner & Eddy Corporation on the first of four new 10,400-ton freight steamships, which the corporation will build for its own account. The new vessels will be widely different from any carrier yet built in the Skinner & Eddy yards and will be of greater speed than any constructed for freight service on this coast, say officers of the company. For complete specifications and plans of these ships see September Pacific Marine Review.

Because the law creating the Port of Seattle district restricts its bond issuing powers to 3 per cent of the assessed value of the property of the port district, the port may have to "abandon the progressive policy that has made it one of the most efficient organizations of its kind in the country and postpone needed extensions and improvements because of lack of funds," according to a statement made by members of the commission who preside over the destinies of the great system of public piers and warehouses. As a result of this condition of port affairs, the commission has decided to defer indefinitely its plans for expending $120,000 for an addition to the Spokane Street cold storage plant, used in caring for shipments of fruits and fish. They will also, it is said, be compelled to reduce the size of the proposed transit shed on Smith Cove Pier B by one-half and to postpone the purchase of a gantry crane, costing $65,000, which it planned to erect on the new terminal to assist in handling freight with efficiency and dispatch. The port has now issued bonds to the limit of its bonding capacity and these improvements must be deferred, say members of the commission.

At the last session of the State Legislature, the Port Commission had a bill prepared which would have put the port on an equal footing with other municipal corporations as to the issuance of bonds, on a basis of 5 per cent of the assessed value of the property of the port district. The bill was given to a member of the legislature who did not introduce it because he was informed that some of the reactionary members would start legislation which would take away some of the important powers of the port district.

"The port of Seattle will cease to be the big progressive organization it has been in the past unless the city of Seattle and the county of King arouse themselves to the gravity of the situation in port finances," said C. J. France, executive secretary of the Port Commission, in explaining the conditions which are now being faced by the port district.

Recognizing the importance of Seattle as a shipping center, the American Express Company has established a travel bureau in this city where full, complete and accurate information may be obtained on transportation routes and services to any part of the world. The company recently extended the scope of its activities and established travel bureaus in every large city in America, England, Continental Europe and the Orient. F. O. Finn, who arrived here recently after serving in the Canadian forces overseas, is in charge with the title of district passenger agent.

The canned salmon cargoes brought to Seattle by vessels of the Pacific Steamship Company, the Admiral Line, so far this year aggregate 600,000 cases, and, estimating the pack yet to be moved, representatives of the company believe that the total amount of the product of the Alaska plants handled by the Admiral Line this year will aggregate 1,300,000 cases.

With the sailing of the steamship Suwa Maru of the Nippon Yusen Kaisha from Seattle for ports in the Orient, September 18, first and second cabin passenger rates were advanced from 25 to 54 per cent and steerage rates also went higher, although at a much less percentage, reflecting the increased cost of operation on the trans-Pacific trade routes.

The Nippon Yusen Kaisha decided to advance its passenger rates last January, but the necessary permission to place the higher fares into effect was not received from the Japanese government until September 10.

With battleships anchored in the stream, destroyers at half a dozen piers and moored off the West Seattle shore, and cruisers lying near Harbor Island, no section of the Seattle waterfront was without some type of fighting craft during the visit of the Pacific fleet.

The fleet came into the bay September 12, led by seven sleek, business-like looking destroyers, which went ahead of the flagship New Mexico just as the armada rounded Magnolia Bluff. The seven fighting craft took up their positions in a semicircle, extending from Smith Cove to the West Seattle shore. The New Mexico, with a roar of anchor chain, dropped her big mudhook into the bay at a point off the Grand Trunk dock, the other battleships and cruisers anchoring west and north of the flagship.

With nearly every officer aboard the big freighter a native son of Seattle and 90 per cent of her crew born in this city, the steamship Seattle Spirit steamed from Seattle September 4 on her maiden voyage bound for ports in the Far East, under Captain A. P. Spaulding.

The Seattle Spirit is a craft of 8800 tons, built in the yards of J. F. Duthie & Company for the United States Shipping Board. She is being managed and operated in the Seattle-Oriental trade by the Pacific Steamship Company.

Captain A. P. Spaulding, master of the United States Shipping Board steamer Seattle Spirit

HONGKONG AGENT FOR ADMIRAL LINE

Captain R. C. Brennan, one of the best known ship masters on the Pacific Coast, has been appointed agent for the Admiral Line at Hongkong and is scheduled to leave for the Orient early in October. Captain Brennan will act as marine superintendent for the company in the Orient, as well as agent, the company's operations now being so extensive that services of a marine superintendent in Asiatic waters have become necessary.

Captain Brennan is a native of San Francisco and began his sea career there twenty-three years ago when he was a boy, shipping on sailing schooners. He subsequently graduated from the New York State Nautical School. He then enlisted in the United States Navy and from the navy entered the service of the Red Stack towboats of San Francisco. In the Spanish-American war he served in the transport service between San Francisco and the Philippines, and, after that war, joined the Pacific Mail Steamship Company. From that corporation he went to the old Alaska Pacific Steamship Company in February, 1907. Then he served as chief officer on the company's steamship Buckman and was holding that berth in September, 1910, when two highwaymen attempted to hold up the ship at sea. Captain E. B. Woods, master of the ship, was slain in battle with the robbers, and Captain Brennan led the fight that resulted in the capture of one of the men and the disappearance of the other. For his work in that affray, he was presented a medal by the company. The following year he was promoted to the command of the steamship Yukon.

Captain Brennan, who had become senior master of the Admiral Line, was assigned to the command of the Harvard in 1916, but later transferred to the Yale.

When the Yale arrived in England for war service, the British Admiralty was delighted to find that she was ready to begin work the moment she berthed, not a bit of overhaul being necessary. Her record throughout her war service in running with the steadiness of an express train back and forth across the English Channel brought Captain Brennan the highest commendation from both the American and the British admirals.

A Typical four-masted auxiliary motor schooner

By Special Correspondent

SECRETARY OF THE NAVY DANIELS paid a day's visit to Portland September 9. He was accompanied by Mrs. Daniels, Admiral Parks, chief of the bureau of yards and docks, Admiral McKean, chief of operation, and Commander Hilton, chief of the bureau of supplies and accounts. The party was convoyed by the veteran cruiser Birmingham and six destroyers.

The secretary's only recommendation in regard to Portland's harbor, which the party had come here to investigate, was that the channel in the Columbia and Willamette rivers be dredged to a greater width and to a depth of 35 feet, to accommodate the largest vessels of the Navy. The time will surely come, he said, when the largest vessels afloat will come and go in Portland harbor, and he intimated that he will make recommendations to Congress for the appropriations to make this possible. Secretary Daniels left Portland by special train to Astoria, where he boarded the battleship Arkansas to continue his journey northward.

For the first time in history, two new steel shipping board steamers have been assigned to carry full lumber cargoes to the Orient. The vessels are the Portland-built 8800-ton steamers West Harts and West Segovia, which took 4,500,000 feet of fir lumber apiece to China last month, under the management of the Columbia-Pacific Shipping Company.

Further activity in Portland's lumber trade is shown by the chartering of two motorships, the Babinda and Kirkentind by the Pacific Export Lumber Company to take two million feet of lumber apiece to an Arabian port. The American bark Harvard was also chartered to carry lumber to Sydney, Australia.

In addition to the regular fleet of lumber carriers running from Portland to California ports, the steam schooner Claremont has been placed on the run by the Hart-Wood Lumber Company, her owners and operators. The Claremont will make a round trip every twenty-one days. Rates on all coastwise lumber shipments have been increased fifty cents a thousand feet.

Wages of all shipyard workers in the Portland district were raised eight cents an hour by the new scale which went into effect October 1. The scale, together with a working agreement providing for a forty-four-hour week, was adopted at a conference between shipbuilders and representatives of the shipworkers' locals, metal trades' council and international labor representatives, which was held here September 3, 4 and 5. The new agreement replaces the award of the shipbuilding labor adjustment board which went into effect October 1, 1918, and will remain in force for a year, being in this respect, as well as in wages adopted, similar to agreements reached elsewhere on the Coast.

Wages of longshoremen in Portland were raised by the action of a conference in Seattle, establishing a uniform scale for the entire Pacific Northwest.

Two important events of the past month in Portland shipbuilding circles are directly contradictory in their indication as to future activity along this line. The Albina Engine & Machine Works, according to an announcement by its president and manager, William Cornfoot, is to be dismantled because of lack of contracts and is to return to its pre-war basis, employing about 100 men. When war-time shipbuilding activity was at its height, this plant employed 3500 men and operated five ways. It produced a total of seventeen steel vessels of the 8800-ton class. Preceding this announcement by only a few days was one by Guy M. Standifer, president of the G. M. Standifer Construction Corporation, that this concern was to start immediately upon the building of six 9500-ton steel ships on its own account.

In spite of the dismantling of the Albina Engine & Machine Works and an apparent tendency on the part of most builders to await more settled labor conditions, there is a strong undercurrent of optimism for the resumption of private shipbuilding. The Northwest Steel Company and Columbia River Shipbuilding Corporation, which are practically at the end of their government programs and have not as yet announced the acceptance of further contracts, have made no move to cut down the capacity of their plants or to stop the purchase of shipbuilding steel and other supplies.

The supply and sales division of the Shipping Board, which has made Portland its Pacific Coast headquarters for the disposal of surplus material left over from the shipbuilding activities of the board, has launched a huge selling program, meaning to dispose of all salvage with the loss of as little time and money as possible. All the material in this district has been gathered in the old yard of the Grant Smith-Porter Ship Company and catalogs and price lists have been prepared showing all the material that is to be sold.

The congressional committee investigating shipbuilding, which consists of Representative Joseph Walsh of Massachusetts, chairman, and Representatives P. H. Kelly of Michigan, L. H. Hadley of Washington and Mr. Miller of Ohio, contented itself on its visit to Portland with an inspection of the work of the supply and sales division and a visit to the concentration yard. The committee was scheduled to spend three days in this city, but completed its work in two.

By Special Correspondent

IN his only public appearance in Southern California during his recent trip to the state, Frank A. Vanderlip, former head of the National City Bank of New York, declared that he was optimistic and especially so over prospects of trade to be brought to the Coast via the Panama Canal.

Mr. Vanderlip was the guest of San Pedro business men at a smoker held in the Elks hall and when it was learned that he would speak on world financial conditions, representatives from Los Angeles, Redondo and Long Beach attended to listen.

Mr. Vanderlip referred to economic conditions in Europe and the entire world, and said that this country could not hope to escape feeling the effects of such conditions. He referred to the breaking down of all means of transportation in Europe, declaring that if the ports of Europe were filled with food it could not be distributed to the people for lack of transportation. Mr. Vanderlip explained the manner in which foreign exchange was operating against European business men and governments and of how it increased the cost of living in Europe.

Referring to economic conditions in America, he said that labor and capital should reach a better understanding and while sympathizing with the view of labor regarding the high cost of living, namely, that increases in wages were nullified by the increase in the cost of the necessities of life, he spoke strongly against what he called the "silent strike" or decreased production, giving as an example the construction of a steamer by the New York Shipbuilding Company recently with 400,000 hours of labor as compared with the construction of a sister ship of that steamer with 200,000 hours of labor during the war. He said the increase in cost of the second steamer was four times that of the first.

Discussing the Panama Canal, Mr. Vanderlip stated that while so far it has not had the effect hoped for, this is due to the war, and he hazarded a guess that California's belief in the importance of the opening of the canal will be fully justified. Steamship lines soon will be operating between the coasts carrying huge cargoes, and there is every reason for optimism.

Officers of the Southwestern Shipbuilding Company stated that work on the contract for the ten new steamers recently awarded the company by the Shipping Board would commence in October. The vessels will be of 12,000 tons and work will be started as soon as a slip is available.

The Los Angeles Shipbuilding & Drydock Company has been awarded a contract for five new steamers of the 12,000-ton type. It will commence work as soon as present contracts are completed. There are fifteen steamers of the old contracts to be delivered. The West Kalumb was given her trial trip in September and the trial of another vessel was given some two or three weeks later.

The last steamer to be launched by the Ralph J. Chandler Shipbuilding Company of Wilmington for the Emergency Fleet Corporation was launched in September, when the Nakonia glided down the ways. The hull will be finished as a barge. Mr. Chandler announced that the company would continue to build steamers, and that several contracts with private shipping operators were about ready for signature. The Nakonia was the sixth steamer launched by the company for the government. It is a wooden steamer of 3500 tons.

The Long Beach Shipbuilding Company launched the Haleakala in September. It was christened by Mrs. Robert Smith of San Francisco and was named in honor of the splendid response Hawaiian Islanders made in the recent Victory Liberty Loan drive.

One of the most momentous decisions affecting commercial fishermen here was handed down by Judge Valentine of the Superior Court recently, when he refused to uphold the injunction proceedings of the Coast Fishing Company and some ninety fishermen against the State Fish and Game Commission in connection with the restrictions against commercial fishermen around Santa Catalina Island. This island has been made a game preserve for sporting fishermen, and fishermen for the canners and markets have been prevented from catching fish there in quantities.

The construction of an additional breakwater here, to cost approximately $1,000,000 and to enclose a greater portion of the harbor, was advocated by the San Pedro Chamber of Commerce before Colonel Frederick B. Downing, United States engineer in charge. Under plans proposed in the report of an assistant secretary of war several years ago, it is proposed to construct the additional breakwater from a point 2500 feet easterly from the end of the present breakwater, in a general easterly direction toward Long Beach. The plan proposes the construction of two other units at a cost of $1,000,000 each.

Captain Chancye Shackford, commander of the submarine base here, advocated the enlargement of the harbor by the construction of another breakwater and the dredging of the harbor to a uniform depth of forty feet. The present depth is thirty feet, and it is considered advisable that dredging be done to accommodate naval vessels.

Agitation for the purchase by the city of additional acreage in the outer harbor which would be given to the Navy Department for the submarine base, has been begun by Mayor M. P. Snyder and other city officials. When Secretary Daniels was here recently he advocated the purchase of forty-seven acres of land on top of the bluff overlooking the site of the proposed submarine base.

SAN FRANCISCO

MANY vessels have been tied up at the various docks of the port during the month on account of the stevedores' and longshoremen's strike. Nearly 2000 of these men refused to go to work when the employers failed to grant the conditions demanded. The ship operators maintain that they cannot comply with the demands of the strikers, which they claim are unreasonable. The passenger steamships of the Pacific Steamship Company have traveled on schedule, but for the time being are handling no freight.

After more than a year's service in transporting troops through the submarine zones of the Atlantic, the Great Northern is back in Pacific waters and will be used by the government between this port, Manila and Vladivostock.

During the month Japan's record ship, the Raifuku Maru of the Toyo Kisen Kaisha was in port en route for Japan. The Raifuku Maru was built at Osaka in twenty-three days, and notwithstanding that fact, seems to be a tight little ship.

Steamship Unimak, which was rammed off Duxbury Reef by the Helen P. Drew and towed into port by that vessel, has been temporarily repaired, righted and floated by Captain Whitelaw and towed to the Barnes & Tibbetts Shipbuilding plant at Alameda, where she will be restored and reconditioned.

On September 13 the Matson liner Maui sailed for this port from Norfolk, Virginia, with a cargo of coal for the government. After discharging, she will be turned over to the Matson company and be made ready to go back on the run between this port and Honolulu. The Wilhelmina of the Matson line is now berthed at Pier 28 and surveys are being made on her by representatives of the local shipbuilding and repair plants and keen competition is expected in the bidding for her reconditioning. All of the parts removed from the vessel when she was commandeered by the government were carefully crated and are now aboard the ship. It is expected that the work will take about seven weeks. The Matson company is understood to have had plans drawn for a palatial new steamer which will make the trip from San Francisco to Honolulu in much shorter time than anything now on that route.

The Shipping Board steamship West Aleta, the first of the vessels under the management and operation of Williams, Dimond & Company to initiate direct service between this coast and the United Kingdom, has arrived at Hull with more than 8000 tons of general California products.

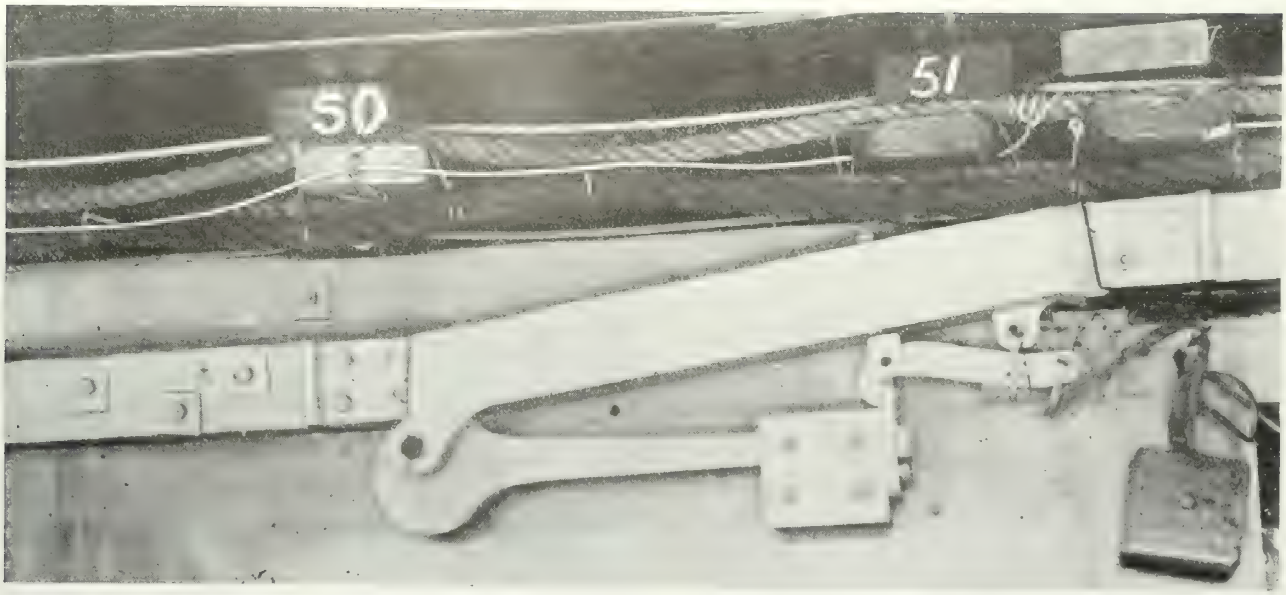
The captured German submarine U-88, which has been lying at pier No. 11, has been a great center of interest on the waterfront, being visited daily by crowds of people who wait patiently in line for a chance to walk through her interior and indulge in many exclamations as they try to figure out her complicated machinery and control system.

Contractors are busy laying the last stretches of pavement on the Embarcadero. When this is finished, we will have in San Francisco an approach to our waterfront from the land side of which we may well be proud.

Work is forging ahead rapidly on the pier sheds at Nos. 33 and 41, and these structures will soon be ready for use. These modern structures with their concrete fronts facing the Embarcadero add greatly to the uniformity and beauty of the city side of San Francisco's waterfront.

The battleships Vermont and Georgia returned to this port from the North and were taken to Mare Island Navy Yard for a thorough overhauling, preparatory to their steaming south to the target practice grounds. Naval officers usually handle their own ships up to the Island, but as there have been numerous changes in the channel course during the past year on account of the fast rushing of the flood and tide waters Captain Charles Hall, the veteran river pilot, was called in to navigate the naval vessels from the stream to the Mare Island docks.

Steamship Maui as a passenger liner entering Honolulu Harbor



Launching trigger used at the yard of Union Construction Company

A NOVEL LAUNCHING TRIGGER

Mr. J. A. Sjoberg, superintendent of the hull department of the Union Construction Company, has devised a rather novel trigger for holding and releasing the dogshores on the launching ways. Reference to our illustration will clearly show the details of this interesting piece of mechanism. A cam lever, having on one side of the cams a wedge-shaped projection, is eccentrically hinged to the lower end of the shore timber in the manner shown in the cut and locked in that position by the trigger so that the wedge-shaped projection engages the end of the stop on the stationary way, preventing the dogshore from slipping off its seat on the stop. The upper end of shore is enclosed in a casting having a lip which prevents that end from slipping up on the stop attached to the sliding way. The weight at the right, released at the signal from the platform, trips the trigger, releasing the weighted lever which revolves the cam on its hinge, pulling the projection out of the lower seat and allowing the pressure to slide the dogshore off the same, releasing the ship.

FREIGHT REPORT

OUR last circular was dated August 20, and the only business since done on barley from this port to the United Kingdom was a charter by E. L. Eyre & Company of space for 2000 tons on a United States Shipping Board steel steamer to the United Kingdom at $30 a ton. This rate has been freely bid since then for wooden steamers, and even sailers, but owners would not look at it.

Lumber freights, on the other hand, show more strength and freights have advanced. The schooner Bainbridge was chartered at $17 from Puget Sound direct to a Hawaiian Island port.

Comyn, Mackall & Company chartered their schooner Watson A. West at $40 for two ports of discharge, Valparaiso and Pisagua Range; also their schooner Onega on private terms to a direct port in Chile.

Wolff & Kirchmann have chartered two of their vessels at the reported rates of $35 for redwood from Eureka to Sydney.

Proposed new office building for The Main Iron Works

J. J. Moore & Company paid $35 for lumber from the North to Sydney for the George E. Billings and the James Tuft.

A. F. Thane & Company have since chartered the schooner Inca and the Cecilia Sudden, also to Sydney, at $37.50. The Canadian Trading Company closed the schooner Bianca from the North to Bombay at $55. The Rolph Navigation & Coal Company chartered the barkentine Hesperian at $60 from the North to Algoa Bay and Durban to Gates & Company of Portland, which is the highest charter to Africa for many months.

The motorboat Kirketind was chartered by the United States Trading Corporation to the Pacific Export Lumber Company at $68.50 from Columbia River to Basra, Persian Gulf, and there are further inquiries for this port.

Comyn, Mackall & Company chartered the motorboat Margaret at $55 for lumber from the North to the United Kingdom or a French port. The schooner Vancouver was chartered at a lump sum of $52,250 from Puget Sound to Buenos Ayres. We do not know the charterer's name.

Nothing has been done in time charters, so far as we know. Owners are holding their vessels at from $9 to $9.50 a ton on the deadweight, on government form, for six months or one year.

Japanese steamers have ceased offering for time charters in this market, as the demand still continues for their steamers from the Orient to the United Kingdom, and the last freight quotations from London show that Japanese owners are getting as high as 55/- a ton, delivery Japan and redelivery United Kingdom.

Owing to the scarcity of copra, there are more vessels offering than there is copra to supply them with, and we understand that during the last week a vessel has been turned down by charterers even at $18 a ton.

Peruvian buyers have lately bought the steamer Aurelia from the Pacific Steamship Company. She will load lumber in the North to Peru for the new owner's account.

Walter Scammel bought the schooner Le Primera for his coastwise business. The prices paid have been kept private so far.

We have just heard that the Rolph Navigation & Coal Company have sold the schooner Golden State, now at Pensacola loading lumber for Buenos Ayres, at $100,000. Presumably the new owners get the benefit of the charter to South America, but of this we are not certain.

PAGE BROTHERS.

OUTLOOK FOR THE LUMBER MARKET IN ITALY

Austria furnished before the war the bulk of the lumber imported into Italy. In 1913 lumber brought into Italy from Austria was valued at slightly over 100,000,000 lire ($20,000,000), while the imports from the United States came next, amounting in value to about 21,000,000 lire ($4,200,000). All other countries furnished less than 12,000,000 lire ($2,400,000) worth.

Austrian rail transportation facilities have become sadly impaired. It would be difficult to get Austrian lumber into Italy even if the supply were cheap and abundant because of the sheer inability of the Austrian and Italian roads, crippled as they are by the shortage of coal and rolling stock, to transport such a bulky commodity as lumber.

E. M. CUTTING LEAVES SAN FRANCISCO

E. M. Cutting, formerly Pacific Coast manager for the Edison Storage Battery Company with headquarters at San Francisco, has been appointed manager of the company's railroad department with headquarters at Orange, New Jersey. Mr. Cutting expects to leave the Coast early in September to take up his new duties, for which his previous experience admirably qualifies him. Entering the employ of the Southern Pacific Company's signal department in 1888, he rose to the position of signal supervisor for the Western division by 1897. In 1905 he was also given charge of the car-lighting on the Southern Pacific lines, and in 1908 became engineer of train lighting, heating and ventilation. In 1912 he resigned to become Pacific Coast manager of the Edison Storage Battery Company. "Uncle Ed," as he is affectionately known from coast to coast, has always taken an active interest in electrical affairs, having been instrumental in initiating the movement which culminated in the Association of Railway Electrical Engineers, of which he was the second president, and also being a past president of the San Francisco Electrical Development League. While his many friends on the Pacific Coast will be pleased to learn of his newest advancement, they cannot but feel a deep regret at his withdrawal from the Pacific Coast field.

ELECTRIC FURNACE ORDER

After an extensive investigation of the various types of electric furnaces and a visit to the United States Navy Yard at Puget Sound, where a six-ton "Greaves-Etchells" furnace is in operation, the Vancouver Engineering Works, Ltd., Vancouver, British Columbia, has given an order to the Electric Furnace Construction Company for a "Greaves-Etchells" furnace.

Marine Insurance

UNDERWRITING METHODS

By Charles F. Howell

A POST-BELLUM marine insurance liability of substantial extent is coming to the fore in the shape of claims as regards unrepaired damage to requisitioned vessels. It is probable that it will take a test suit to definitely settle the point and determine the government's share of the liability. The English courts have already gone into the question. The shipping controller of the British Empire has given it as his opinion that the position of the Ministry of Shipping relative to requisitioned vessels is simply that of a time charterer and that claims for deterioration or damages which would fall upon the owner and not upon the charterer, were the charter entered into between two private individuals, cannot be considered. Certain claims, however, he admits are admissible, and he is distributing lists wherein particulars of the chief types of damage are outlined, in respect of which claims will be considered. Underwriters anticipate that claims of this character will have to be met, and they believe that the number of them will not be small. Particular interest is manifested in the admissibility of claims for damage done by collision while coaling war vessels at sea, and the underwriting view on this point is that they should be excluded as not falling legitimately within the scope of the marine policy, and that the government should defray the cost of damages caused entirely by the urgency of the state of war under which such operations were conducted. American shipping interests will find important reading in the test case involving the liability of underwrters for unrepaired damage recently brought in London by the Wilson Shipping Company, Ltd., against the British & Foreign Marine Insurance Company, for a loss on the hull of the steamer Eastlands, which, after a number of partially redeemed casualties, was torpedoed in January, 1918. She was under requisition to the British government at the time. The form employed by the latter in chartering vessels is known as the "T. 99," and by its terms the Admiralty contracts to pay for the loss by war risks. The Eastlands was insured for marine risks only, by the private companies, and the latter maintained that they were not liable for the difference claimed from them by the plaintiff arising out of the depreciation in the vessel's value on account of partially repaired particular average damages sustained prior to her total loss. They based their contention upon the Institute item clause which reads: "In no case shall underwriters be liable for unrepaired damage in addition to a subsequent total loss sustained during the term covered by this policy." The justice denied that this clause protected the underwriters, as being limited to a case of total loss, which falls upon the underwriters, and not covering where a total loss is due to an excepted peril. He further cited the Marine Insurance Act of 1906 as providing that where a partial loss which has not been repaired or otherwise made good is followed by a total loss, the assured can only recover in respect of the total loss. His final conclusions, however, were favorable to the defendants, and were as follows:

"Whether an underwriter is or is not liable for unrepaired damage cannot be ascertained until the expiration of the policy. If, before the expiration of the policy, there is a total loss, the underwriter is not liable to pay for the earlier unrepaired damage sustained during the currency of the same policy, and it makes no difference whether the total loss falls upon them or is due to an excepted peril against which the owner is insured or uninsured."

The Sailing Ships

We have, in this country, a rapidly declining business in the underwriting of sailing vessels. It is a far cry to the palmy days when the American clipper ship won the mastery of the seas and wrested the great bulk of the ocean-carrying trade from England and the Continental powers. The far-seeing Britishers were not slow to recognize their dilemma and to shift the tide that had set against them by substituting iron and steel for wooden construction, and steam for sails as a propelling power. Despite the fact that we had been the first nation to employ steam in oceanic navigation, we permitted others to supplant us in this important field, pinning our faith to our unquestioned superiority in sailing craft. Then came our Civil War, with its attendant panics, and the decline of our ocean prestige was rapid. When the recent great war broke out, there were comparatively few American sailing ships to be seen anywhere. Then followed a revival of interest in "sails," owing to the destruction of steam vessels by enemy submarines, and those that were still available were at once taken over by the government and employed in the moving of the accessories of war. Old hulks that had been serving ignominious ends, as cut-down lighters and barges, were restored to their original state and uses and sent out with general commercial cargoes to the four quarters of the world. Those underwriters who had long continued to cover the despised "sails" then came, for a brief period, into their own again, realizing a considerable profit on war risk business and something less on straight marine. The staunch old sailers would go out with general cargoes, and were freely employed to take coal, lumber and oil to Australia, South America and South Africa, returning heavily laden with grain, linseed, coffee, wool and cocoa from South America, wool from South Africa, and cocoa from West Africa. In the main they carried these commodities dry, though damage claims were incurred from time to time; and though, of course, the vessels were not so sound nor their skippers so clever as in the days of the clippers. Heavy

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weather caused numerous losses, and sometimes as much to hulls as to cargoes. This brief revival was a last gasp. With the termination of the war the carrying conditions of the world have been rapidly returning to normal, and sailing ships are reduced to a coastwise trade in lumber and a little coal, with next to nothing in the trans-Atlantic way. Even this will soon pass into the holds of tramp steamers, and then the old hulks will be again cut down into lighters and barges. At present, American underwriters are covering "sails" with more and more reluctance, and many companies decline to write them altogether. The hull rate is considered just and adequate, but cargo quotations are low to the point of a vanishing profit. There are good reasons for such a condition. The United States Shipping Board is covering the seas with modern steamers of value, and the slow-creeping sailers cannot hope to compete with them. Again, the cost of repairs has leaped to figures that stagger both shipowners and insurance men, and an underwriting rate increase is absolutely imperative. It is interesting to note, however, that a somewhat more favorable view of the subject is entertained in other countries; nor should it be concluded that dissent is unanimous even in America, as occasionally an office is to be found that has selected its lines with caution, reinsured its questionable risks, and finds itself in position to show a loss ratio but slightly above 50 per cent with a tidy profit for the past two or three years. In England sailing ships have been accepted freely, as they have been comparatively immune from disaster there in recent years, and it is stated that the rates are frequently below the actual hazard of the voyage. It is not denied, however, that during the submarine menace sailing ships were confined to comparatively easy trips, and that a considerable increase in losses may be looked for now that they are being employed in all the old trades on account of the reduced number of steamers available to the British.

Substituted Expenses

Shipowners sometimes adopt alternative means of handling the adjustment of their marine losses, employing what is known as "substituted expenses." A prominent authority points out that under such circumstances it is advisable for the owner to obtain in advance the approval of all the parties interested. Should a vessel at a port of refuge find it necessary to proceed elsewhere for repairs, the cost of moving is allowed in general average if the vessel has all or a part of her cargo on board. The cost of returning will also be allowed. But if the cargo is discharged at the port of refuge and the vessel proceeds in ballast to the repairing port, the cost of the voyage both ways will be treated as part of the repair costs; consequently, if the repairs are all particular average, the expense becomes particular average; if the repairs are all general average, the expense will be all general average; and if part each, the expense will be divided between particular and general average in like proportion. The sole exception is the allowance for wages and provisions of the ship's company, which, in any event, is allowable in general average. "Where the adjustment is governed by American law," says Hugh A. Mullins, of New York City, "and is properly drawn up according to the usages of the Atlantic Coast, the shipowner is entitled to a disbursing commission of 2½ per cent on the actual amount of his general average disbursements. He is also entitled to interest on these disbursements, together with interest on any allowance made to the vessel from the date of disbursement to the estimated date of reimbursement, the interest being reckoned at the legal rate prevailing at the port of destination. Interest is allowed on cargo and freight allowances from time of completion of discharge. The shipowner is also entitled to 2½ per cent commission for collecting and disbursing the general average. Where the adjustment is made according to the usages of the Pacific Coast of this country, the shipowner is allowed 2½ per cent on disbursements up to the extent of the prepaid freight, if any, and 5 per cent on all disbursements in excess of such freight. Interest is allowed on the Atlantic Coast, but in respect of collecting and settling general average, the allowance is 5 per cent on the first $10,000, 2½ per cent on the next $20,000, and 1 per cent in excess of $30,000."

Internment Charges

The cost of the lying up of merchant ships in enemy ports during the internment period is being charged up to the account of the marine underwriters. This has already become a substantial item in England, and the underwriters there are regarding these charges as entirely normal. According to one of their leading authorities, the procedure is practically identical with the collection of an ordinary lying-up return, the only evidence required by the claim settlers being a certificate or statement to the effect that the vessel was actually laid up during that period, and was not used by the enemy for trading purposes in such waters as were left to him. Considering that any damage from enemy action falls outside of the scope of the

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marine policy, and that deterioration from disuse is also excluded, it is felt that the risk during the enforced period of inactivity was in no way enhanced through the vessel's being in the hands of the enemy. The periods for which the charges are being made are, in the main, the concluding months of the policies just prior to the outbreak of the war; coverage on vessels in enemy ports was seldom renewed after the current policies had expired, the owners being obliged to run their own risk. There is knowledge of isolated instances of port risk coverage, and their renewals, but such were exceptions. Here and there a shipowner would claim a total loss under the war risk policy, when his vessel was captured. In such a case there could be no question of a return, as the underwriters came into possession of the ships as soon as they paid the claims. The subsequent enhancement in value is believed to have handsomely compensated the underwriters for their outlay.

Federal Marine Tax

There is every likelihood that before the deliberations of the congressional subcommittee on merchant marine and fisheries have been concluded, a substantial Federal tax will have been levied upon those marine brokers who place American business in foreign countries. It is authoritatively stated that no less than $75,000,000 of premiums are taken out of this country every year by unauthorized marine insurance companies, and that a very considerable volume written by foreign admitted companies escapes taxation by being transmitted by cable, the medium on this side being American brokers. The charge is also made that many American brokers would rather cable their business abroad than go through the small trouble of attending to the details here. If, as is frequently stated, the foreign companies are in position to save 10 per cent above what the American companies have to pay on account of taxes here, it is apparent that we have little chance of meeting their rates. The argument that this market is short of facilities and cannot take care of the business is refuted in the statements made by William H. McGee, the prominent New York underwriter, before the congressional subcommittee. He insists that the American companies can cover any ordinarily good risk to a total of $1,000,000, and that high-grade ocean steamers can secure coverage here up to $3,000,000 each.

The Falling Exchange

There is an unusual degree of briskness in the marine insurance market at the present time, and the reason is generally ascribed to the decline in foreign exchange. Shippers are not only refusing insurance in foreign companies unless it is made payable in dollars, but are taking out additional coverage in American companies, anticipatory of the cancellation of foreign policies, the purpose of the latter move being to protect against the difference between the face of the policies and the rate of exchange. It has been estimated that prevailing exchange figures, which quote the pound sterling at but little above $4, would involve a loss of 15 per cent of the face of the policy were payment to be made in sterling instead of dollars. Payment in francs involves a still greater discrepancy, and there is even more when lire are tendered. There are numerous instances of the cancellation of foreign insurance by shippers on this side, and the substitution of American policies; and it is known that a number of astute exporters had even anticipated the fall in exchange and stipulated for dollars in their contracts—which develops a source of worry for the underwriters.

American Hulls

Ever since the suspension of advisory rating on ocean hulls by the American Hull Underwriters' Association on June 23, the merry war on the tariff has waxed keener and keener. Natives and foreigners, all are taking a hand at it; and "the sooner over the better" appears to be the basis of action. Already several of the more conservative offices are retiring from the fight, feeling that, with war risk profits practically wiped out and losses piling up, the business is not worth the having. Cargo rates keep up, but it is suspected that they, too, may relax under the pressure. The hull business is being written "less 3 per cent tax," which is a warning to foreigners that the United States government stands ready to help its marine underwriters in the upbuilding of a real market in this country. The deduction is made from the premium and therefore does not particularly interest the insured so far as regards whether his insurance is placed at home or abroad. Considering how much grumbling has been going on in English underwriting circles over the alleged smallness of American hull rates, it is to be wondered that they persist so tenaciously in hanging on to their business here. Says Fairplay: "At the moment it must be confessed that underwriters are not refusing the business on account of the imposition of the tax. It remains to be seen whether it will have any effect in reducing the amount of American business coming into London when experience has shown whether the business can be carried on with this additional burden."

PROXIMATE CAUSE

By Special Correspondent

THE question of liability of a marine underwriter for a loss of or damage to property insured is frequently blurred by the difficulty of determining as to whether or not the loss or damage was actually caused by the perils insured against. All policies of marine insurance stipulate that underwriters are liable for losses caused by certain enumerated perils and in the event that there are two or more incidents or events leading up to and causing the damage it becomes necessary to ascertain which event is actually the direct cause in order to determine whether or not the underwriter is liable under his policy. The question is by no means a simple one and no hard and fast rule for determining the proximate cause can be laid down, in fact a review of the text books and legal decisions leads one to the conclusion that in many cases a judgment of the court is necessary to settle the vexed question.

Eldridge, in his text book on Marine Policies (1907) says:

> "The principle which prevails is that the loss must be attributed to the actual and direct cause, so that where there are a number of events successive in order of time, each producing the one which follows it, the last event preceding and producing the loss is held to be the cause of such loss."

In commenting on the maxim "causa proxima non remota spectatur," Lord Bacon said:

> "It were infinite for the law to judge of the causes of causes and their impulsions one of another; therefore it contenteth itself with the immediate cause, and judgeth of acts by that, without looking to any further degree."

From the above it would appear that the proximate cause is the one nearest in time to the act of damage and there are many decisions which seem to bear this out. For instance, the well known and oft quoted case of Hamilton Fraser & Company versus Pandorf & Company. In this case a hole was gnawed in a pipe leading from the bath room to a point in the shell of the ship which was below the water line. The hole was above the water line when the ship was loaded but as she rolled in the seas water found its way through the hole and damaged some of the cargo. In this case the damage was found to have been caused by a peril of the sea, that that was the proximate cause and that the gnawing of the hole through which the water entered was the remote cause. In other words "the event preceding and producing the loss was held to be the cause of such loss."

So in the case of Pink versus Fleming where a cargo of oranges was insured free from partial loss or damage unless such loss or damage was consequent on collision with another ship or vessel. The vessel was in collision in consequence of which she was obliged to put into a port of refuge to make repairs and it was necessary to discharge the oranges to effect the repairs. The oranges were damaged partly by handling and partly by decay due to the delay in the voyage. The Court said:

> "The question, which is the causa proxima of a loss, can only arise where there has been a succession of causes. When a result has been brought about by two causes, you must, in marine insurance law, look only to the nearest cause, although the result would, no doubt, not have happened without the remote cause."

In giving judgment that the loss was not recoverable the Court went on:

> "But the proximate cause of the loss was the handling of the fruit, though no doubt the cause of the handling was the necessary repairs, and the cause of putting into port for repairs was the collision. There were three causes of the result, but according to the English law of marine insurance, only the last of them is to be looked at for the purpose of determining the liability of the underwriters."

Our courts have held that the spoiling of meat by reason of delay in the voyage through putting into a port of distress to make repairs made necessary by accident through a peril of the sea is not recoverable under a marine insurance policy as the proximate cause of the loss is the inherent vice of the meat and not the peril or accident which caused the delay.

But the majority of the decisions do not bear out this interpretation of the maxim.

Phillips on Marine Insurance says:

> "The commonplace maxim, that in cases of doubt to which of two or more perils a loss is to be assigned, 'causa proxima non remota spectatur' has been not infrequently resorted to, by which was meant, originally at least, that a loss is to be attributed to the peril in activity at the time of the ultimate catastrophe, when the loss is consummated. But much of the jurisprudence is contradictory to the maxim taken in this sense, and it seems to have served rather to direct attention from the proper inquiry and to becloud instead of elucidating the subject."

And he further says:

> "I understand the results of the jurisprudence to be that—In case of the concurrence of different causes, to one of which it is necessary to attribute the loss, it is to be attributed to the efficient predominating peril whether it is or is not in activity at the consummation of the disaster."

In the case of Mordy versus Jones a vessel loaded with hides and tobacco shipped a quantity of sea water which rotted the hides but which did not come into direct contact with the tobacco, but the tobacco was spoiled by the reek of the rotten hides, and it was held that the shipping of the water due to heavy weather was the proximate cause of the loss notwithstanding the fact that tobacco is very susceptible to damage by absorption of odors from other commodities, although not itself of a perishable nature.

In the case of the G. R. Booth some detonators were being loaded on a vessel. Some of these exploded in the hold causing a break in the sides of the ship through which the sea water entered damaging some of the cargo. It was held in this case that the explosion was the proximate cause of the damage and not the water entering the hold.

So also in the case of the Zulio. A shaft which was being loaded on the vessel fell through the bottom and the inflow of water into the hold damaged the cargo. The proximate cause of the damage was held to be the falling of the shaft.

In both of these cases it would appear that the nearest cause was the inflow of sea water but the Courts have gone behind that and held that the cause more remote in time was the proximate cause, and that, not being a peril of the sea, the resulting damage was not recoverable.

The difficulty of deciding as to what constitutes the proximate cause is well illustrated by two identical cases which came up for decision, one in the English Courts and the other in America. In the English case a ship was in collision with a steamer for which both were held to blame and in the settlement of the damages the ship was obliged to pay to the steamer a balance representing the difference between the damages sustained by each. The owner of the ship sought to recover this from his underwriters as being a loss caused by a peril of the sea but the Court held that he could not recover, on the ground that the obligation to pay the sum in question was neither a necessary nor a proximate effect of the perils of the seas, but growing out of an arbitrary provision of the law of nations. In the American case the underwriters were held liable on the ground that the damages so apportioned must be regarded as a direct and proximate effect of the collision.

The fullest discussion of this maxim of "causa proxima non remota spectatur" which we have had in recent years is in the case of the Ikaria, (Leyland Shipping Company, Ltd. versus Norwich Union Fire Insurance Society, Ltd.), decided by the House of Lords in January, 1918. This steamer was torpedoed about twenty-five miles outside of Havre and badly damaged but with the aid of her pumps she was able to make the harbor. She was moved from the inner harbor to the outer harbor where, at low tide, she rested on the bottom, suffered further damage and became a total loss. The Court held that this was not a loss by a peril of the sea as covered by the ordinary marine insurance policy but that the proximate cause of the loss was the damage done by the torpedo. In this case the doctrine that the proximate cause is that nearest in time was utterly scouted. Lord Shaw, in concurring in the decision said:

"In my opinion too much is made of refinements upon this subject. (Proximate cause). The doctrine of cause has been since the time of Aristotle, and the famous category of material, formal, efficient and final causes, one involving the subtlest of distinctions. The doctrine applied to these existensies rather than to occurrences. But the idea of the cause of an occurrence or the production of an event or the bringing about of a result is an idea perfectly familiar to the mind and to the law, and it is in connection with that that the notion of causa proxima is introduced. Of this, I will venture to remark that one must be careful not to lay the accent upon the word 'proximate' in such a sense as to lose sight of or destroy altogether the idea of cause itself. The true and the overruling principle is to look at a contract as a whole, and to ascertain what the parties to it really meant. What was it which brought about the loss, the event, the calamity, the accident? And this not in an artificial sense but in that real sense which parties to a contract must have had in their minds when they spoke of cause at all.

"To treat causa proxima as the cause which is nearest in time is out of the question. Causes are spoken of as if they were as distinct from one another as beads in a row or links in a chain, but—if this metaphysical topic has to be referred to—it is not wholly so. The chain of causation is a handy expression, but the figure is inadequate. Causation is not a chain but a net. At each point influences, forces, events, precedent and simultaneous, meet, and the radiation from each point extends infinitely. At the point where these various influences meet it is for the judgment as upon a matter of fact to declare which of the causes thus joined at the point of effect was the proximate and which the remote cause.

"What does proximate here mean? To treat proximate cause as if it was the cause which is proximate in time is, as I have said, out of the question. The cause which is truly proximate is that which is proximate in efficiency. That efficiency may have been preserved although other causes may meantime have sprung up which have yet not destroyed it, or truly impaired it, and it may culminate in a result of which it still remains the real efficient cause to which the event can be ascribed.

"I illustrate this by the present case. Did the vessel perish because she was torpedoed or by a peril of the sea apart from that? It is replied 'She perished by a peril of the sea because sea water entered the gash in her side which the torpedo made." Certainly the entry of sea water was a peril of the sea, and certainly that entry of sea water was proximate in time to the sinking. But how could there be any exception in the case of a vessel lost in harbor or at sea to a loss by perils of the sea, if the proximate cause in the sense of nearness of time to the result were the thing to be looked to? It is hardly possible for the mind to figure anything which would interfere with or be an exception to a cause so proximate as the entry of sea water into or over the hull as the vessel sinks in the waves. The result of this is that the consideration of the exception of the consequences of hostilities, or indeed any other exception so far as I can at present figure, if that consideration be limited to a cause proximate in time, destroys the exception altogether. It might as well never have been written. In my opinion accordingly proximate cause is an expression referring to the efficiency as an operating factor upon the result. Where various factors or causes are concurrent and one has to be selected, the matter is determined as one of fact, and the choice falls upon the one to which may be variously ascribed the qualities of reality, predominance, efficiency. Fortunately, this much would appear to be in accordance with the principles of a plain business transaction and it is not at all foreign to the law."

Salvaging Cocoanut Oil and Tallow

Two views at the scene of the wreck of the William Olson showing salvaging of cocoanut oil cargo

The bark Albert, from New Zealand, with 1400 casks of tallow and $20,000 worth of leather, was wrecked near Point Reyes in April, 1919. The ship broke up immediately, and about 700 or 800 casks of tallow were washed up on a sandy beach. After various efforts were made to salve the cargo from the sea without success, a contract was made with Messrs. P. J. Seale & Company to salve the casks of tallow overland and to gather up the broken tallow on the beach, render it on the spot, and deliver it in San Francisco. As a result nearly 343 casks were delivered in more or less shipping condition in San Francisco and 792 barrels, about two barrels equaling a cask, were also saved.

The principal difficulty in saving this tallow arose from the fact that the beach near Point Reyes had very deep, loose sand, and part of the country over which the tallow had to be hauled was quicksand. The tallow was sold in San Francisco, realizing over $80,000, and the underwriters made a salvage net of nearly 30 per cent. All the leather was a total loss.

The William Olson was wrecked on the island of Niihau, April 20, 1919. This vessel had a cargo of copra and about 400 barrels of cocoanut oil on deck. It was reported that some of the copra and about 200 barrels of oil had washed ashore on the island.

The Oahu Shipping Company made an offer to salve, on a 50 per cent basis, all the cargo that could be reached, and sent their steamer, the J. A. Commins, to the spot, and succeeded in recovering about 140 barrels of oil. Part of this had to be repacked in tins in Honolulu and the cargo arrived in San Francisco in good shape, bringing the salvor about $3500.

On the beach at Point Reyes just after the wreck of the bark Albert

Casks and lumps of tallow imbedded in the beach at Point Reyes

PACIFIC MACHINERY

Construction of Marine Engines at the Joshua Hendy Iron Works' Plant

By **H. L. Rexworthy**, Chief Engineer

THE building of marine engines to meet the requirements of the shipbuilding program laid down by the Emergency Fleet Corporation has necessitated a great deal of study on the part of various manufacturing concerns in order that no delay should occur in supplying the machinery necessary to complete the various ships.

Among the Pacific Coast plants who have devoted their energies to accomplishing this work is the Joshua Hendy Iron Works. The main offices of the company are in San Francisco and the works at Sunnyvale, Santa Clara county. The plant covers an area of about twenty-five acres, including an adjacent tract of land available for any future extensions. The company is building a number of 2800-horsepower triple expansion reciprocating marine engines. After general assembly in the shop they are taken down, shipped and put in the various ships built at the Schaw-Batcher yards, South San Francisco. All the patterns, gray iron and metal castings are made at the plant, and the heavy forgings by the Edwin Forrest Forge Company, Oakland. The steel castings are made by the Best Steel Casting Company, Elmhurst.

At the commencement of this work, it was apparent to the management that the present equipment was insufficient to accomplish the work to be done in the given time, owing to the amount of other work on hand. The engines referred to above have, respectively, cylinders 24½ inches, 41½ inches and 72 inches in diameter, a common stroke of 48 inches, and are designed for a piston speed of 86 r. p. m. Each cylinder is cast separately. The H. P. and L. P. are provided with piston valves and the L. P. a double-ported slide valve. All these are connected to Lovekin patented balanced cylinders attached to heads of the cylinders. The engines are furnished with a vertical 8 by 6 cylinder engine, provided with a double worm drive to crankshaft for turning purposes. The valve gear is of the "Stevenson" type, fitted with double links. On the center back column there is a 14-inch diameter steam cylinder connected to a way shaft for reversing purposes. The crossheads are of forged steel, provided with double slippers, and the crankshaft is the built-up type. Air and bilge pumps are attached to the back column and driven through a rocker arm connected to main L. P. crosshead. The floor space occupied is 14 feet by 21 feet with an overall height of 28 feet. The total weight of the engine is about 120 tons.

In casting the cylinders a composition of pig and scrap iron has resulted in an average analysis of—

Silicon	1.72
Manganese	.63
Combined carbon	.57
Phosphorus	.0502
Sulphur	.129

The test bar from above analysis, 1¼-inch diameter, broke at 2450 pounds with a deflection of 0.13 inch. With the above mixture twenty-eight cylinders have been cast, showing no defects, having passed the official test in each case called for, and in some cases the pressure has remained nearly constant over one hour's duration after acceptance.

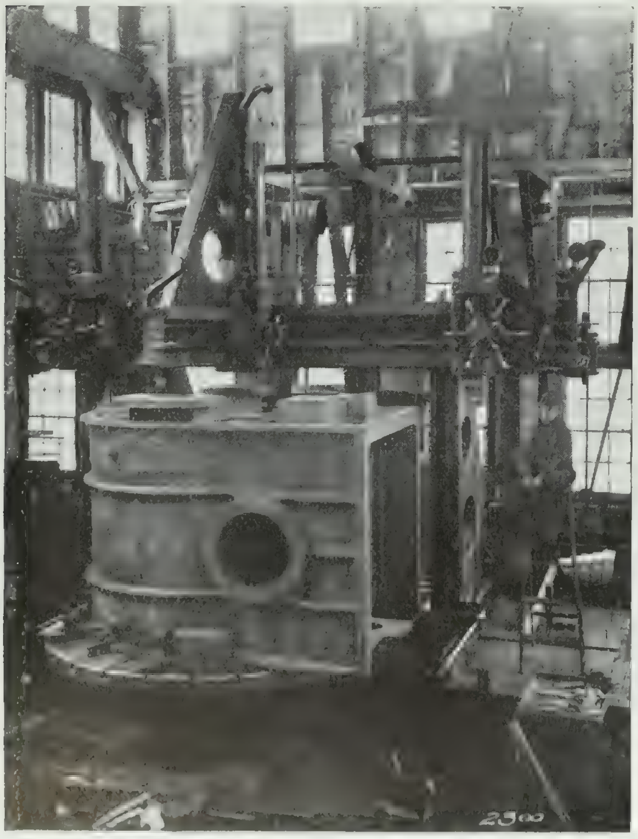
The barrel cores are made up in black sand. Steam and exhaust port cores are made from a flour-sand mixture. Three large concrete pits in the foundry are provided for the molding of these

View in the Joshua Hendy Iron Works at Sunnyvale showing erection of marine triple expansion engine cylinders and are served by an overhead electric crane of 25-ton capacity. About ninety-five tons of iron were used in the various flasks.

All cylinders and other castings subject to steam pressure are carefully examined for flaws and defects, after which they are pickled in an 8 per cent solution of sulphuric acid and water for sixteen hours' duration in order to loosen up the burnt sand and other scaly matter in the steam and exhaust passages. Afterwards the castings are taken out and thoroughly cleansed with cold water to remove the acid and sand before being sent to the machine shop.

The speedy construction of these engines required special equipment. On account of the difficulty of obtaining deliveries at that time, the work necessitated in many cases designing and constructing tools on the spot. One of these is a horizontal boring mill that can handle cylinders up to 90-inch diameter, the boring bar of which has a diameter of 12 inches by 28 feet 6 inches long, provided with an 8-inch auxiliary bar. The machine has sixteen cutting speeds in order to give the maximum speed in boring out the piston valves, or larger cylinders. This machine has been in operation twenty-four hours a day for several months and has given excellent satisfaction. The machine is of substantial design and very accurate.

Another machine of some interest is a special rig for planing the cylinder valve faces. Having no machine large enough to undertake this, a portable arrangement was made and attached to an existing open side planer. The cylinder to be planed is secured to a surface plate set in concrete on the floor at right angles to the planer. A substantial cast iron "A" frame bracket extends vertically, bolted to the planer table, provided with a compound head and tool attachment. The feed is regulated by an automatic arrangement. This machine has also given satisfaction. It is of simple design, rigid, and can be attached and detached in a few minutes.

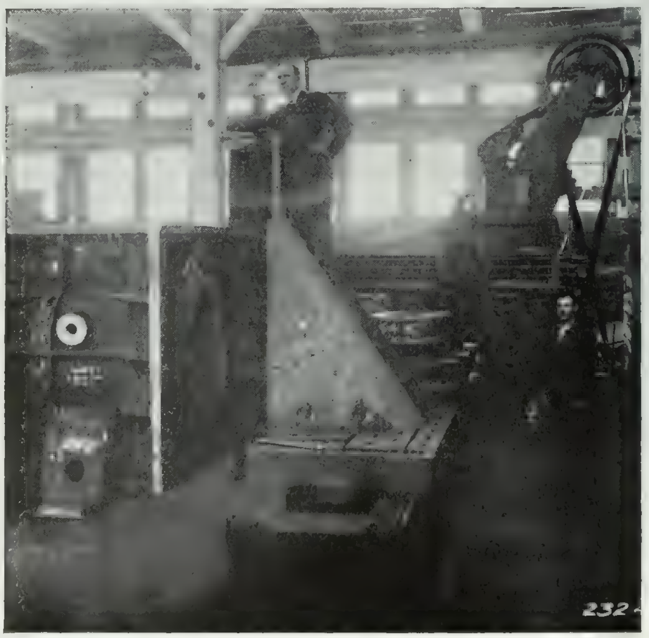


Machining the feet of a large marine engine cylinder on boring mill, Joshua Hendy Iron Works, Sunnyvale, California

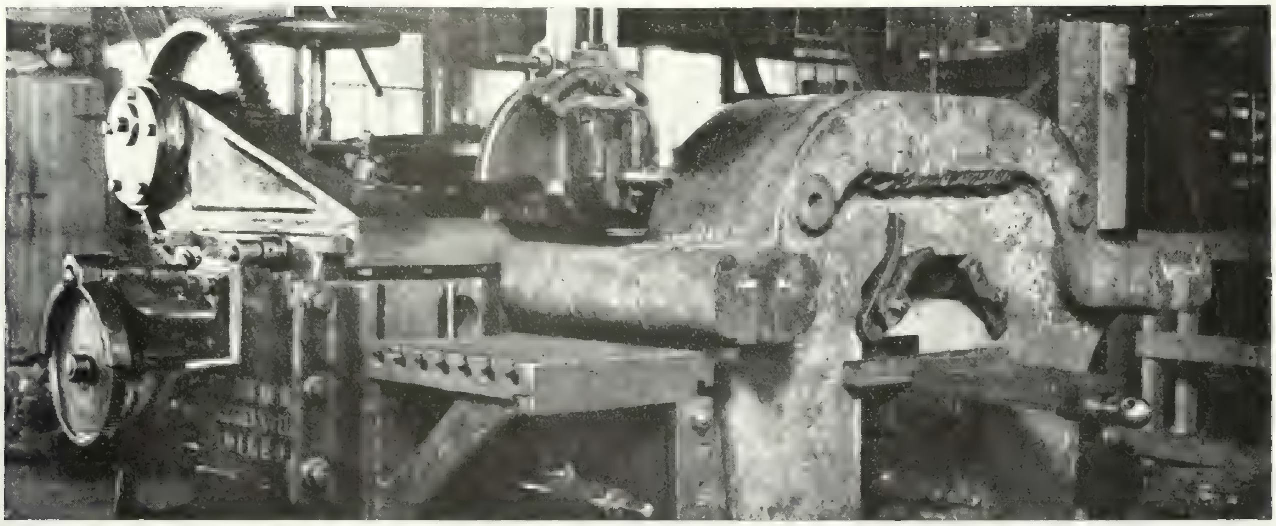
The three-throw 15-inch diameter crankshaft, as already stated, is of the built-up type, made in two sections—the H. P. and I. P. in one and the L. P. in the other. The crank webs are of cast steel and are forced into place on the shafts by means of a pneumatic cylinder provided with piston rod and head placed horizontally on a large surface plate, having angle stops. The heated crank, already in position for shrinking, is slid forward by the pneumatic apparatus and in one stroke each web is shrunk on its respective shaft in rotation until completed. Facing strips are machined on the narrow side of each crank web in order to give the correct height from the surface plate carrying the apparatus. Considerable time is saved by this arrangement over the "V" block system. Afterwards the shafts are put into an 84-inch lathe to receive the final finishing cut before being assembled into main journals of the engines.

The bed plates are cast in three sections, each weighing about 14,000 pounds. After machining and drilling, they are bolted together and levelled on the floor ready to receive the main journal boxes. A steel tube mandrel is used in place of the completed crankshaft for lining up and scraping in main journal brasses. This comprises a steel tube 12 inches in diameter, 21 feet long, fitted with cast iron collars machined to same size as shaft journals.

The front and back columns are machined and drilled to jigs and are bolted to the bed plate. After the levelling up of same the top of these columns are drilled to a jig to suit the cylinder feet. The cylinders are assembled on the floor complete with lagging and all other accessories, ready to be lifted into position. The turning engine, already bolted in place, is connected up with compressed air service to turn the main crankshaft. The crossheads, piston rods, pistons, connecting rods, valve stems, etc., are assembled and on completion the engine is turned over for the purpose of setting the valves.



Special rig for machining cylinder valve faces on an open side planer, Joshua Hendy Iron Works, Sunnyvale, California



Old style sliding head Niles Shaper adapted for a special planing job

HANDLING A DIFFICULT OPERATION IN A SIMPLE WAY

IN visiting various shops one frequently sees some very interesting machine jobs, one of which is shown in the accompanying cut—an old-time Niles sliding head shaper in the shops of the Pacific Car & Equipment Company of South San Francisco, the work in question being a side frame for a rolling mill, the material a steel casting. The operation consists of planing the "V" ways on which the frame travels along the bed of the rolling mill.

The adaptability of the machine and the fact that the head has a wide lateral range, permits both ways to be machined at a single setting of the work. The maximum stroke of the shaper head would not permit of taking a complete cut over the entire length of the ways, so a relief was cut about midway of the length and the cut made in two sections. It was not necessary to remove the work and reverse its position on the machine in order to accomplish this, as the point of connection of the driving connecting rod on the side of the ram can be moved back and forward under quite a wide range so that a cut can be taken close up to the support of the ram or far out as desired.

We do not frequently run across such universal machines in these days, as machine tool development has been along the lines of special tools rather than universal ones. This particular tool in the operation shown herewith does work that would otherwise require a large open side planer or a slotter, or another expensive machine. The owners of this tool have provided a deep pit in front of the machine into which long work may be dropped.

IMPORTANT ANNOUNCEMENT FOR PUMP USERS

The Worthington Pump and Machinery Corporation announces its purchase of the plant, patterns, accounts, patents and other assets of the Epping-Carpenter Pump Company, located at Pittsburgh, Pennsylvania. The plant will be operated as the "Epping-Carpenter Works."

Orders and contracts now in hand will be completed by the Worthington Pump and Machinery Corporation, and all further business will be for its account.

A SUGGESTION FOR THE CHIEF ENGINEER

YOU have heard it said that bronze propellers eat away the stern frame of a steel ship. You probably are familiar with the reasons for such a statement, but in case you are not, the following may be of interest, particularly the portion which refers to the method of preventing action between bronze propellers and the stern frame:

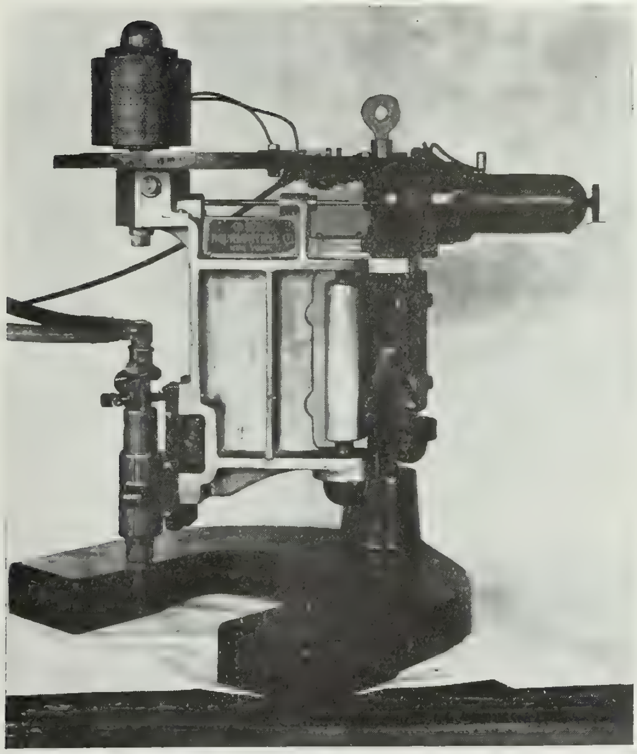
Whenever steel or iron and zinc (which constitutes about 40 per cent of the metal known as manganese bronze) come in close proximity to each other in a liquid, such as salt water or impure waters of any character containing light acids, sewage, etc., an electric battery is created, the action of which is known as galvanic action. This causes the zinc and the iron in very finely divided particles to detach themselves from their respective bodies, thus in time causing noticeable ruptures in the surface of the material.

There is a definite point of distance between two such bodies of metal where this galvanic action ceases, and to prevent the action it is necessary to separate the metals by a greater distance than the minimum referred to.

Practically the entire damage that might occur to the stern frame of a bronze propellered ship occurs when the ship is lying in port and in waters that are decidedly acidulous in their composition. In an attempt to overcome this action, zinc plates are many times fastened on the stern frame, and by such an installation of zinc plates the zinc in the bronze is not acted upon nor is the steel in the stern frame. A better way, however, to reduce this action is to separate the bronze blades from the stern frame by stopping the shaft so that each of the blades will be at a 45 degree angle from the vertical line of the stern frame. We suggest that you mark your shaft in such a way that when it is registered with any stationary point you may select, the blades are at the 45 degree position, and that whenever you are in port you make it a rule to invariably rest your engine in this position. This will practically eliminate the galvanic action referred to and give greater life to the ship.

This information is furnished by the Columbian Bronze Corporation, manufacturers of Columbian propellers, 50 Church street, New York City, in the interests of efficient ship operation.

Automatic Oxy-Acetylene Cutting



The Davis-Bournonville Camograph No. 2

THE No. 2 camograph was designed especially to cut hand holes in boiler plates, and similar openings in ship plates and other wrought-iron and steel sections. The flame perforates the steel, and the path traversed is controlled by an internal cam at the top, the shape of which determines the shape of the opening made. The machine is admirably suited for cutting all openings in steel plates that cannot be produced quickly and economically on a drilling machine. The larger size openings, even if circular, can be cut quickly with the No. 2 camograph; it has the advantage over a drilling machine that no expense is incurred for special cutting tools and very little power is required to drive it. A hand hole having a periphery of 12 to 13 inches can be smoothly cut in ½ to ⅝-inch steel plate in one minute.

The machine comprises a cast iron base with a U-shape opening through which the torch flame strikes the work beneath. At the back of the base is a vertical post to which a double-jointed radial arm is pivoted. The cutting torch is mounted on the outer end of the radial arm which provides for movement in any direction over the entire area covered. The jointed arm is made of two aluminum castings of light but rigid construction; these are mounted on ball bearings which offer a minimum of frictional resistance.

A feed roller on the outer or free end of the radial arm is surrounded by a yoke in which is placed the guiding internal cam or templet required to control the movement of the torch. The principle of cam guiding action is unique: The feed roller is magnetized by a powerful electro magnet, and is thus attracted to the inner face of the cam, the parts in contact being made poles of the magnet, one of which rotates and thus acts as a traction driver.

The traverse movement of feed is provided by a small variable speed electric motor mounted on the swinging radial arm. The motor drives the feed roller through a double worm reducing gear, and the magnetic pull provides for the necessary traction. The electric current that operates the motor also serves to energize the electro-magnet by which the feed roller is held to the cam face. Direct current is required.

The shape of the opening cut in the plate being determined by the shape of the cam, it is necessary, therefore, to provide a cam plate for each shape required. The cam plate fits into a circular opening in the yoke or cam holder, and is readily removed and replaced by another. The nominal diameter of the largest hole cut with the No. 2 camograph is 7 inches, but openings other than circular having one dimension much larger may be provided for. All thicknesses of plates used on the largest marine boilers are readily cut. While intended for cutting commercial steel plates only the power of the torch is ample for cutting much thicker metal, should it be required.

The electrical control is a double push button switch for starting and stopping, and for energizing the magnet. The speed control is effected by a small knurled disc on the motor itself. The torch is provided with interchangeable cutting tips of the sizes required for the range of thicknesses to be cut. The electrical control is connected with the torch oxygen valve in such manner that when the cutting oxygen is turned on the feed motion automatically starts and continues until the full circle has been cut out. When cutting holes in plates and using the torch for perforating, it is necessary, of course, to perforate inside the cutting line in order to cut a smooth contour; a secondary cam is provided as a switch to guide the feed roller to the main cam surface. Hence, the operator lets the machine operate automatically as soon as the cutting oxygen is turned on.

The United States ship Eten, formerly the German ship Rhakotis in a Panama Canal lock

The Machine Shop and Tool Department of the Moore Shipbuilding Company

THE high standard of efficiency attained by the various departments of the Moore plant is an acknowledged fact.

A tour of inspection covering the machine shop and tool room should prove extremely interesting to those who may not be conversant with conditions and methods as they obtain in that department. It has fully kept pace with the advance of the most progressive of the other departments in the Moore organization, and handles the varied and urgent demands made upon it with a promptitude and thoroughness that is remarkable. When consideration is given to a shipbuilding plant of the magnitude of Moore's, with ten hulls being built simultaneously on the ways, and always some seven or eight ships in the water receiving the finishing touches prior to the trial trips, and also the ships at the wharfs and on the drydocks being repaired, a clearer perspective of the enormous demands made on the resources of the machine shop and tool department is obtained.

Some two or three years ago the Moore machine shop was a rather insignificant affair, large enough only to accommodate a one-slip and one-drydock shipyard, employing somewhere in the neighborhood of a score of men, and housed in a building not any larger than a fair-sized garage. With that in mind and contemplating the huge building and immense output of this up-to-date, thoroughly equipped, machinery manufacturing establishment, it is difficult to comprehend how such an amazing development was possible in such a brief period of time. The new modern building covers a floor space of 33,000 square feet. A gallery 30 feet wide extends on each side for the full length of the building. When fully utilized and stocked with machines, it will increase the present output of the machine shop by at least one-third. One of the galleries is now used for a valve department where all valves, from the smallest to the largest sizes, are manufactured, assembled, and tested. There, also, the many varieties and sizes of cast iron pipe fittings are machined and tested. Every fitting and every valve, whether of high or low pressure, must be tested before leaving the machine shop. On the ground floor are all the large machines, with a capacity for handling and machining the biggest and heaviest type of ship machinery, whether it be for tanker, freighter, or passenger liner.

There are side planers up to 84 inches by 84 inches by 23 feet; engine lathes 72 inches by 30 feet, in conjunction with a multitude of machines of lesser caliber, such as 30-inch Bullard boring mills, Gisholt and other makes of turret lathes, and multiple spindle drill presses.

Two overhead cranes, a 30-ton Shaw and a smaller power crane run the entire length of the shop.

All repetition machine work is handled by means of the latest jigs, and new schemes and devices are continually being put into operation to further simplify the work and cut down the cost of production. An interesting device is the valve and fitting testing apparatus developed by the machine shop general foreman, W. H. McKenzie. Several valves or fittings may be tested at one time and by one operation, cutting down the time by 10 to 1 over former methods for handling such work.

On one side of the main floor, under the gallery and extending the length of the building, is the tool-making department, under the supervision of F. J. Kuhlman. Here again are evidences of the marvelous growth, development and efficiency that have been characteristic of the Moore Shipbuilding Company's plant during the last two years. From four machines eighteen months ago has been developed a model system of accuracy and efficiency, utilizing twenty-five of the largest tool-making machines for the manufacture of all of the tools and jigs necessary in a large modern shipyard.

An illustration of the enormity of the output of the Moore tool room is shown in the fact that the average number of chipping and caulking tools given out daily is around 350, while the daily average for riveting dies is 75.

From carefully tabulated reports covering a period of about eight months, it was demonstrated that the percentage or rivet die breakages (one of the most prolific sources of loss in a shipyard) is considerably lower with the Moore-made die, as compared to that of the factory-made article, a stock of which was on hand previous to the advent of the "home product." Another expensive tool, in which this department has been singularly successful in improving on the factory-made article, is the rivet-making die. The tremendous pounding and heating incidental to the making of rivets means that the rivet-making die at best has only a comparatively brief existence. The bought die, after making about eight tons of rivets, is ready for the junk pile. The Moore tool room product, however, has an average of fifteen tons during its period of usefulness.

United States Hospital Ship Comfort in the lock at Pedro Miguel, Panama Canal

A COMPARISON OF COSTS AND EFFICIENCIES BETWEEN ELECTRICITY AND COMPRESSED AIR AS APPLIED TO THE OPERATION OF PORTABLE DRILLS

THIS comparison is of interest to the production manager and factory superintendent in deciding two questions: Will it pay me to replace my air equipment with electric equipment, or will my new installations be pneumatic or electric? The three factors to be considered are: Source of power, distribution, and performance. Cost is a factor of all three.

It may usually be assumed that electric power is available, either central station service or private service. In such cases, we can dismiss the source of power item. Where electric power is not available, the choice is between generating it or compressing air. To get anywhere now, we must make some assumptions. It requires about 22-brake horsepower to deliver 100 cubic feet of free air a minute at 90 pounds' pressure. This same 22-brake horsepower will deliver 14 kilowatts, driving a generator with 85 per cent efficiency.

This power must now be distributed. The distribution of the electric power is flexible, permanent, efficient and much cheaper. Ten per cent is the maximum allowance that need be made for loss. We have, therefore, 12.6 kilowatts at the tools. An air line is costly to install, inflexible, subject to freeze-ups, leaks, and generally high cost of upkeep. It is impossible to prevent leakage, even with constant replacements of hose and repair of joints. The cost of this item may be tremendous.

To illustrate: The amount of leak for very small holes in a 90-pound system will be:

Size hole	Amount of leak in cubic feet a minute
1/16-inch	6.0
1/32-inch	1.5

I believe you will allow me to put the loss of pressure by friction at 10 per cent, off-setting the electrical distribution loss. The leakage is a very uncertain item, that may reach almost any figure if the system is not carefully maintained. We are quite charitable in placing this loss at 10 per cent. We now have 90 cubic feet of air at the tool under about 80 pounds' pressure.

The question now is: Which will do the most work—the 90 cubic feet a minute of compressed air at 80 pounds, or 12.6 kilowatts of electric energy? The efficiency of an electric motor is constant throughout its life, but the efficiency of an air motor falls continuously as the piston and valves wear. Assuming that we have a new air drill—let us compare results on the basis of the ½-inch tool. The manufacturers of two standard makes of pneumatic tools give the air consumption of the ½-inch drill as 15 cubic feet for the four-cylinder piston type and 20 cubic feet for the rotary piston type.

Our unit of air supply would therefore take care of five or six ½-inch pneumatic drills. I will venture to state that a ½-inch electric drill with 550 watts input will outdrill the air tool, and at this consumption our unit of power will operate twenty-three electric drills.

The efficiency of the tool in the hands of the operator is affected by weight, balance and vibration. The advantage of weight obtained in some types of air tools is more than offset by the better balance and lack of vibration in the electric tool.

SMITH-BOOTH-USHER COMPANY

THE Smith-Booth-Usher Company of Los Angeles have recently opened offices in San Francisco at 431-35 Rialto Building under the management of Mr. H. A. Olds, assistant secretary of the company.

The Smith-Booth-Usher Company have been in the machinery and supply business in Los Angeles since 1893 and will represent exclusively in San Francisco the following accounts:

Bessemer Gas Engine Company, gas and oil engines, compressors.
Foos Gas Engine Company, natural gas engines.
C. & G. Cooper Company, natural gas engines, compressors.
Lakewood Engineering Company, contractors' equipment, industrial haulage.
Clyde Iron Works, hoists and derricks.
Barber Greene Company, standardized material handling equipment.
Ohio Locomotive Crane Company, locomotive cranes.
Pennsylvania Boiler Works, California law boilers.
Hoppes Manufacturing Company, feed water heaters.
Ames Iron Works, steam engines.
Von Norman Machine Tool Company, milling machines.
Von Blerck Motor Company, multiple cylinder gasoline engines.
Cincinnati Iron & Steel Company, Cisco lathes.
Henry & Wright, high speed drills.
U. S. Electrical Manufacturing Company, Johnson grinding and buffing outfits.
Noro Engine Company, hoist and pump outfits.
Epping Carpenter Company, oil field pumps.

Their many friends will be glad to learn of this move by the company, who expect to render service and specialize on contractors', mining and oil field equipment. Their accounts completely cover the construction and industrial haulage field a very complete line of labor and time-saving equipment, the need for which is becoming more and more apparent. A warehouse is maintained at San Francisco and deliveries can be made from stock.

The General Tool & Supply Company of Saginaw, Michigan, have opened an office in the Saginaw district, representing the Cleveland Milling Machine Company. They carry a stock of milling machines and a large supply of cutters.

The Electric Furnace Construction Company, makers of the Greaves-Etchells Furnaces, announce that Mr. Frank Hodson, president of the company, is touring the principal Western cities, including Vancouver, Victoria, Seattle, Portland, San Francisco and Los Angles. While in San Francisco Mr. Hodson will stay at the Palace Hotel.

The Camden Forge Company of Camden, New Jersey, report considerable activity and the receipt of substantial orders from their Pacific Coast representatives, Messrs. Hilton-Pike-Oakley Company of San Francisco and Portland, and C. W. Pike Company of San Francisco and Los Angeles, California.

AMERICAN MALLEABLE CASTINGS ASSOCIATION

WHEN an industry, by the concerted effort of its members, evidences a determination to establish a high standard of quality for its product, it is but natural that considerable interest should be aroused. But when such determination is expressed by a body of men representing so many distinct organizations as those composing the great malleable industry, the importance and difficulty of the task is at once recognized.

This in brief was the responsibility which the American Malleable Castings Association assumed at the time of its organization.

Aside from the various laboratories of its members, the association maintained at Albany a research department for investigation and experiment, and for the testing and analysis of the daily output of each member of the association. Impartial tests were made and the results, together with direction for improvement, where the need was indicated, were forwarded to the respective members.

So successful has the work of the association proved that today it is credited with bringing all its members to a high average quality in their product known as "Malleable Castings."

Having accomplished that result, the association, it is said, will continue these daily tests and analyses for the purpose of grading the product of each member. When a member's product has daily met the requirements of the prescribed standard for a period of three months, a "certificate of quality" will be issued to that member, who may designate his output as "Certified" malleable castings.

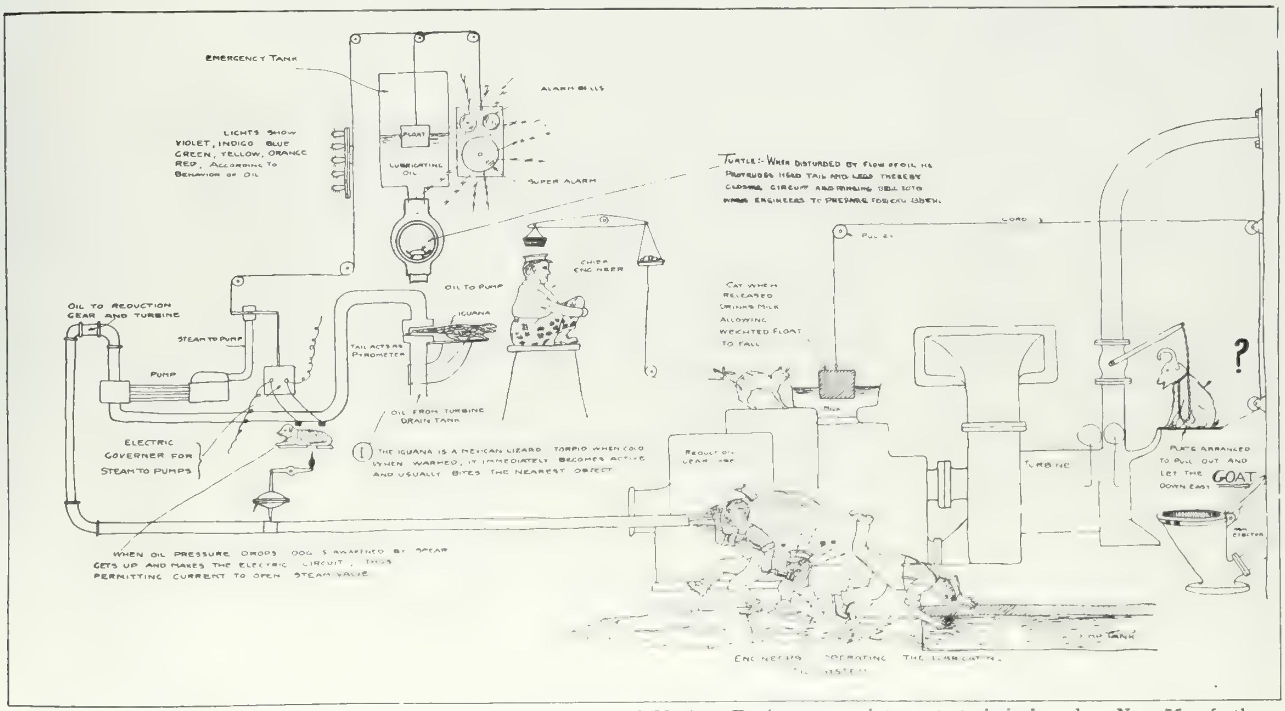
These certificates will be renewed quarterly, where the quality required is maintained.

At the same time the association is issuing a booklet on malleable iron and its production which will prove very interesting to those who desire a better understanding of the methods employed in the improvement of malleable. The book can be obtained by any of our readers without charge by writing to the American Malleable Castings Association, 1900 Euclid Building, Cleveland, Ohio.

INTERNATIONAL MACHINERY EXPOSITION ANNOUNCED

ANNOUNCEMENT of the International Machinery Exposition to be held in Grand Central Palace, New York City, has been made by the Merchants & Manufacturers Exchange of New York. This is to be one of the most advanced steps made in the machinery industry since the war ended, and will be a permanent affair. October 15 is scheduled as the opening date, at which time it is expected that hundreds of machines will be in actual operation on the floor. The exposition will occupy 50,000 square feet of floor space in the high structure, which is the largest exposition building in the world, and will include a most comprehensive display of modern engines, lathes, milling machinery, planers, drills, screw cutters, presses, boring, canmaking, wood-turning machines, etc. The Merchants & Manufacturers Exchange which operates the Grand Central Palace is owned and controlled by the Nemours Trading Corporation, of which Alfred I. duPont is president. It has nineteen branches and 3000 selling agencies throughout the world, and is one of the most remarkable organizations of the sort in existence. The Merchants & Manufacturers Exchange will operate eight permanent industrial expositions in the palace on the eight upper floors of the twelve-story building. The four lower floors will be used for temporary exhibits such as the Annual Automobile Show, Motor Boat, Flower Show, etc.

Frederick L. Colwell, formerly of the Colwell Lead Company and the old Colwell Iron Works Company, is manager of the Machinery Exposition and will be assisted by an able staff. Fred W. Payne is general manager of the Merchants & Manufacturers Exchange, and has general supervision of all the expositions.

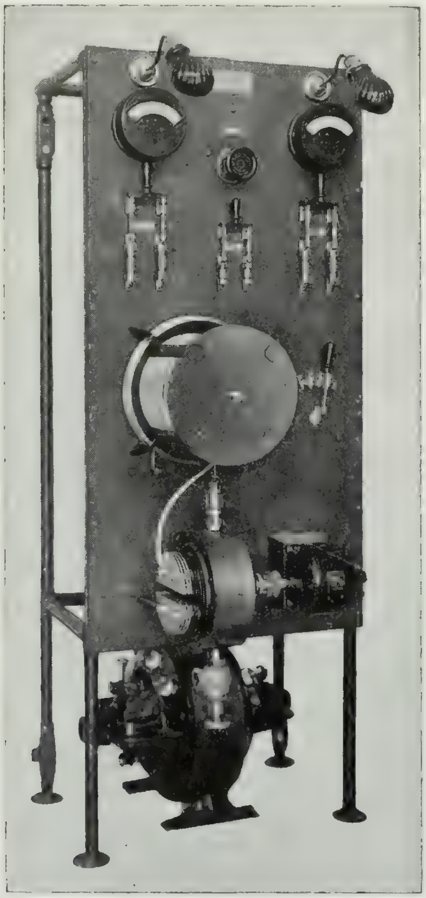

EMERGENCY TANK
ALARM BELLS
LIGHTS SHOW VIOLET, INDIGO BLUE GREEN, YELLOW, ORANGE RED, ACCORDING TO BEHAVIOR OF OIL
FLOAT
LUBRICATING OIL
SUPER ALARM
TURTLE:- WHEN DISTURBED BY FLOW OF OIL HE PROTRUDES HEAD TAIL AND LEGS THEREBY CLOSING CIRCUIT AND RINGING BELL TO WARN ENGINEERS TO PREPARE FOR ... BERTH.
CORD
PULLEY
CHIEF ENGINEER
OIL TO PUMP
IGUANA
OIL TO REDUCTION GEAR AND TURBINE
STEAM TO PUMP
PUMP
TAIL ACTS AS PYROMETER
OIL FROM TURBINE DRAIN TANK
CAT WHEN RELEASED DRINKS MILK ALLOWING WEIGHTED FLOAT TO FALL
MILK
ELECTRIC GOVERNER FOR STEAM TO PUMPS
① THE IGUANA IS A MEXICAN LIZARD TORPID WHEN COLD WHEN WARMED, IT IMMEDIATELY BECOMES ACTIVE AND USUALLY BITES THE NEAREST OBJECT
REDUCTION GEAR
TURBINE
?
PLATE ARRANGED TO PULL OUT AND LET THE GOAT DOWN EASY
EJECTOR
WHEN OIL PRESSURE DROPS DOG IS AWAKENED BY SPEAR GETS UP AND MAKES THE ELECTRIC CIRCUIT, THUS PERMITTING CURRENT TO OPEN STEAM VALVE
TANK
ENGINEERS OPERATING THE LUBRICATION OIL SYSTEM

This caricature represents the combined efforts of a number of Marine Engineers to interpret technical order No. 75 of the Emergency Fleet Corporation relating to the lubrication of marine turbines. Published through the courtesy of H. Archer of The General Electric Company. Any engineer who so desires is at liberty to enlarge and embellish.

Modern Trend in the Design of Modern Radio Equipment

An Argument in Favor of Simple, Rugged Equipment

George F. Haller



The Halcun Radio Equipment

EVERY new science such as wireless telegraphy goes through three or more marked changes in its development. First we have the invention or discovery of the basic principle; generally by no means reduced to a practical working basis. Next we have a large amount of development work brought about by the stimulus of the original invention. During this stage every known possible modification and difference is brought out, leading to a multitude of designs, patterns, and apparatus. The third stage, resulting from the experiences and failures of the second stage, is the period of standardization. The impractical ideas are eliminated, and only those standing the test of practicability are retained.

Wireless telegraphy has passed through the first and second stages, and is now entering the third. Wireless telephony is only passing into the second, and it will be some years before practical wireless telephone apparatus will be produced that will comply with the paramount demand that this apparatus give commercial service day after day in the hands of an unskilled person without the supervision of a radio expert.

During the last three years much wireless telegraph apparatus has been produced and installed, which is highly efficient from an engineering standpoint, but far too expensive both in first cost and upkeep to appeal to the average shipowner. The Navy Department, not being influenced by the economy necessary to be taken into consideration by the shipowner, has developed and brought out a highly technical equipment. The leasing companies also in order to justify the high rentals by an apparent investment, and an elaborate showing, have followed somewhat the same trend. Their so-called standard equipments today represent an investment of from $3000 to $4000.

On the other hand there has been a development along the lines of designing as simple and yet as rugged and reliable a set as it is possible to manufacture.

A difference of 15 per cent to 20 per cent in the current consumption of a radio transmitter, at first thought may seem to be important from an engineering standpoint, but from a commercial standpoint this difference in efficiency is of practically no value. When it is taken into consideration that a wireless transmitter is only in use ten or fifteen minutes a day, and the total imput seldom exceeds three or four horse power, it is seen that a saving of 20 per cent in the power used would hardly affect the oil consumption of the average ship by more than a barrel or so on an entire voyage. Most vessels waste far more power in leaking valves and stuffing boxes than the entire wireless ever uses.

Refinements such as automatic starters, circuit breakers, a half dozen elaborate appearing meters, are more or less potential sources of trouble in the hands of inexperienced operators who follow the profession of radio operator for a few months as more or less of a vacation or recreation.

A good deal of the equipment of the high priced radio sets is analagous to the electric starters and other luxuries of the automobilist. If the shipowner operated the radio as he does his own car, an automatic starter which will permit him to start the set by pressing a button might be justified. Motor trucks as a rule are not equipped with these conveniences. The manufacturers generally figure that the convenience of a paid driver in being able to start the engine without leaving his seat, is not so essential as the saving in first cost and in upkeep which is effected by the elimination of this convenience.

The Halcun Radio Company of San Francisco was one of the first manufacturers of radio equipment to recognize simplicity as a big necessity in the design of wireless apparatus. Two hundred successful Halcun installations have proved that radio communication over distances from 500 to 2500 miles is possible with simple apparatus, having a minimum of moving parts and all superfluities eliminated. Apparatus of this type is being manufactured at prices ranging from $1000 to $1500.

There is much justification for a low first cost, and the following is convincing proof of the necessity of inexpensive apparatus: First, radio apparatus is unquestionably the most delicate and most easily damaged equipment aboard a vessel. It is particularly subject to the corrosion caused by salt water and moist air. The average set has only a life of five or six years, and it is the opinion of the writer that the depreciation of wireless apparatus figured on a straight line plan should be 20 per cent per annum. The promise of radio telephony in the next four or five years will undoubtedly make most of the apparatus designed today obsolete.

The care given the equipment by the average operator is negligible. Wireless seems to enjoy a position on board a ship independent of direct supervision regarding care, either from the engine room or the deck department. The mystery attached to it generally makes the operator more or less supreme, and his statement of defects is generally sufficient to conceal neglect and abuse, which would not be tolerated in any other part of the vessel equipment. For the above reasons it is obvious that the equipment which the shipowner should buy today is the inexpensive set, boiled down to essentials, which can be purchased from $1000 to $1500, and which can be scrapped in four or five years if need be. He can thus effect a marked saving in interest and upkeep over the higher priced equipments which are certain to be out-of-date in four or five years, even if they have had good care, which is the exception rather than the rule.

DUCOMMUN HARDWARE COMPANY

Seventy years of business integrity is assuredly a slogan of which any firm may well be proud. The firm of Ducommun Hardware Company was established in 1849, and during the past seventy years has built up a very large hardware specialty business. Purchasing agents and consumers have found that they may rely upon large stocks of materials carried by Ducommun, including brass, bronze and copper sheets, rods, tubes and wires. Such items as tobin bronze, cold rolled steel in various sizes and shapes, steel and condenser tubes, ferrules and circles are often difficult for the purchasing agent to obtain, and the Ducommun Hardware Company has made a practice of carrying a complete stock of these materials ready for immediate delivery.

This firm has a large store and warehouses in Los Angeles and in addition has recently opened offices and warehouses in San Francisco at 656 Townsend Street, in charge of Manager E. H. Breidenbach.

Battery of Swartz Furnaces at the Great Western Smelting & Refining Company

GREAT WESTERN SMELTING & REFINING COMPANY

THE smelting and refining of nonferrous metals probably ranks with the most important branches of the manufacturing industries in the country. One of the largest producers of such metals is the Great Western Smelting & Refining Company, the San Francisco branch office of which has been in operation for the last twenty-two years.

Pouring Babbitt Molds, Great Western Smelting & Refining Company

Starting in a small way on First street near Howard, just previous to the conflagration of 1906, the company moved to its present quarters at 75 Folsom street. The plant was not destroyed during the fire of that year because of the assistance rendered by the water supply system of the transport docks, then located at the foot of Folsom street. On account of this good stand, the company was not handicapped and was able to take advantage of its entire equipment and fill the pressing demands for babbitt metals and nonferrous alloys. Coming up from a small beginning, the San Francisco plant today is producing 15,000,000 pounds of metal annually. The plant is one of the most modern on the Pacific Coast and extensions planned for the near future will nearly double the present equipment and production.

In addition to the San Francisco plant, a larger plant is operated in conjunction with the main office at Chicago. Other plants are located at St. Louis, Seattle and Vancouver, B. C. Warehouses and offices are maintained for the distribution of the company's products at New York, Boston, Philadelphia, Cincinnati, Detroit, Los Angeles, Atlanta, New Orleans, Denver and Portland. In addition to these American offices the company maintains a European office at Birmingham, England, where a complete stock is carried.

The coast plant of the Great Western Smelting & Refining Company furnish probably 90 per cent of the type metal used on the Pacific Coast, the company having built up by many years of experience an enviable reputation for its type metal products. XXXX nickel babbitt metal is probably known in every manufacturing center throughout the world, and the company is now enjoying a large domestic business as well as an export business to South America and the Philippines and at the present time extensions are being carried to the Orient and South Africa.

Ingot Casting, Great Western Smelting & Refining Company

Of the many users of babbitt metal who rely on the Great Western Smelting & Refining Company may be mentioned the largest street and interurban railway system on the Pacific Coast, the copper mines of Arizona and the builders of heavy duty gas and oil engines on the Pacific Coast. Recently the use of XXXX nickel babbitt has been extended to the airplane fields and, during the recent war period, Liberty motors built in California have been fitted with this metal.

The company's claim to superiority in babbitt metals is laid upon experience gained through many years of experimentation with all classes of bearing conditions and metals, and it might be of interest here to quote a

The Sweating Furnace, Great Western Smelting & Refining Company

brief history of the evolution of babbitt metal.

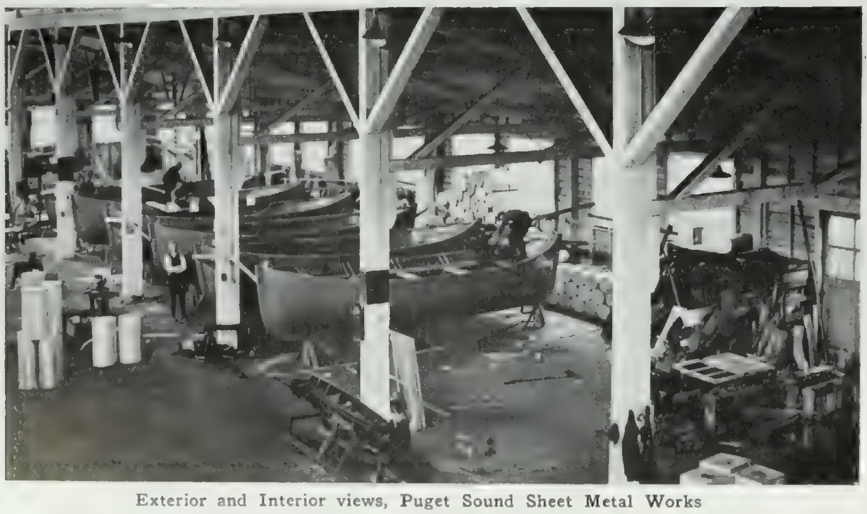
It is now nearly sixty-five years since Isaac Babbitt recognized the need of a bearing metal softer than iron, copper or bronze, the metals used exclusively for bearings. After considerable experimenting he decided upon a tin antimony copper alloy containing 88.9 per cent tin, 7.4 per cent antimony and 3.7 per cent copper, and secured a patent on this formula from the United States government. One of the chief claims of his patent was that he produced a coarse-grained metal which acted as natural oil-ways by permitting the oil to remain in the interstices until consumed. The mechanical world quickly grasped the theory and Babbitt's metal rapidly came into general use. However, it required but a few years to demonstrate to thousands of metal users that the coarse-grain theory, as far as retaining the oil was concerned, was a delusion, for upon an examination of bearings made of babbitt metal, it was found that the surfaces of the bearings were as smooth as plate glass, and consequently could not retain or hold the oil as claimed. Nevertheless, a good impression was created and since the expiration of the patent rights, many improvements and discoveries have been made. Since that time the design of machinery, insofar as bearing pressures and rotative speeds are concerned, has undergone many changes, and we find, particularly in the automobile industry, a tendency toward both increasing speeds and pressures. With the advent of the Diesel motor for marine propulsion, we find a like tendency.

To keep fully abreast with the times and to insure that all employes of the organization may be fully informed, an annual event of this company is the salesmen's and officers' convention held each year in Chicago. At this meeting subjects of vital importance to the entire organization are brought up for discussion, and subjects, all the way from the price of tin to the formulas used, are discussed and decided upon.

BURNING MONEY

Life is gay and blithe and sunny since the peace dove hit the breeze; every one is burning money just as though it grew on trees. I insist on thrift and saving, but there's none to heed my words; Johnnies say that I am raving, and throw money to the birds. Men are drawing princely wages, and their breasts are filled with mirth, and they jeer foreboding sages who predict a day of dearth; but that day will come as surely as tomorrow's sun will rise; things will then be going poorly with the giddy spendthrift guys. Things won't boom along forever as they're booming now, my friends; and the man who's truly clever saves as ably as he spends. It is patent to the knowing, in expansive times like these, that the kopecks won't be growing always on the shrubs and trees. There will come a day of trouble, when this boom is left behind, and the kopeck and the ruble will be mighty hard to find; happy then the lads whose wages have been safely placed in brine, who obeyed the seers and sages, when the saving graft was fine. And how sick will be the mortals who like spendthrifts now behave, who reply with jeers and chortles when we call on them to save!

WALT MASON.


Exterior and Interior views, Puget Sound Sheet Metal Works

THE PUGET SOUND SHEET METAL WORKS

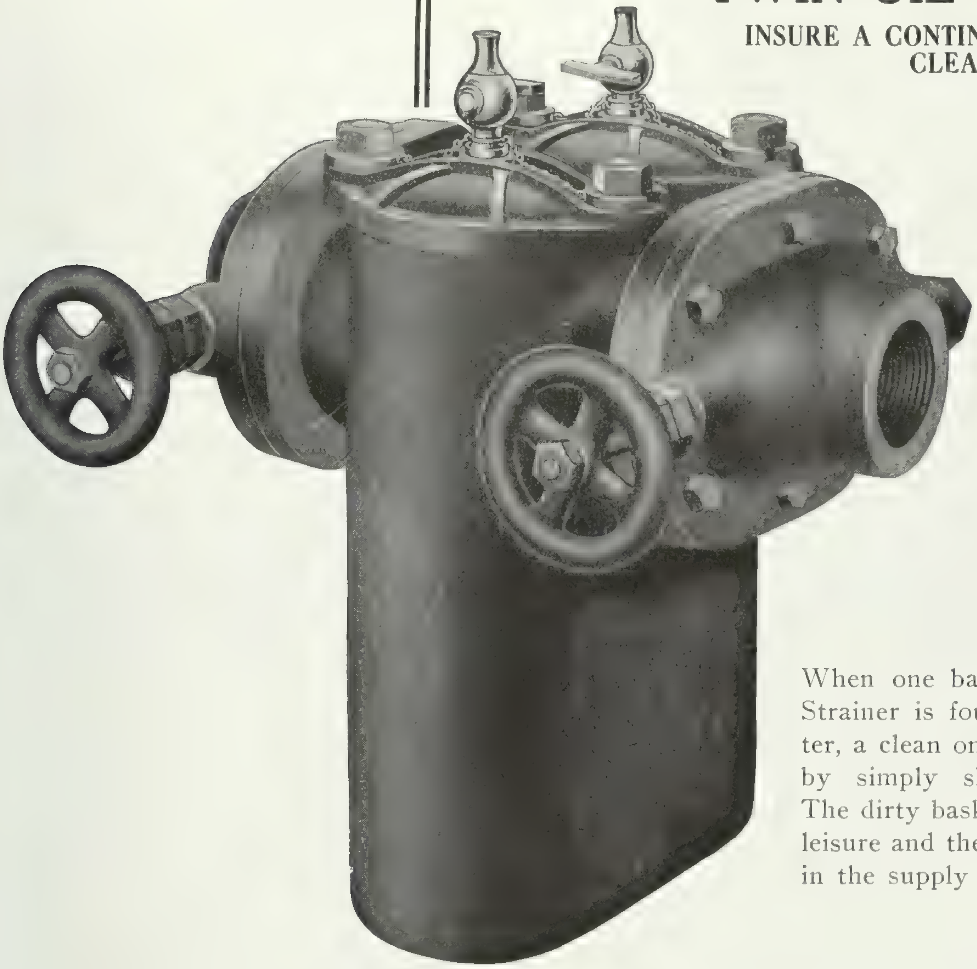
This plant, established since 1900 in Seattle, moved one year ago to 3631 East Marginal Way and occupies the new factory shown in our illustrations. It is very completely equipped to manufacture metal life boats, life rafts, ships' cowls, water tanks, oil tanks, lockers, drums, cans, smoke stacks and every shape and size of metal structure up to three-eighths of an inch thick.

The personnel of the directing force indicates an exceptional combination of technical and executive ability. D. W. Bowen is president; M. E. Getchell, vice-president; Edward W. Flohr, secretary, and H. S. Bowen, superintendent.

USE TWIN OIL STRAINERS FOR EITHER FUEL OR LUBRICATING OIL

TWIN OIL STRAINERS

INSURE A CONTINUOUS SUPPLY OF CLEAN OIL



When one basket of a Twin Oil Strainer is fouled with solid matter, a clean one is put into service by simply shifting two valves. The dirty basket can be cleaned at leisure and there is no interruption in the supply of clean oil.

The Twin Oil Strainer

gives the same service as two Single Strainers, but it is more convenient to operate, requires less space for installation and does away with all the extra valves and piping necessary to connect up.

These are the features that led to its being used in Submarines and Destroyers now being built for the United States Navy and in Cargo Boats now being built for the United States Merchant Marine.

Sizes range from 1 to 5 inch. ($2\frac{1}{2}$ inch and larger sizes have flanged connection). Basket mesh 1/64 inch or larger.

For detail information ask for Bulletin AA.

ELLIOTT COMPANY

443 Grant St., Pittsburgh, Pa.

TRADE LITERATURE

Vulcan Soot Cleaner Bulletin No. 541: This bulletin, printed in two colors, by the Vulcan Soot Cleaner Company, Dubois, Pennsylvania, illustrates and describes the Vulcan Patented Diagonal Method for cleaning soot from the tubes of horizontal water tube boilers. It embraces the following features:

1. Thorough cleaning efficiency.
2. Long life.
3. Low maintenance cost.
4. Accessibility for inspection and repairs.
5. Ease of installation without interference with present boiler equipment.
6. Low first cost.

Illustrations in two colors show typical designs as applied to horizontal water tube boilers with vertical baffling. This bulletin also contains a discussion entitled "The Cost of Vulcan Cleaners and an Analysis of Their Value as Investments." Mailed free upon request to any reader of Pacific Marine Review.

Baily Electric Furnaces, Booklet 5-B of the Electric Furnace Company, Alliance, Ohio.

Describes the Bailey resistance type 105 K. W. tilting furnace of a hearth capacity of 1500 pounds for melting brass, bronzes and alloys and also larger stationary furnaces of the tapping type and crucible furnaces for melting precious metals. The catalog also covers various auxiliary machinery such as motor-operated casting tables, special furnace transformers, oil break switches, etc. Accompanying the above there comes also a booklet giving specifications and line drawings, with dimensions of various types of the Baily electric furnaces as used in war work for billet heating, melting and heat-treatment of various munitions of war and ship parts. The Electric Furnace Company is represented in San Francisco by Gunn, Carle & Company, 444 Market Street.

The Kobe Steel Works Company, Ltd.

Opening at the back and beginning at the lower right hand corner of the page, reading up and down this splendid silk bound book of 200 pages sets forth the history and the accomplishments of the great Japanese Steel Works at Kobe, which has a melting capacity per year in steel of 20,000 tons and in alloys of 2000, and capacity in equipment to handle a maximum weight in one casting of thirty tons steel and two and one-half tons in the alloys, and forging machinery capable of handling 20-ton forgings. They deal principally in steel castings, car wheels, stern and rudder frames, anchors, crushers and rollers, hydraulic cylinders and large gear wheels, steel forgings, special alloy steels and large crank shafts. The machine shop produces auxiliaries for warships, marine engines, mining machinery and machine tools. The plant covers over forty one acres.

Sun Ship.

A catalog of the Sun Shipbuilding Company of Chester, Pennsylvania, describes with line drawings and skeleton specifications the standard ships built by the Sun Shipbuilding Company, also the marine engines, marine auxiliaries, power machinery and Corliss stationary engines built by Robert Wetherill & Company, a division of the Sun Shipbuilding Company, also located at Chester, Pennsylvania. This catalog is to be commended for compressing into a very compact space a large body of information conveniently arranged.

Rego Welding and Cutting Apparatus. The Bastian-Blessing Company of Chicago.

Descriptive catalog and price list covering a number of outfits for oxy-acetyline welding and cutting apparatus, each outfit especially designed to cover the requirements of various users of this apparatus. The catalog is profusely illustrated and the apparatus described in great detail.

VULCAN SOOT CLEANERS

W. G. STEPHAN of the Hale-Stephan Company of Cleveland, Ohio, contributes the rhyme below. The Hale-Stephen Company are the Northern Ohio representatives of the Vulcan Soot Cleaner Company of Du Bois, Pennsylvania. Mr. Stephan has a very prolific pen and contributes numerous articles to the leading technical magazines of the United States.

Boiler Cleaning

Then—

The fireman stood high off the boiler room floor
Wet to the skin, his hands were sore
From burns on the hot steam lance that he bore,
Trying to clean flues through the boiler door.
His face was black from the soot that blew
Back through the door—not out through the flue,
As well behaved coal soot ought to do.
What he said of his job was a plenty, too!

And now—

The fireman stands on the boiler room floor,
Opens a valve or two. Nothing more.
Pulls a few chains. The steam jets roar.
My, how quickly the job is o'er.
Cleans the boiler—saves the heat,
John thinks soot cleaners can't be beat,
Likes his work,—smiles all day,
He cleans his boilers the VULCAN way.

THE "FRISCO" STANDARD GAS ENGINE PLANT.

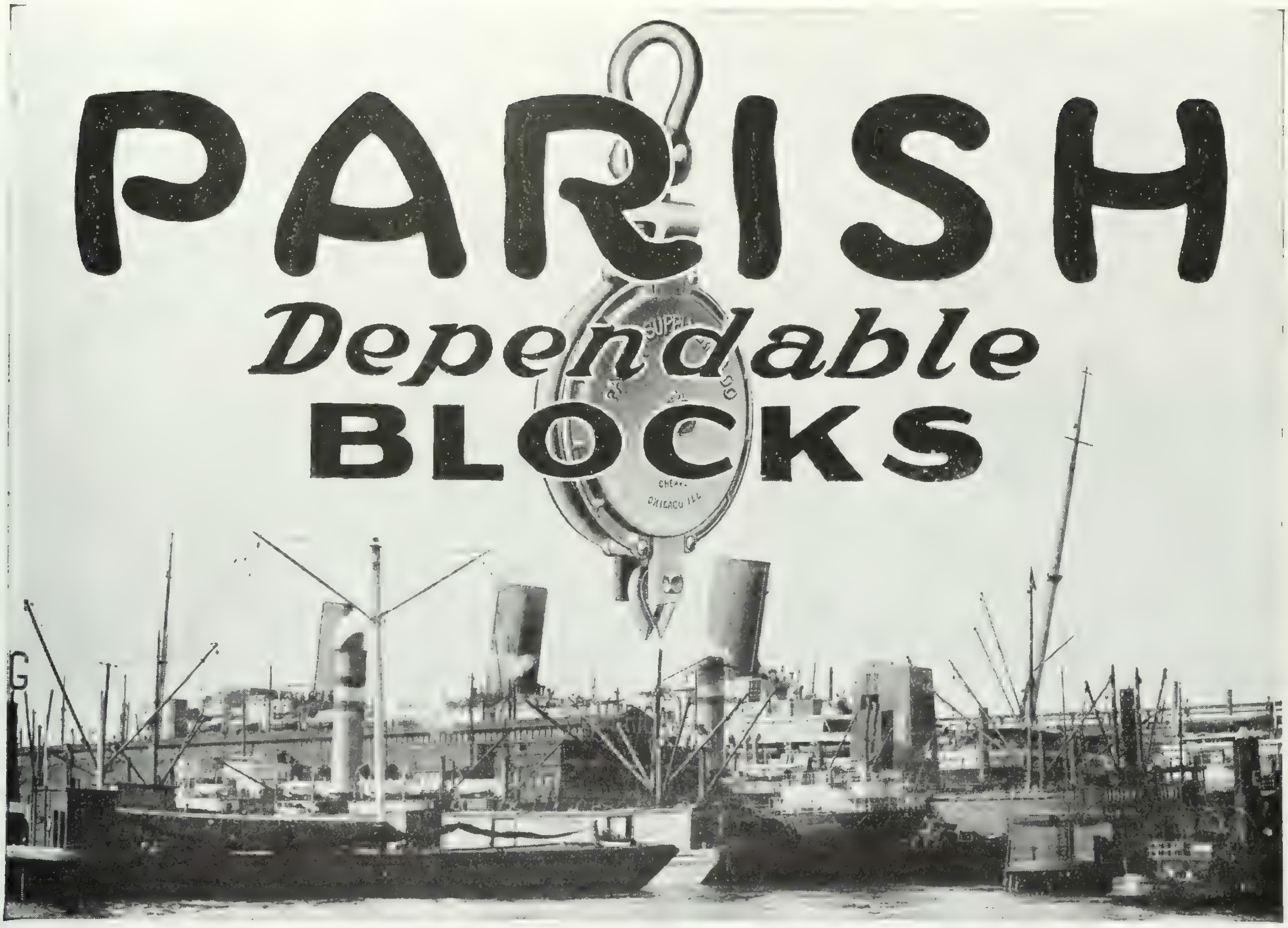
THE plant of the Standard Gas Engine Company, Oakland, California, is filled with many interesting features to the shop man. Just previous to the first of this year, many changes were made in the personnel of the organization, and among others joining the staff is Mr. E. W. Hughson, Manufacturing Manager. Mr. Hughson spent a number of years in the manufacturing departments of the Ford Motor Company of Detroit and brings West with him many modern ideas on shop management and control. It is indeed interesting to see the modern methods that he has introduced in the cost and record system. Many of our manufacturing institutions have been satisfied with a haphazard method of cost and record keeping, but not so at the Standard Gas Engine Company. Every piece entering into the construction of the "Frisco" Standard Engine is none too small to receive the detailed attention accorded to even the most expensive parts of their production. When stock requirements or orders for engines demand a replenishment of stock, a quadruplet order is made out which becomes authority for purchasing and all shop operations. The final copy of the record becomes the cost summary and at the completion of the work on these parts, the complete cost of the individual part is at hand. This becomes of immense value when computing varying costs due to the difference in cost of labor, material, etc., and it enables the Manufacturing Manager to immediately run down and correct losses in the various departments.

Heat Treating

Another interesting feature about the Standard plant is the heat treating department now coming to the front. Under the management of Mr. Hughson, who is well posted on heat treating methods, many costly operations have been eliminated. It has been the custom for many years past to make ignitor parts of tool steel and hardened. Many of these parts are of irregular shape resulting in considerable waste of expensive material in their production. Mr. Hughson showed the writer some exceptionally fine pieces of work produced from cold rolled steel, a much cheaper material with an exceptionally hard case. On experiments along these lines a case of 3/32 of an inch on ⅝ and ¾ inch round cold rolled steel showing a carbon content in the case of from 90 to 100 points was obtained. The present plan of this company is to produce special form milling cutters for reducing machine operations which in the past have been performed by a combination of shaping and hand filing. At the present time gas furnaces are utilized in the heat treating department for case hardening, the work being enclosed in cast iron carburizing boxes about 8x8 inches and approximately two feet long. The work is heated to about 1500 degrees requiring almost one hour to thoroughly heat up the box and contents, after which it is soaked at this temperature for about three hours which gives a sufficient carbon content and depth to the case for the required work.

Brass Finishing and Sub-Assembly

The entire brass finishing, sub-assembly and ignition work departments have been moved to a balcony formerly occupied for storage. This move allows considerable more space for assembling on the main floor. The company is working at the present time toward the plan of manufacturing in quantities for stock and assembling the engines entirely from parts carried in stock.



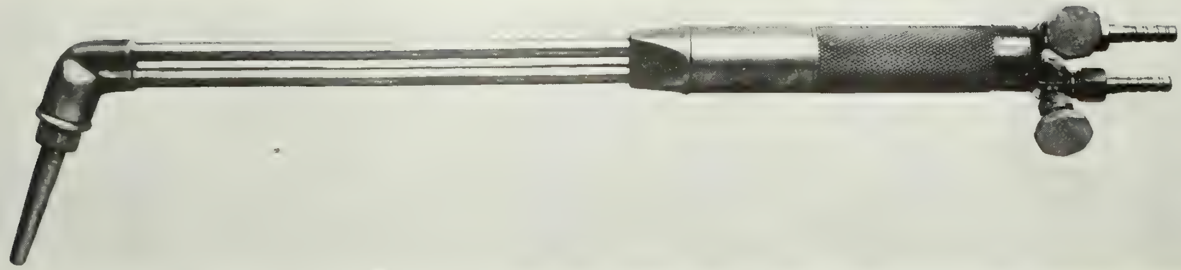
STAUNCH and sturdy, these well-built, trim and trustworthy blocks can be found in every seaport of the globe, giving steady, unremitting service on ships of every size and description.

Receiving practically no attention, they require none, but run just as smoothly and evenly after years of continual operation as they did when first placed on the ship.

The sheaves still remain closer fitting than on any other make block, the bushings and center pins show very little wear, and excessive side play has not developed.

Quality blocks fulfill their obligations, are more enduring, more economical and more satisfactory always. The Parish catalogue describes in detail a complete line of high grade, Malleable Iron and Steel Shell Tackle Blocks, and explains their fitness for all maritime purposes.

PARISH SUPPLY & MFG. CO.
Makers of Tackle Blocks and Shipyard Tools
Factory & Offices: 2858 Quinn Street, Chicago



New Airco Welding Torch

THE NEW AIRCO WELDING TORCH

A NEW welding torch, capable of meeting the varied requirements of modern welding, has been introduced to the trade by the Air Reduction Sales Company, manufacturers of Airco welding and cutting gases and apparatus.

In the new Airco torch the manufacturers have aimed to produce apparatus that would meet the requirements of the practical welder based on his experience with other equipment. Improvements have been made not only in fundamental design, but in such details as the nicety of construction of the valve handles, hose connections, etc.

To insure none but desirable features being incorporated, only those principles were followed which had been proved correct and in full accord with the requirements of practical usage. The Airco welding torch is of very strong construction, yet at the same time is so light and well balanced that the operator will not experience the usual strain when welding a long job. The handle is knurled and comfortably proportioned so that a firm grip can be secured without undue pressure. An interesting feature in this connection is a gas pressure table rolled on the upper part of the handle. Such a table is very handy for reference and this location proves a convenient and lasting place for the information.

The valve handles are of octagon shape. They are easily turned and will not catch in the operator's work or clothing. Both the handles are on the left side. With this construction and with the hose connections extending straight out from the valve body, there is nothing to interfere with the proper manipulation of the torch.

All passages are so designed and the parts so assembled as to insure an easy flow of gas. The tubes between the head and handle are of hard-drawn, seamless brass, countersunk at both ends. The torch is silver soldered. The valve body and the butt of the handle are in one casting instead of being screwed together. The valve body will not work loose or break off, and there are, of course, no threads for the gases to work through.

It is interesting to note at this point that the new torch has received the full approval of the Underwriters' Laboratories.

The conical projection of the head co-operates with the conical recess of the tip in a metal to metal seat. The tip is held securely in place by a tip nut. This practice does away with threads on the tip as well as eliminating outside threading on the head. The tip is made of a special alloy selected after an extensive series of heat and endurance tests. The acetylene grooves are accessible and but a few seconds are required to remove carbon if cleaning becomes necessary. The torch head is drop-forged of the same material as the tip, so that both these parts are subject to the same co-efficient of expansion and contraction.

The manufacturers have adapted the apparatus to a wide range of work by making it in four different sizes which are adaptable for all classes of welding from sheet metal to heavy castings. Different heads are also provided for special requirements. A range of tips is available, providing flames from the smallest to the largest required in general practice.

Interior view American Manganese Bronze Company

THE AMERICAN MANGANESE BRONZE COMPANY

The offices and foundry of this company are located at Holmesburg, which is within the city limits of Philadelphia, on the main line of the Pennsylvania Railroad to New York. This location insures excellent shipping facilities.

They are exceptionally well equipped to handle heavy castings, having two 15-ton cranes in their main foundry bay. The metal for large castings is melted in a reverberatory furnace which has a capacity of over fifteen tons of metal to a heat.

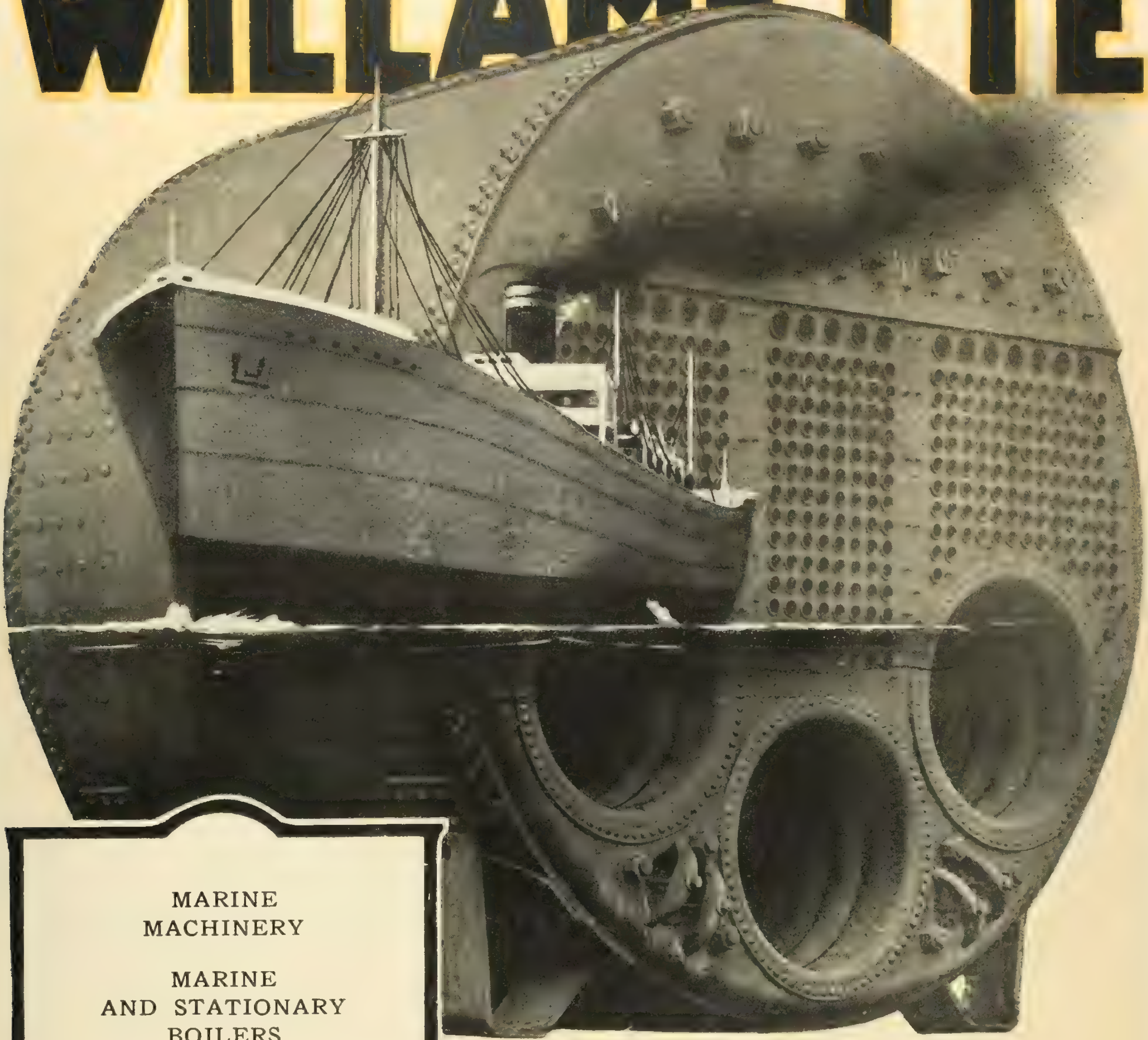
A broad-gauge spur runs directly under the main foundry craneway, which enables shipments to be made with the best possible expedition.

The officials of this company are: James B. Curtis, president; C. R. Spare, vice-president and general manager; T. H. Addie, vice-president and treasurer. The latter gentleman is also in charge of sales.

This company contributed its share toward winning the war by supplying considerably over one hundred large propeller wheels as well as large quantities of other bronze war-time equipment. Incidentally, it might be interesting to know that in supplying forty bronze propellers of 18 feet 6 inches diameter to the Hog Island shipyard, the American Manganese Bronze Company executed the largest single order for bronze castings ever placed.

Shop of the American Manganese Bronze Company, Holmesburg, Pennsylvania

WILLAMETTE



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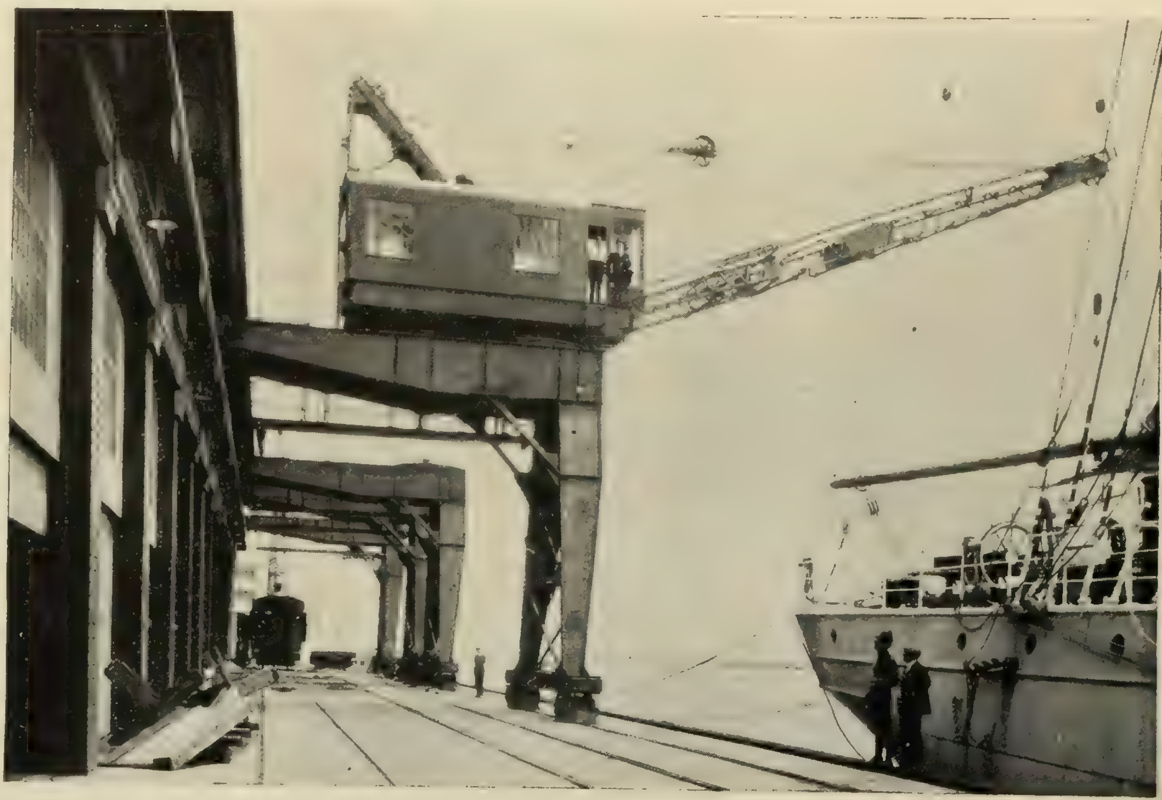


View of Army Supply Dock, Boston, showing one W-S-M Dock Crane Complete and the bridges for three additional cranes

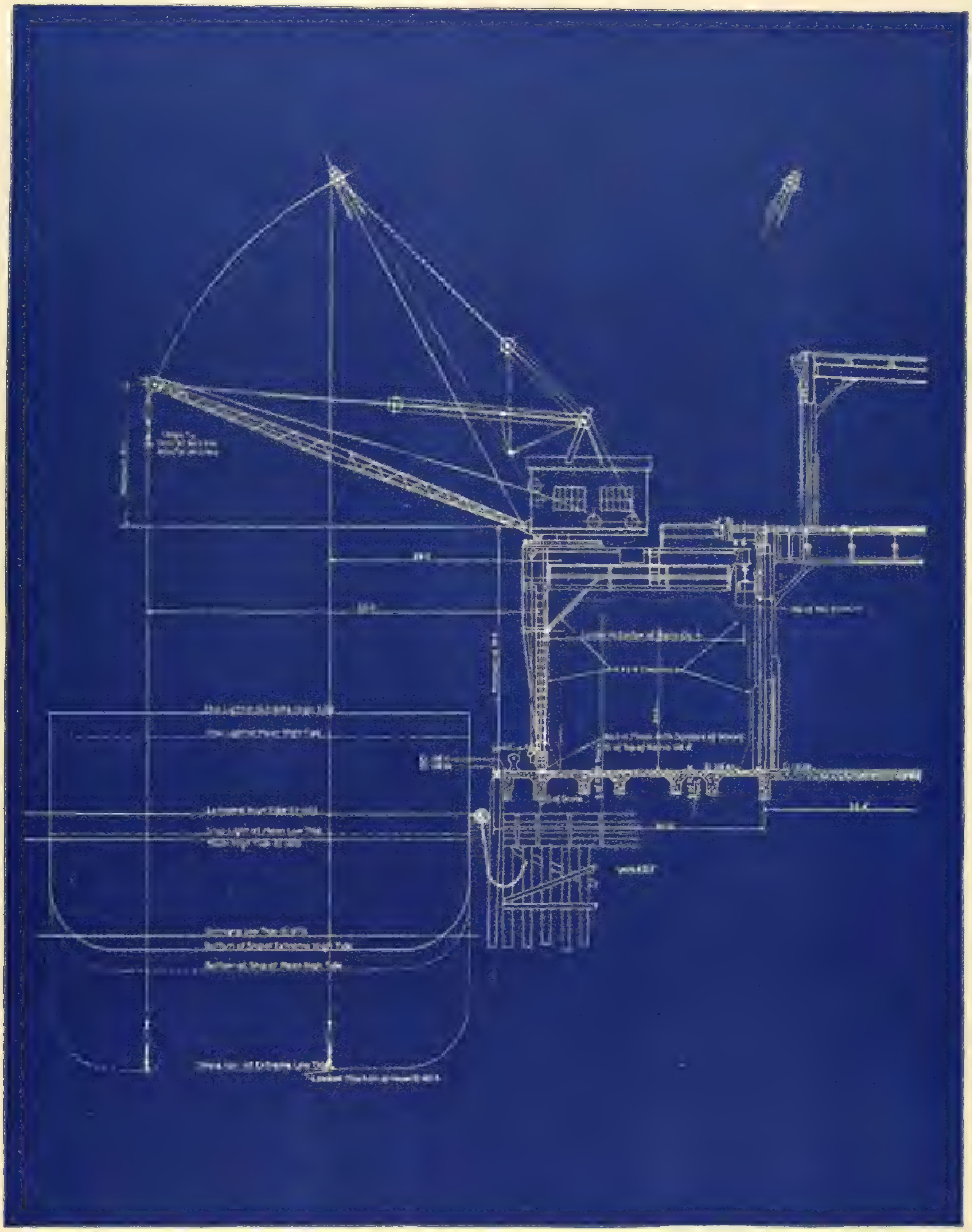
W-S-M Dock Crane

The Wellman-Seaver-Morgan Company is now installing four semi-portal bridge type hoist cranes at the U. S. Army Supply Base, Boston. The first of these cranes is in operation and is shown in the accompanying illustration. The blueprint on the opposite page gives the general dimensions of the crane.

This crane carries a lifting boom operated from a carriage, which in turn is mounted on a semi-portal bridge and arranged to rotate about a fixed axis. The bridge runs on two rails, one located near the face of the wharf and the other supported on brackets carried on the side of the wharf shed.

It will be seen that the crane has four distinct motions — bridge travel along the wharf, trolley slewing, boom hoisting or luffing, and load hoisting. All of these motions are under the control of the operator located in the cab on the rotating carriage.

The crane is designed so that another drum can be added and a two-rope grab bucket operated. The crane is rated to handle 8000 pounds at a distance of 29 feet from the face of the capsill at the rate of 200 feet per minute and 5000 pounds at a distance of 52 feet at 250 feet per minute.



General Arrangement of W-S-M Dock Crane at Boston.

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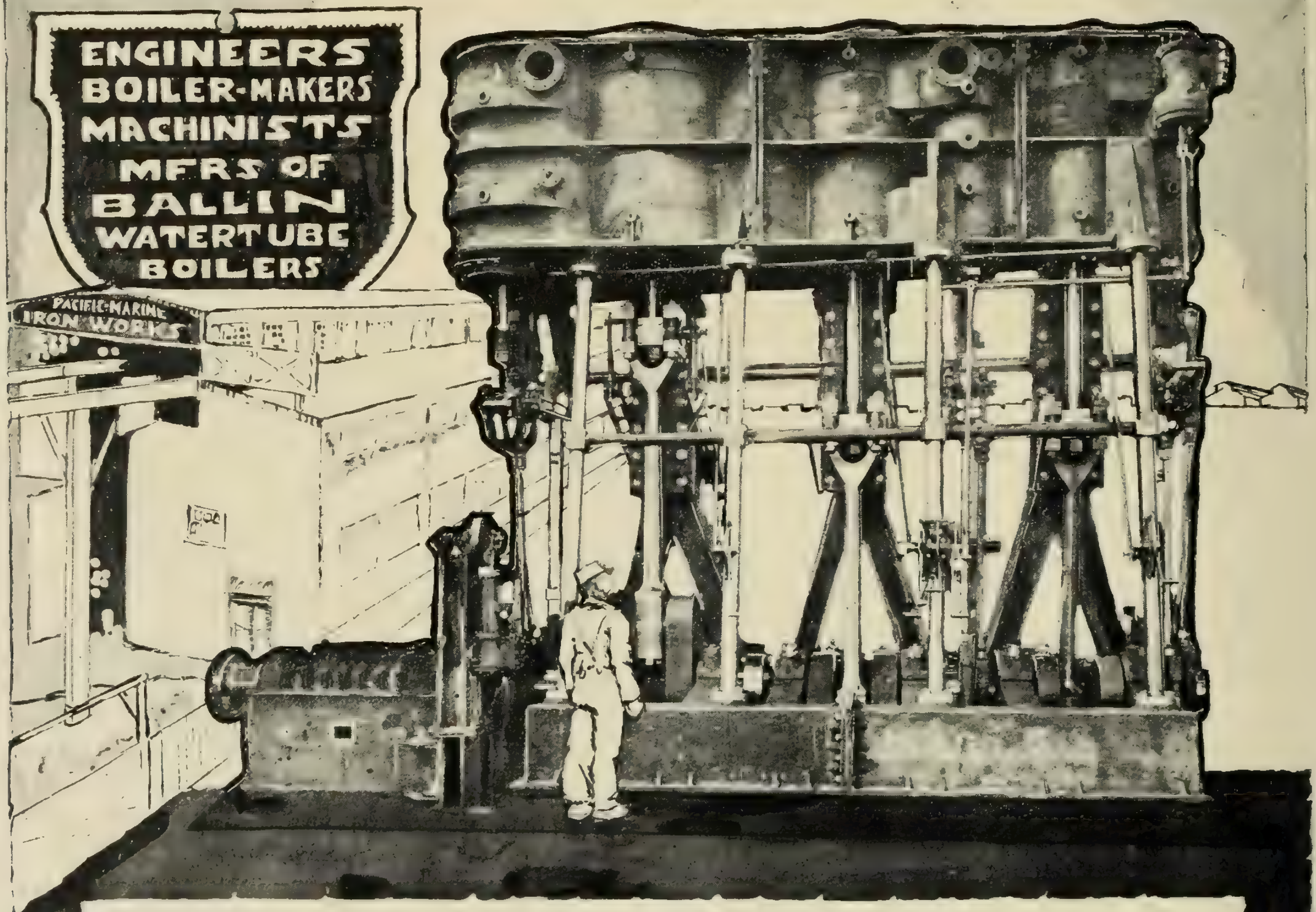

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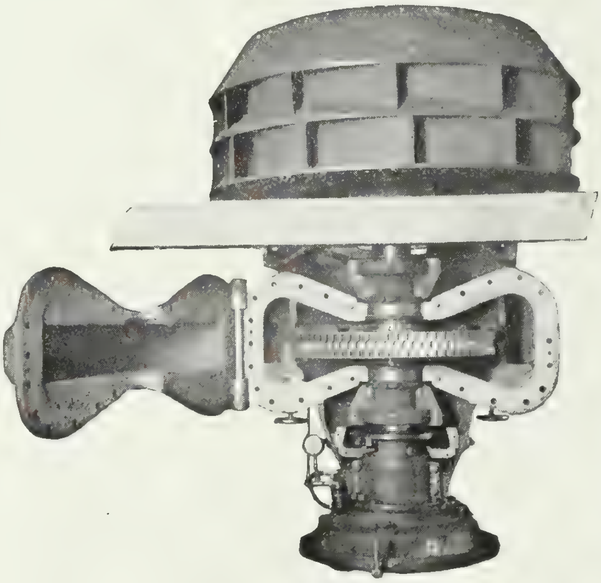

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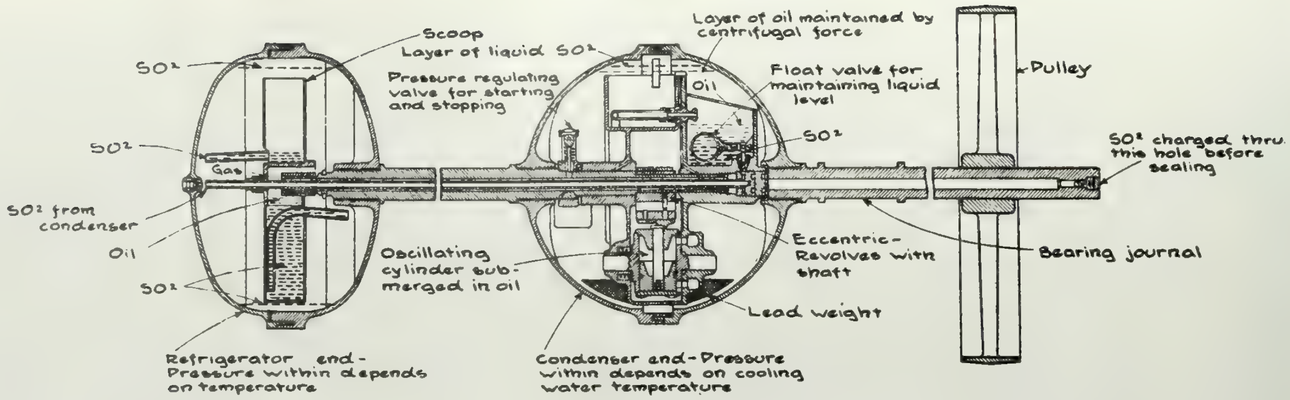

Scoop
Layer of liquid SO²
Layer of oil maintained by centrifugal force
SO²
Pressure regulating valve for starting and stopping
Oil
Float valve for maintaining liquid level
Pulley
SO²
SO²
Gas
SO² charged thru this hole before sealing
SO² from condenser
Oil
Oscillating cylinder submerged in oil
Eccentric-Revolves with shaft
Bearing journal
SO²
Lead weight
Refrigerator end-Pressure within depends on temperature
Condenser end-Pressure within depends on cooling water temperature

Fig. 1

Audifren Refrigerating Machine

THE Audiffren Refrigerating Machine possesses many valuable features that particularly recommend it for marine installation. This machine was developed to its present stage as the result of about twelve years of commercial service, and has become quite popular recently as evidenced by many land and marine installations. Among the latter can be mentioned oil tankers of the Standard and Union Oil Companies and the Atlantic Refining Company, passenger and freight steamers of the Monticello Steamship and the Southern Pacific Company as well as many destroyers, submarines, scout cruisers and gun boats of the navy and merchant ships in this and other countries.

The Audiffren refrigerating machine is of very compact and simple design. The entire compressing mechanism—in fact, all the mechanical parts subject to wear—are entirely enclosed and immersed in an oil supply and sealed against escape. The same is true of the refrigerant which is forced into the system and hermetically sealed at the factory. So complete and successful are the methods employed that an inspection of the interior parts of machines which have been operated for many years has shown no wear or deterioration either of refrigerant or lubricant by chemical analysis.

The Audiffren machine uses as a refrigerant sulphur dioxide (SO_2). The machine consists of a dumb-bell, so called, one end of which houses the compressor and condenser, while the other serves as the refrigerating compartment. Both of these bells rotate and are semi-immersed in tanks, the one within a brine and the other a cooling tank. The cooling effect is produced by the action of the sulphur dioxide in the machine. The compressors in the condensing end of the machine increase the pressure at that end and thus force the liquid sulphur dioxide into the cooling end through a small tube which lies in the hollow shaft connecting the two bells of the machine. In the cooling end, the liquid sulphur dioxide enters a chamber in which there exists a much lower pressure and it therefore expands into a gas. The heat absorbed in this expansion is taken from the brine tank in which this member of the machine is rotating, and which forms a surge tank in the brine circulating system. In many cases this tank is extended for the reception of ice cans or molds. After absorbing heat from the brine, the SO2 gas is drawn to the condensing end of the machine by the action of the vacuum created on the suction side of the compressor. The passage from the refrigerating end to the condensing end of the machine is through an annular space in the center of the shaft surrounding a discharge pipe through which the SO_2 flows when going in the opposite direction. This gas is then compressed by means of compressor cylinders located in the condenser end and the heat is carried away by the condensing water circulating in the containing drum. This action condenses the SO_2 gas into a liquid state and the cycle is repeated—absorbing heat from the brine and delivering it to the condensing water. The principle is of course well known in all refrigerating cycles, but the simple method in which that principle is applied in the Audiffren machine is its recommending feature. A cross section through the dumb-bell with explanatory notes is shown in Figure 1, and a side view with a section through the tanks is shown in Figure 2. It will be noted that baffles are pro-

(Section Continued on Page 153)

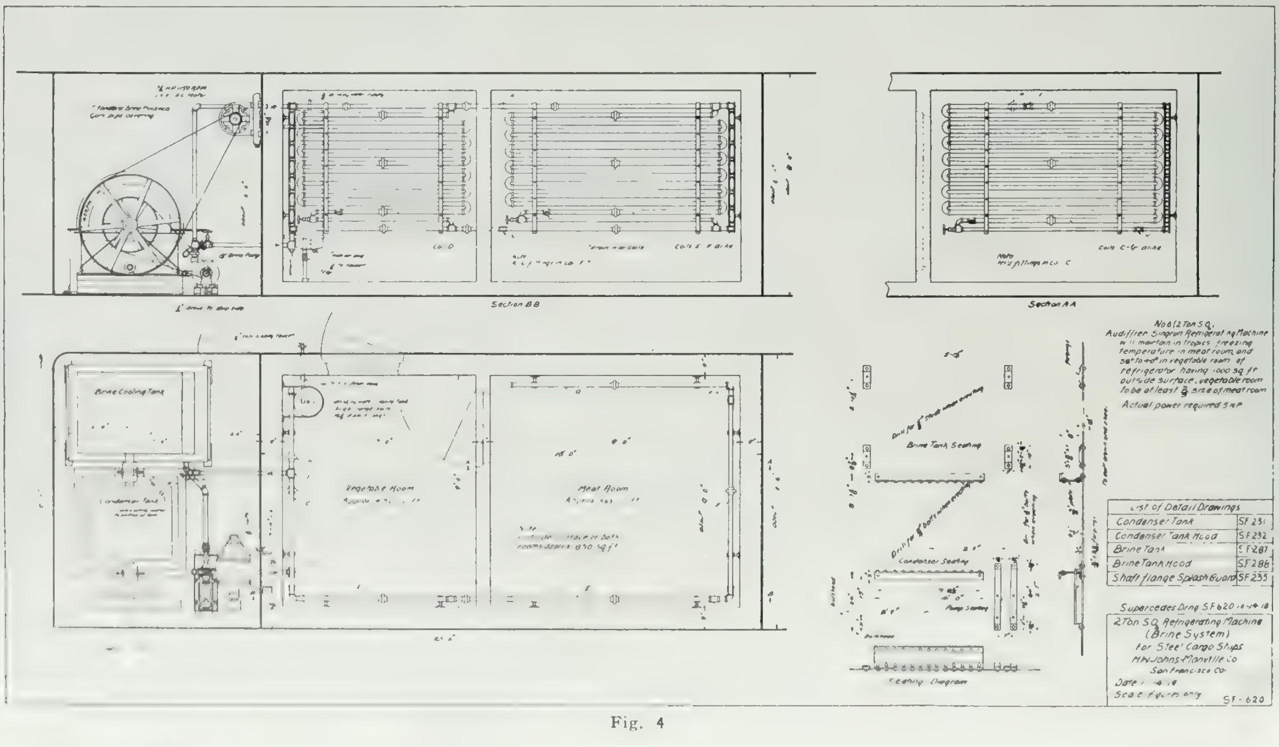
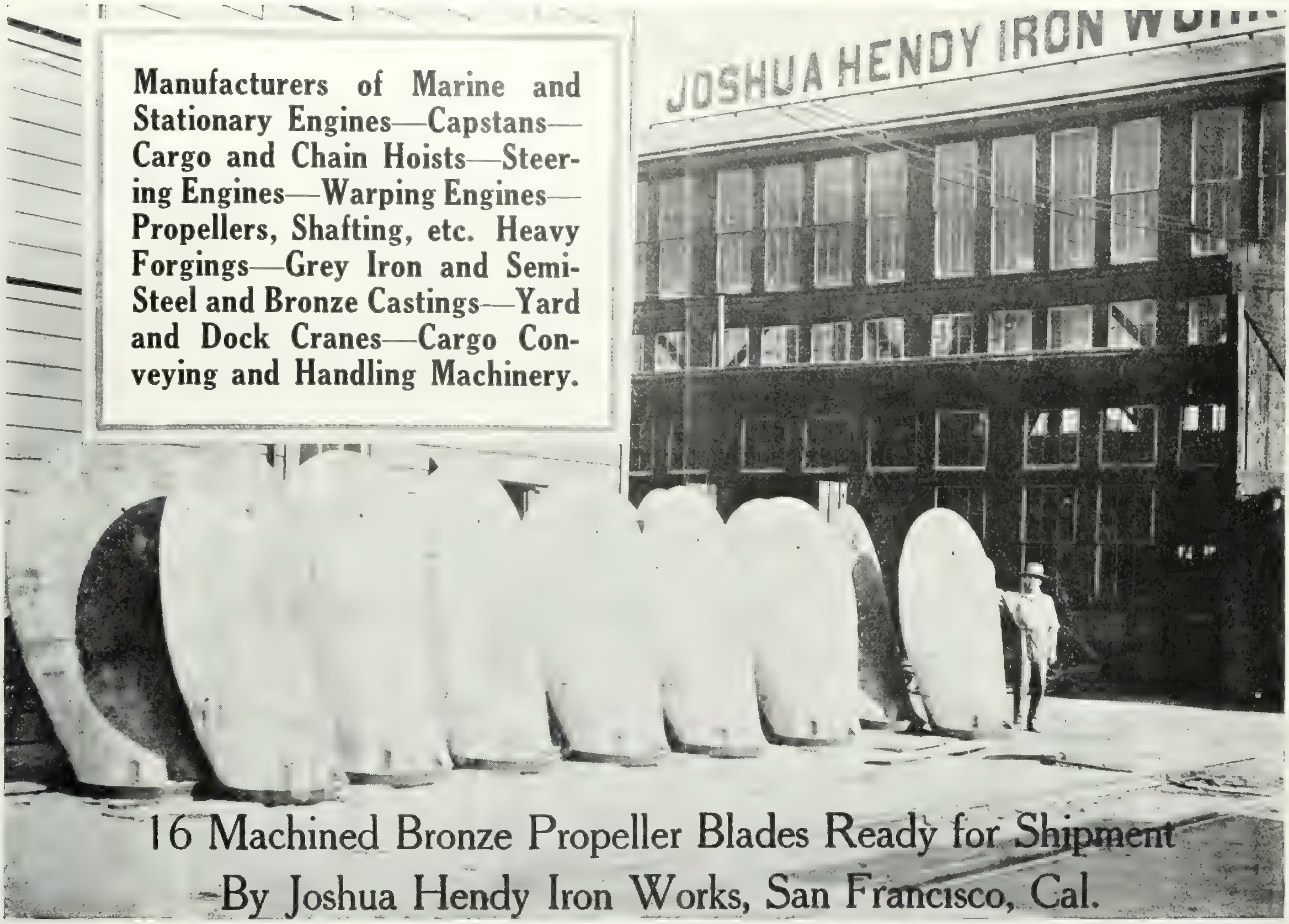

Section BB
Section AA
Brine Cooling Tank
Condenser Tank
Vegetable Room
Meat Room
Brine Tank Seating
Condenser Seating
Seating Diagram
No 6 (2 Ton S.Q.
Audiffren Singrun Refrigerating Machine will maintain in tropics freezing temperature in meat room and 38° to 40° in vegetable room of refrigerator having 1000 sq ft outside surface, vegetable room to be at least ⅔ size of meat room
Actual power required 5 HP
List of Detail Drawings
Condenser Tank SF 231
Condenser Tank Hood SF 232
Brine Tank SF 287
Brine Tank Hood SF 286
Shaft flange Splash Guard SF 235
Supercedes Drng SF 620
2 Ton S.Q. Refrigerating Machine (Brine System)
for Steel Cargo Ships
H.W. Johns-Manville Co
San Francisco Cal
Date
Scale figures only
SF-620

Fig. 4



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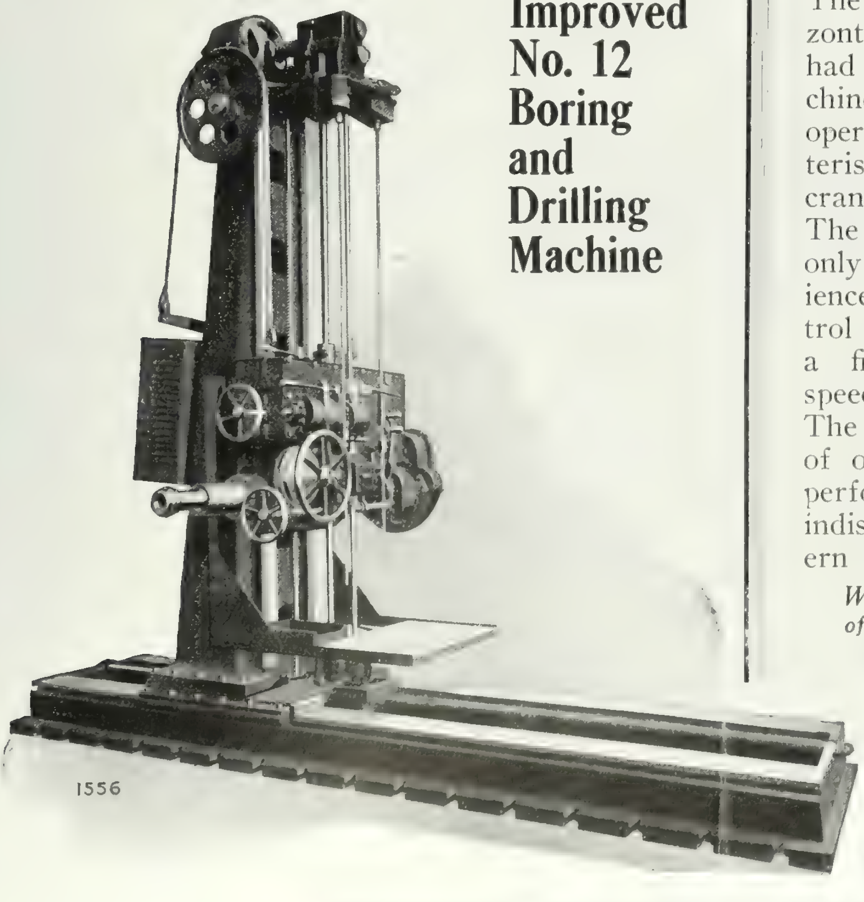

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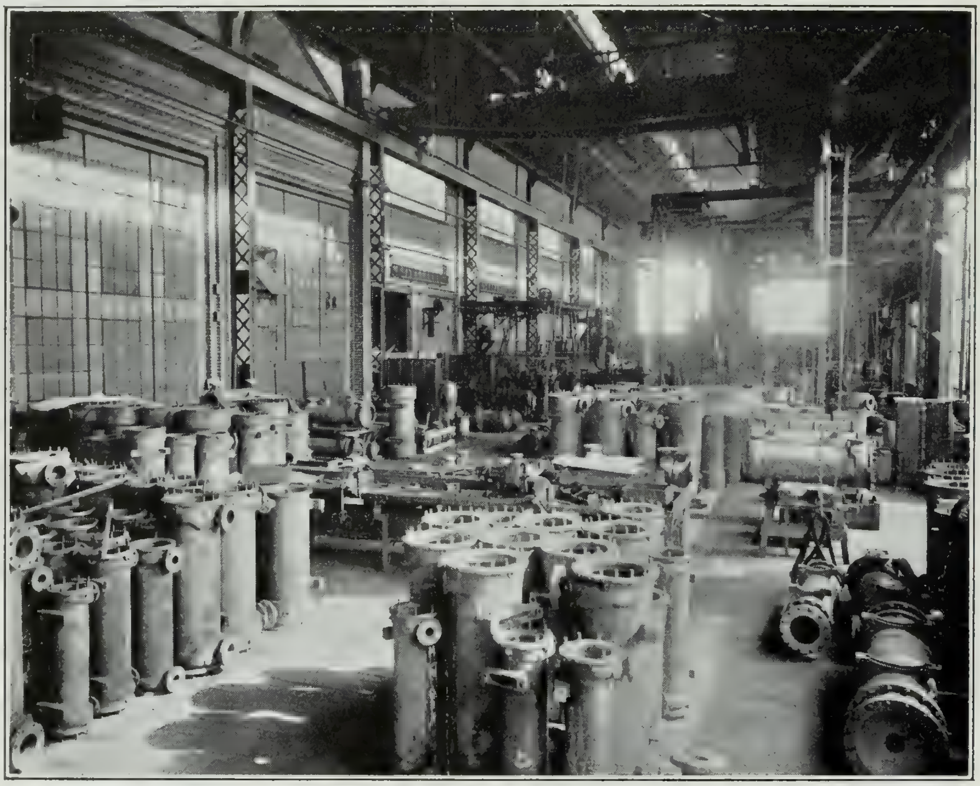

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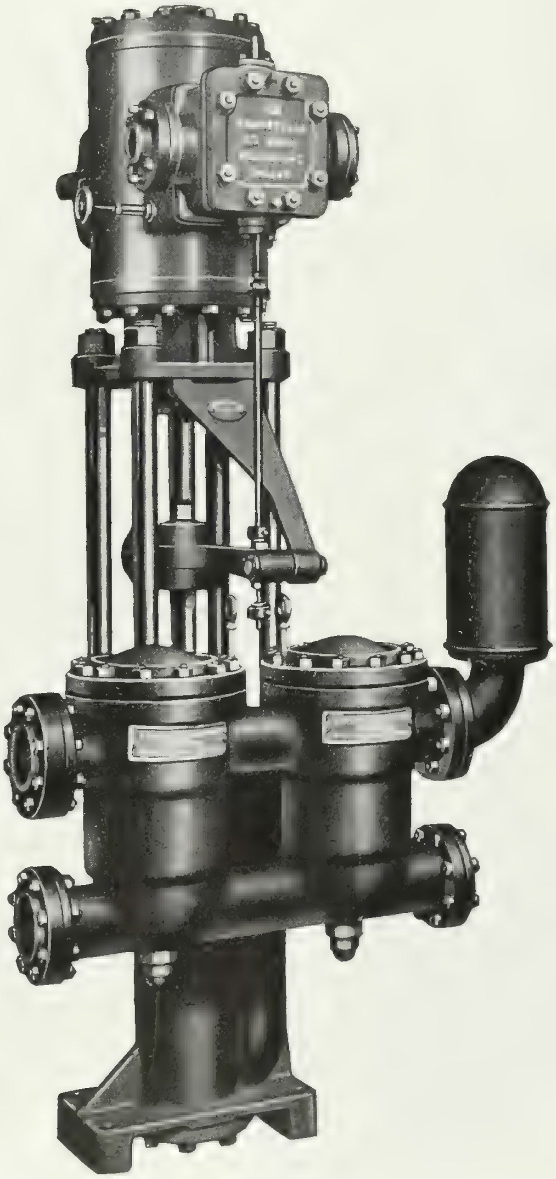

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vided in both tanks to prevent the brine or cooling water from splashing out due to the rolling or pitching of the ship.

Plate steel construction is used throughout, which lends itself readily to application on shipboard for tank construction. A typical plan of a two-ton machine installed is shown in Figure 4, while Figure 3 is a photograph of an installation on the Union Oil Company's tanker La Brea. It is interesting here to note that the space occupied by this machine is only 9 by 5 feet, while the refrigerator room and compressor room occupy a total of 9 feet by 31 feet. The installation of the Audiffren machine allows a wide latitude of choice in the selection of a location on shipboard and we quite frequently find the refrigerator room and the compressor room in different parts of the ship.

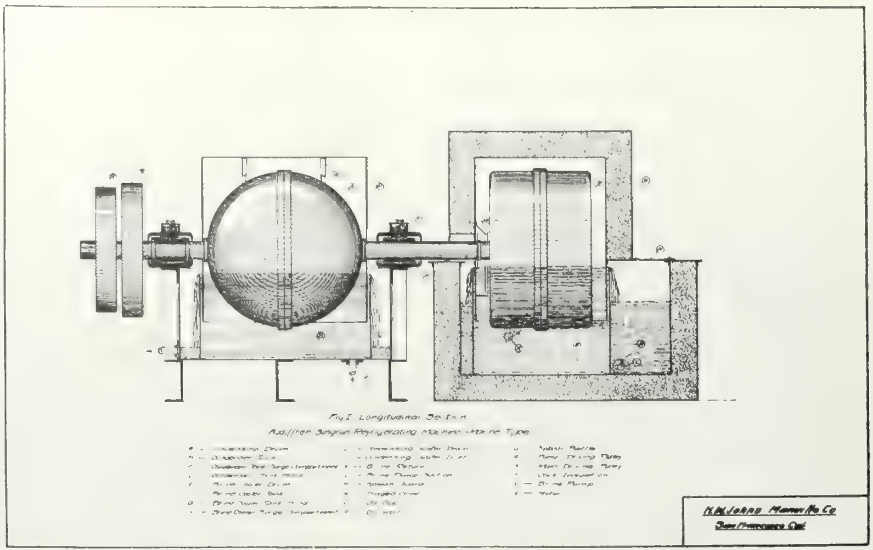
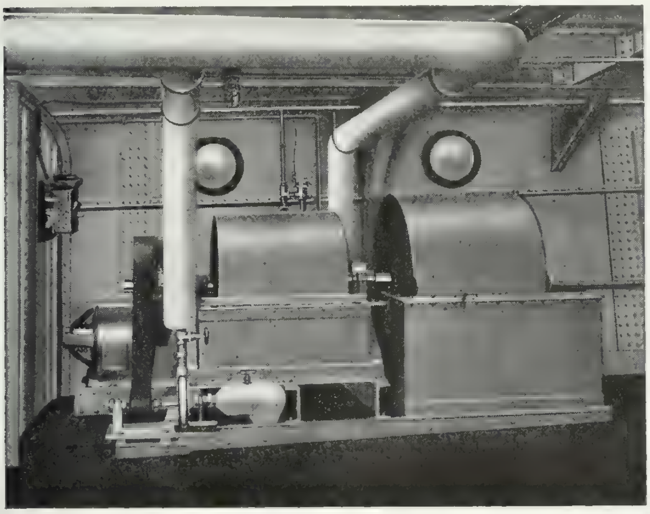
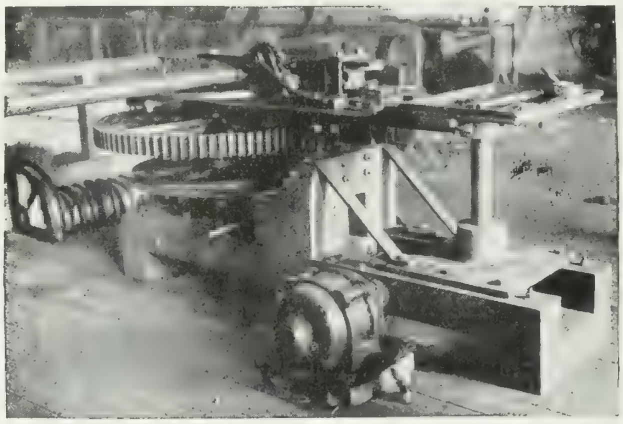


Fig I Longitudinal Section
Audiffren Singrun Refrigerating Machine - Marine Type
H.W. Johns Manville Co
San Francisco Cal

Fig. 3 at left. Fig. 2 above





First power pipe bending machine made by the U. S. Shape & Pipe Bending Company

A Pacific Coast Bending Industry

By W. H. Verwer

ONE of the most interesting shops connected with shipbuilding in the West is the plant of the United States Shape & Pipe Bending Company of San Francisco.

Pipe bending has always been a difficult and touchy job owing to the natural tendency of pipe to collapse or buckle at the point of bending, and the mechanic able to turn out an A1 job of pipe bending under the method commonly used in shipyards and other places is an exception.

It may be of interest to the readers of this magazine to have a comparison between the old method of pipe bending and that invented by this company. The old method, as still used in some shipyards, was described in the July issue of the Morse Dry Dock Company's House Organ as follows:

"Pipe fitters resemble architects or surveyors in a great many ways. They lay out the work which is at hand. When it is necessary to bend a pipe around a certain projection they don't bend the pipe to the desired angle, but instead they bend the more easily handled template wire into the necessary shape, and Joe Lowe and his benders in the pipe shop do the rest.

"After the template is bent, it is hurried off to the pipe shop where the work of the bender begins. Pipe of the right size is first secured and brought to the filling platform. The pipe has what is called a 'tail end' screwed on one end of it. The tail end is nothing more than a handle, an extra piece of pipe plugged at one end and screwed on to the end of the section to be bent. The other end is hoisted up to the filling platform and filled with sand. As it is being filled, the bending gang hammer the outside of the pipe until the sand in it is as well packed as it possibly can be. This part of the process is very important, as the shape of the pipe depends upon the solidness of the sand. After the pipe has been filled with sand it is plugged at the other end and laid upon the bending table.

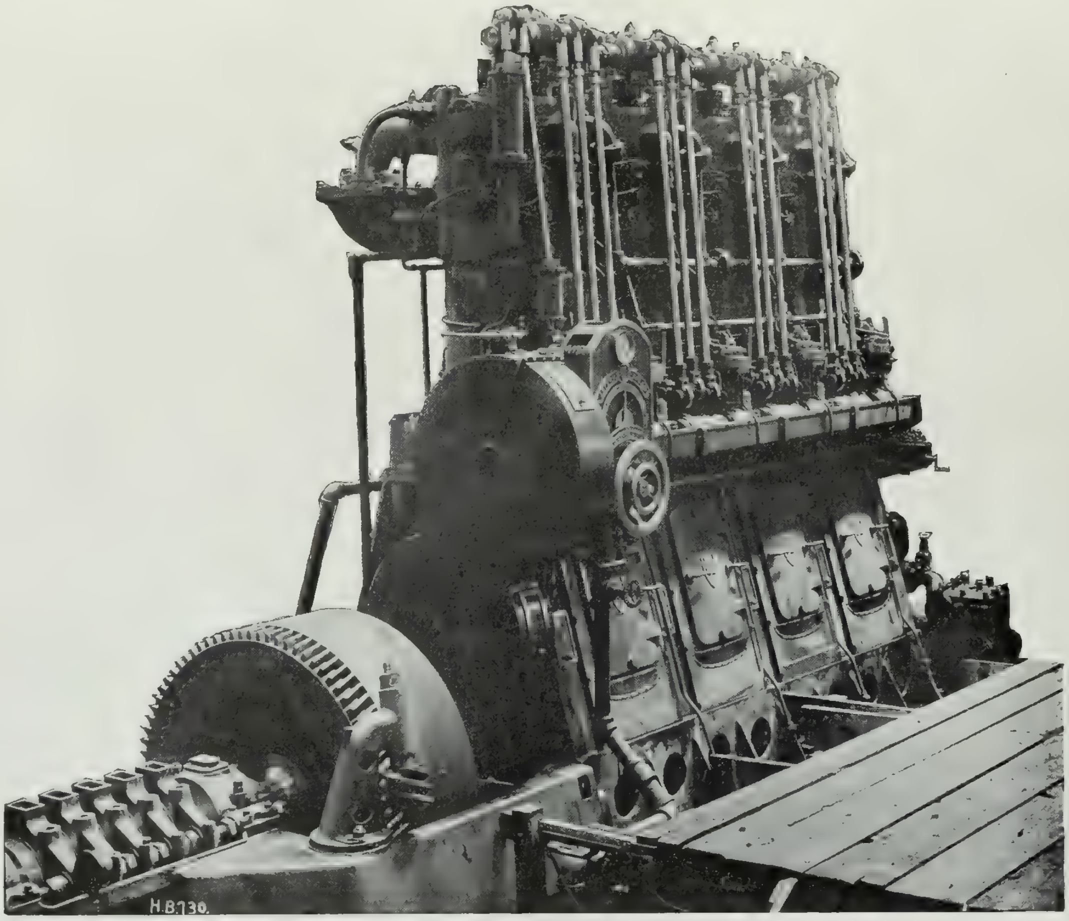
"The bending table is a large platform standing near the center of the pipe shop. It has a base of concrete surmounted by a 4-inch thick plate of steel. The plate is perforated with square holes into which the pins which hold the pipe on the table are inserted. These pins hold one end of the pipe in place while the end nearest to where the bend is to be made is, in the case of a large pipe, pulled around by a winch. Smaller pipes are handled by hand. Before the pipe is heated, the templet, which has been bent to the correct angle by the pipe fitter, is placed on the pipe. The templet shows just where the pipe is to be bent and chalk marks are put on it at these places. Heat of 2900 degrees Fahrenheit from oil and air compression torches is then thrown onto the spaces between the chalk marks and, as the pipe grows hot and pliable, the winch draws it around to the proper shape."

This description is a good account of the bending process, but let us go further. The elongation of a pipe bent hot is an uncertain quantity, and in order to secure accurate dimensions, in most cases the pipe is left longer than required, while being bent. Then the bent piece is taken to the threading and cutting machines, or hand dies are used, causing slow or expensive finishing of the bent pipe to dimension.

Now, let us look into the modern method of pipe bending brought about by the invention of the United States Shape & Pipe Bending Company's machine which has been adopted by such enterprising firms as the Schaw-Batcher Ship Works, the Moore Shipbuilding Company, the San Fran-

(Section Continued on Page 156)

DE LA VERGNE



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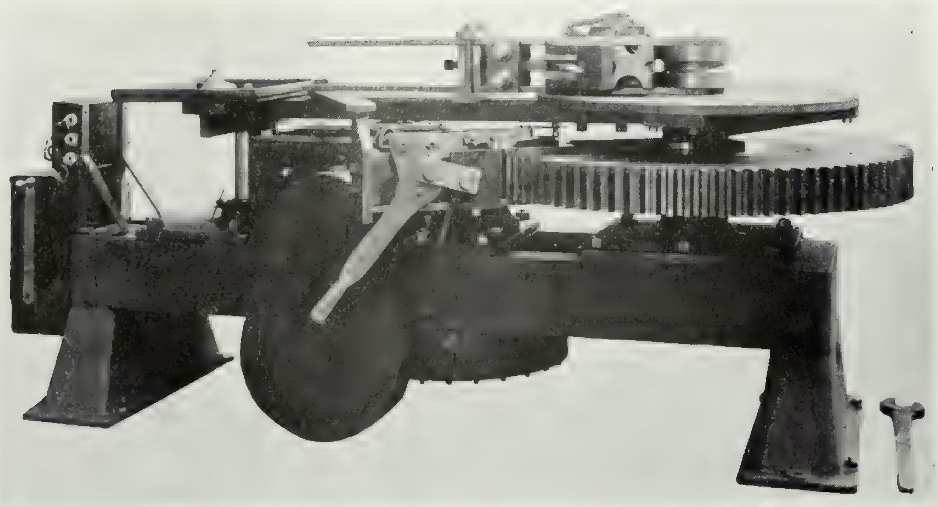

U. S. Shape & Pipe Bending Company Number One Model, Capacity up to Three Inch

cisco Shipbuilding Company (operating for the United States Shipping Board), the Standard Oil Company, and others, within the last year.

Here is how they do it: The template is lifted or the measurements accurately taken for the bend and the pipe is then cut to the exact length and threaded in the straight piece before bending, as the elongation is accurately controlled under this system of machine bending. The pipe is then taken to the machine, the dies are set, pipe is placed in the machine vise—which action is very similar to placing a piece of pipe in any pipe vise—then the machine operator adjusts the pressure blocks, pulls the go-ahead lever, and the pipe is being bent.

This machine is made in two sizes. The No. 1 model has a capacity up to 3-inch pipe and with it 1½-inch standard or extra heavy pipe is bent to any shape with a radius as low as 2½ inches measured from the center of the pipe. Two-inch pipe is bent to a 4-inch radius and 3-inch pipe to as small as a 6-inch radius.

The No. 2 model bends 3-inch to 6-inch pipe **cold** without filling; 6-inch standard pipe is bent to a 30-inch radius. The working time required to set up this machine for any sized pipe bend is ten minutes, with one mechanic and a helper. The bending arm travels at the rate of one revolution every four minutes. This gives the bending time for large pipes bent to 90 degrees one minute. The return of the bending arms is done in one-half this time.

The changing of pipe in the vise or the removing of the bent pipe and placing the succeeding piece of straight pipe to be bent in the vise requires about four minutes, so that duplicate 90-degree bends of 5-inch or 6-inch pipe are made at the rate of one every ten minutes, after the machine is set.

Where only one bend of these sizes is required, the setting of the machine, the bending and removing of the bent pipe from the machine requires about twenty minutes.

By gear shift to the faster of the two speeds, furnished with this machine, the bending time is decreased 50 per cent. This, for the bending of 3-inch and 4-inch pipe.

Where long sweep bends are wanted, they are made by the use of the standard forms, making the bends thereon by a succession of short bends to the radius of the form used, between the bending of each of which the pipe is brought forward a short distance in the vise.

Where odd or irregular bends are to be made, they are produced by the use of the standard forms, the bend made to the angle required for the bend forming the component of the irregular bend at this point. Then the pipe is moved ahead in the vise and the next component bend is made and so on, in a way similar to using short heats on the bending block, but minus the heating.

This method is very rapid. Expansion bends, offsets, etc., are easily made.

(Section Continued on Page 157)

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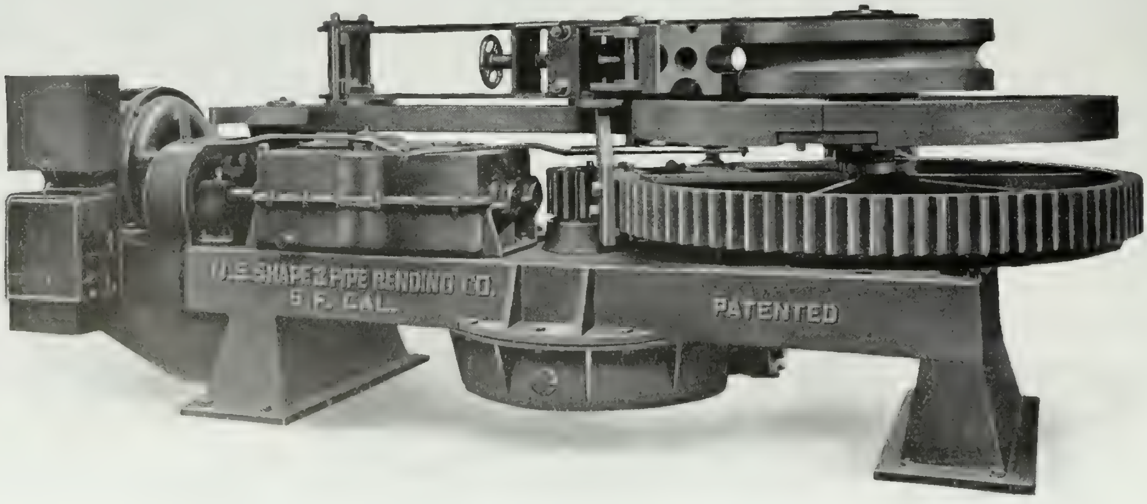
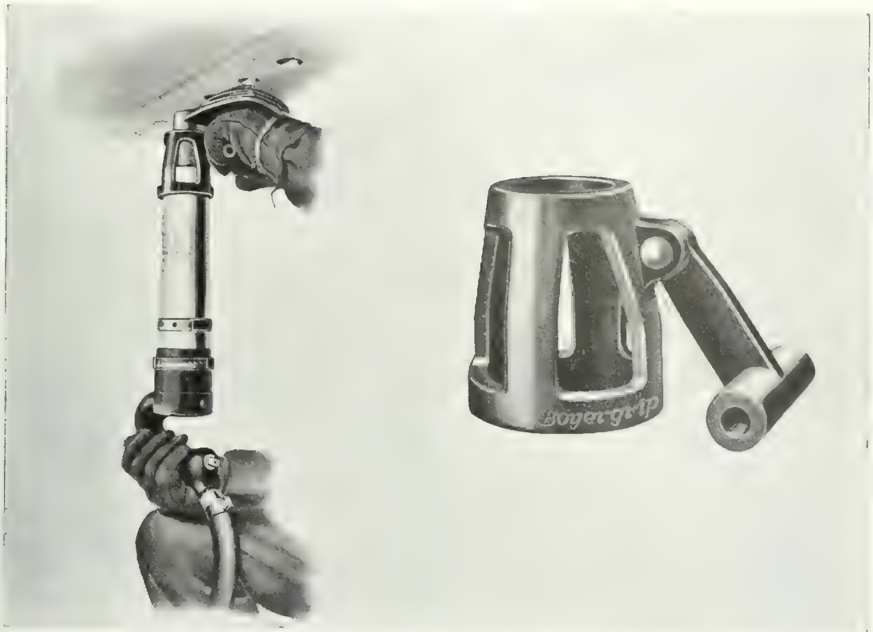


U. S. Shape & Pipe Bending Company Number Two Model, Capacity Three to Six Inch



The Boyergrip for Pneumatic Hammers

BOYERGRIP

The Chicago Pneumatic Tool Company has perfected and is manufacturing in quantity a new fixture for pneumatic hammers known as the Boyergrip.

Boyergrip is a device which fits over the muzzle of most makes and sizes of riveting hammers to provide the riveter a firm full hand control of the hammer, without grasping the heated cylinder.

Boyergrip combines an ideal hammer grip and an absolutely safe set retainer.

Boyergrip allows the riveter to get back of the hammer with the full weight of his body, without having to "strong arm" the work.

Boyergrip insures perfect control of the hammer and an unobstructed view of the work at all working angles.

Boyergrip allows the workman to work over hot rivets without burning his hands and eliminates the possibility of jammed or squeezed fingers.

Boyergrip is made of high-grade steel and so simply and strongly constructed as to be indestructible in any service.

The Boyergrip is also offered in a form adapted for chipping and calking hammers.

As in riveting, the Boyergrip is an invaluable aid to faster, safer and more accurate chipping and calking. Provides a comfortable full hand hold with perfect control at any working angle; also protection against the accidental shooting of the chisel, and the danger of injury to the hands in case the chisel slips off the work.

VULCAN TOOL HOLDERS

J. H. Williams & Company, with works at Brooklyn and Buffalo, New York, have added to their well-known line of "Agrippa" tool holders, their new system of cutting tools—Williams' "Vulcan" forged-cutter tool holders. Holders which embodied this principle, making possible the use of what is practically a solid tool without its expense, were first designed and used in their shops many years ago; they have been developed and perfected to meet the demands of those who prefer the solid, forged type of tool. This construction eliminates the great cost of the old, solid tool and at the same time retains its advantages. Each holder, by the mere insertion of small high speed forged-cutters, is adapted to the heaviest service in any regular machining operation on lathe, planer, shaper, etc. Consequently, the economy and convenience of this line, when installed as standard shop equipment, is at once apparent, as all blacksmith work, to say nothing of the very considerable investment necessitated by heavy, solid forged-tools of costly high speed steel, is eliminated.

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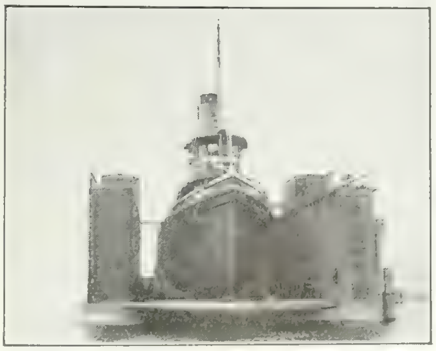
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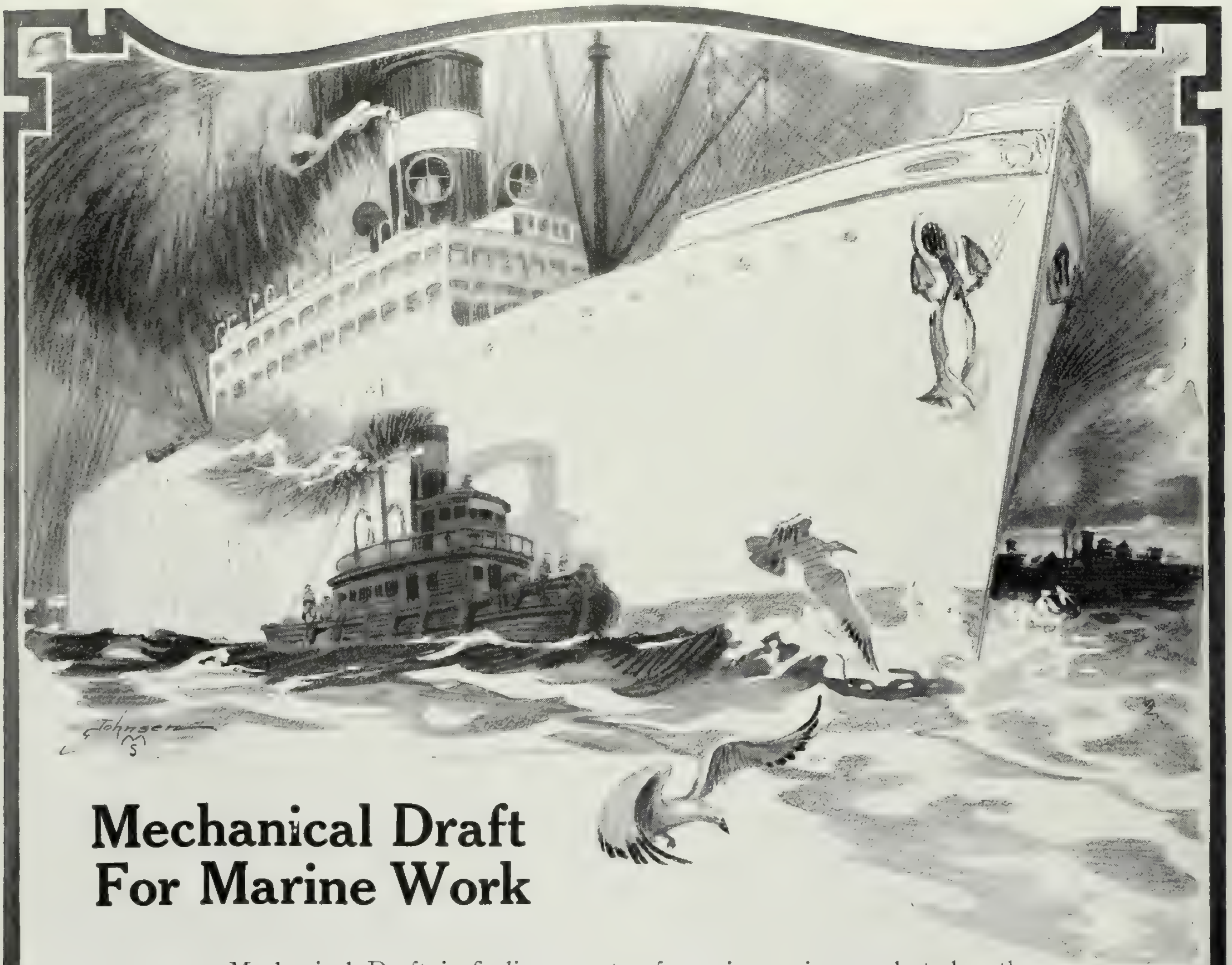

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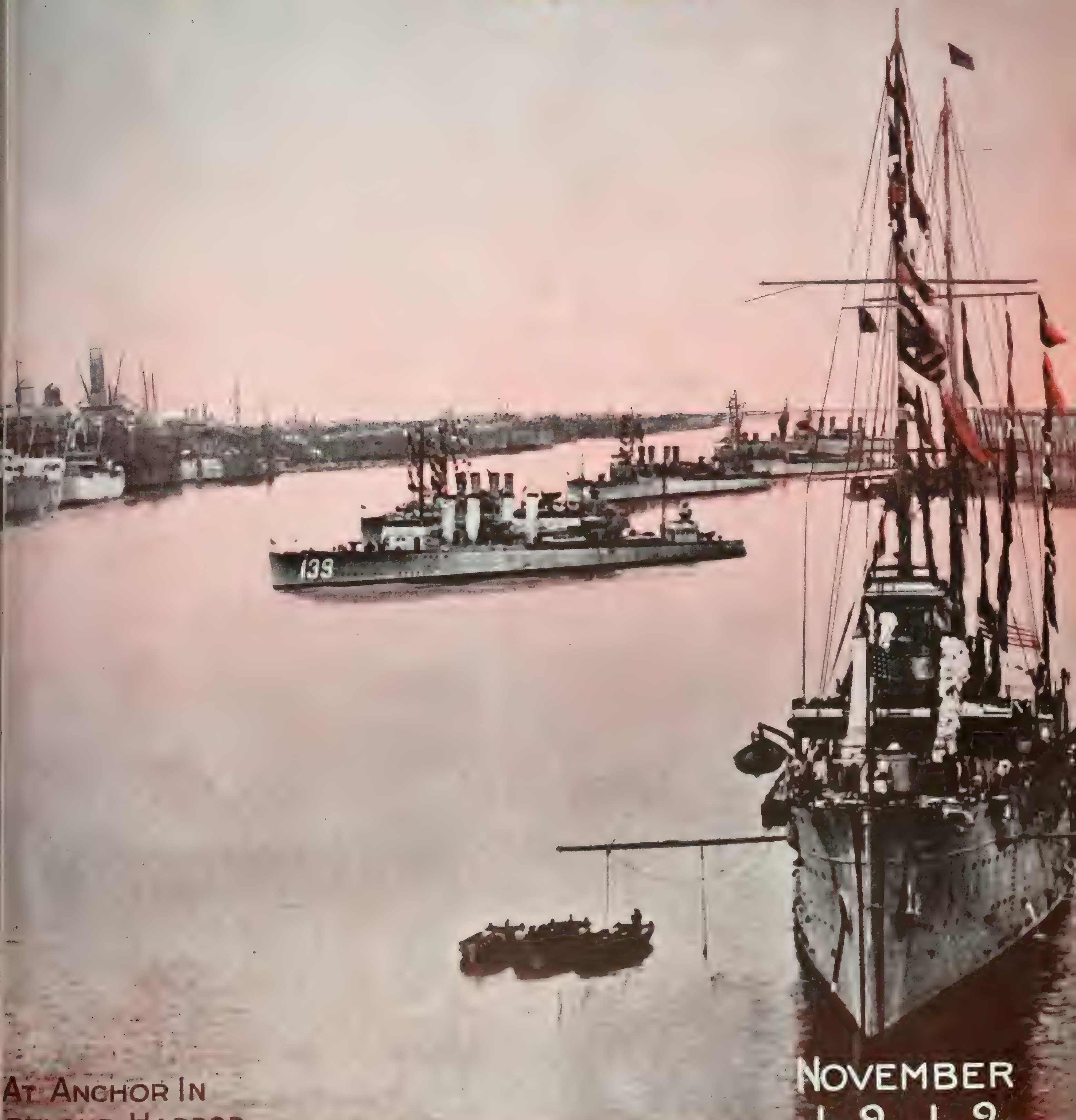

At Anchor In
rtland Harbor

NOVEMBER
1919

Pacific Marine Review. Vol. 16, No. 11. Published monthly at San Francisco. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. $3.00 a year.

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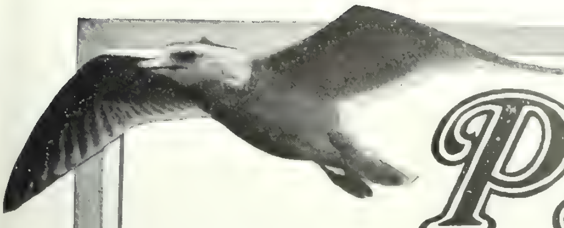

Pacific Marine Review

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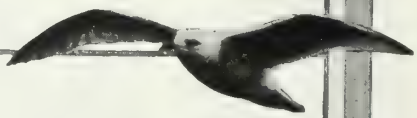

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Pacific Marine Review
The National Magazine of Shipping
November, 1919

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Portland Wears the Crown—Amazing Ship Construction Record

By Sydney B. Vincent

WHEN Germany unleashed her conscienceless dogs of war, the submarine fleet, to prey upon the shipping of the world, whether the vessels of friendly or unfriendly nations, armed or unarmed, bearing the insignia of the Red Cross, or carrying men and women and children in pursuit of their legal business or pleasure, she brought down on herself the condemnation of all civilized peoples.

Having no regard for right, dismissing with a wave of the hand the written and unwritten rules of maritime warfare as "mere scraps of paper," she pursued her murderous career of destruction without let, and in the early stages, to some extent, without hindrance.

Diplomacy availed nothing. Germany could no more be induced to conduct her submarine campaign on the recognized principles of civilized nations, than she could successfully be pleaded with to conduct her land activities in conformity with the well-defined law of nations governing such operations.

The launching of the unrestricted submarine warfare of the Hun, especially as it affected non-combatant shipping, was in the nature of a surprise attack. Consternation followed. Great Britain with her wonderful navy was unable, at first, fully to cope with the situation. It is true that many submarines were captured or sunk, but it was not for months after that the progress of the campaign was perceptibly slowed up. Especially equipped vessels were constructed, hundreds of submarine chasers were utilized, nets were spread, and other means for circumventing the German in his dastardly work were employed, but many of the submersibles escaped to the open sea to carry on their bloody work in Atlantic and Mediterranean waters.

The result of the campaign was the destruction of millions of tons of shipping. British boats of various types were ruthlessly sunk. French vessels by the score were sent to the bottom. The vessels of Sweden and Norway furnished targets to the German. Italian vessels were sunk and the ships of other nations suffered from the marauders. Vessels of the United States, wholly neutral, were attacked and sunk. Hundreds of Americans were killed. Boats carrying food to the Belgians, hospital supplies for the Germans as well as for Britain, France, Italy and other nations fighting Germany were sunk.

The combined shipping of the world, prior to the unlawful entry into conflict of the German submarine, scarcely was able to handle the enormous commerce of the world, burdened as it was by the demands upon it incident to the war. The shipyards of Britain were unable to keep pace with the destruction of vessels flying her flag; France, pressed as she was in all industrial lines, could not build vessels in sufficient number to meet her requirements. Sweden and Norway's requirements were increased, Japan's overseas fleets were inadequate for her needs, and the United States, her old-time maritime supremacy having diminished to such an extent that for scores of years she had depended upon vessels flying the flags of Great Britain, France and other nations, was called upon to supply the deficiency of the world .

Naturally, when the United States was called upon to supply war necessities of whatever character, American genius found a way to fill the order. Our steel mills could not turn out material for ships as rapidly as it was required. The output of steel had to be distributed in a hundred channels. It was impossible, on such short notice, to make steel for all purposes to which that metal must be applied, and at the same time supply plates and other structural steel for ocean-going carriers, and the various types of war vessels which

Two Portland built Freighters loading at a Portland Municipal Dock

River front of a Portland Shipyard

the exigencies of the time demanded must be built.

There was but one way to keep pace with the demand for ships; but one answer—ships of wood.

Steel ship men said it could not be done; that it would be money wasted; that it was an economic mistake, and this or that reason was advanced why the United States should not encourage the re-establishment of the old wood shipbuilding days.

But it was done, and successfully, not only in Portland, Oregon, but in other Pacific Coast cities. There was a sudden and vigorous revival of this almost obsolete industry.

In the sixties and seventies, wood shipbuilding on the Pacific Coast had been an important, but not large, industry. In the eighties there also was some activity in the construction of vessels of wood, but they were nearly all coasters. Few, indeed, were trans-ocean carriers. Steam power had not generally been applied. There were yards in San Francisco, Oakland, on Puget Sound and a few were scattered in the small coastal towns in Washington and California. Several vessels also were turned out on the Willamette River in Oregon. The wood yards remained fairly active until the latter eighties, when steel ships began to replace the wood construction type, especially for deep-water service. At the time of the breaking out of the war, it can be said that wood ships and their construction had practically disappeared on the Pacific Coast.

Whatever may be said about wood ships, there can be no doubt that they served a great and glorious purpose during the war and that had the war continued the old-time glory of the wood ship would have been re-established. Today scores of wood ships of recent construction plough the seven seas, fulfilling a mission, carrying on a great commerce which otherwise would be neglected. They are relieving the wants of hundreds of thousands of persons. They have justified their building.

While it is true that in some localities the wood ships have not come up to expectations, their partial failure should not altogether be charged up to the type as a type, but rather to speed of production, and unfortunately, in some instances, to greed on the part of builders.

Fortunately the Portland builder cannot be classed in the profiteering section. Portland ships have been honestly built, despite the fact that during the control of the Emergency Fleet Corporation more wood ships were turned out in Oregon and the Portland district than in any other part of the United States, and this also applies to the sum total of wood and steel ship construction. To this district belongs the crown of glory for achievement in ship construction. No other section even approached it in performance. The Portland district and Oregon will forever be credited with unprecedented and unequalled production of ships.

With the demand for wood ships, what was more natural than that Portland, Oregon, the largest lumber manufacturing city in the world, should be called into the wood shipbuilding industry on a double count to supply timbers and planking for Eastern and Southern wood ship yards, and to build wood vessels on her own account. Portland was capable of doing both. Portland and the forests of Oregon provided the big timbers for many of the wood shipyards in other sections of the country. It was an easy task, a request readily complied with. Oregon and Washington are the richest timber sections in the world.

One Hundred and Fifty-two Wood Ships

Although wood shipbuilding has practically ceased, it is not a dead industry. Scores of wood ships will be launched in the future, though they will not be of the war-time period types. Today Oregon has put into the water the magnificent total of one hundred and fifty-two wooden steamers.

But some misinformed, some prejudiced and some

Auxiliary Motor Schooner, City of Portland

malicious prevaricators said Portland would have trouble sending her "Made in Oregon" ships into the broad Pacific; that "the bar" at the mouth of the Columbia was unsafe, and a lot of propaganda of that sort. Portland has the finest natural fresh water harbor on the Pacific Coast. There is no bar at the mouth of the Columbia River. The government has removed that old bugaboo. A recent United States survey showed a depth of water at "the bar" at mean lower-low level of forty-two feet.

Prior to the control of the shipbuilding industry by the Emergency Fleet Corporation, several yards in what was known as the Portland district built wood vessels on private account, many being for the French government and for certain shipping interests of Norway and Sweden.

The first serious attempt in Oregon, which proved successful, to construct a power-driven, deep-sea boat of wood construction was made by the St. Helens Shipbuilding Company, which on April 15, 1916, launched the City of Portland, a vessel of 278 feet overall, beam 48 feet, a depth of 19.6 feet and a net tonnage of 1671. The vessel was equipped with semi-Diesel engines. This pioneer vessel proved her worth and has been followed by the construction of others of similar size and equipment. This company has launched a total of ten ships.

Another of the yards which first began operations as wood shipbuilders in Portland was the Peninsula Shipbuilding Company. This company has a splendidly equipped plant, managed by business men of long experience. Its first vessel was launched in December, 1916. Since that time it has put into the water twelve ships. This company's vessels are of the best quality.

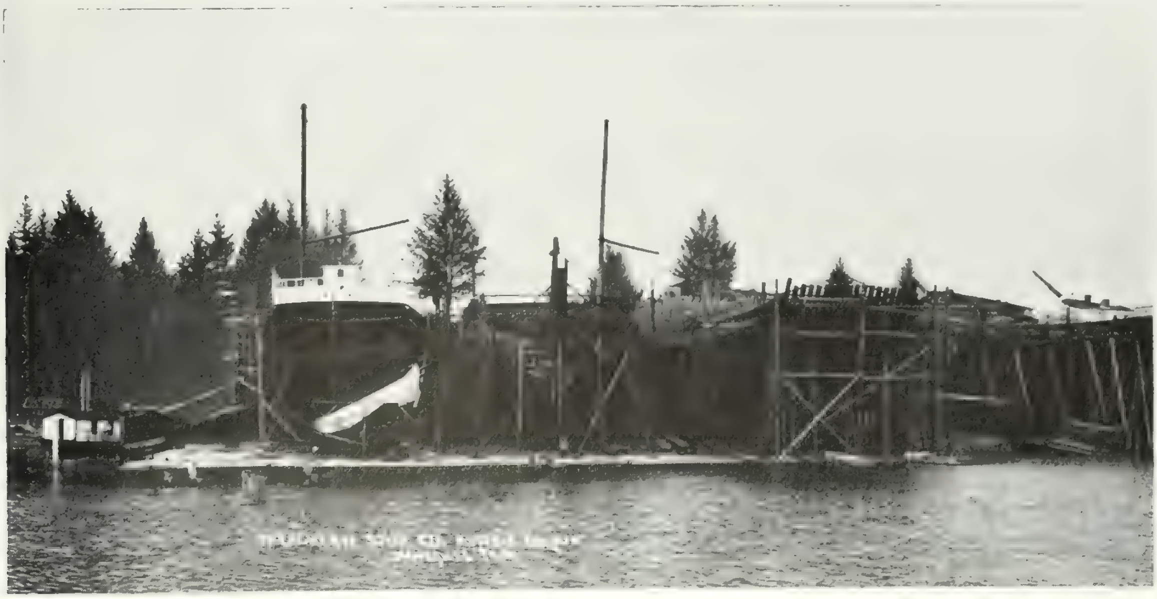
The largest producer of wood ships in the Portland district was the Grant Smith - Porter Ship Company. The history of this corporation was one of remarkable progress. The Grant Smith Company is a nationally known construction concern. When the United States entered the war, it offered its vast organization to the government in any cause its aid might be deemed desirable. At the request of General Goethals, the corporation subordinated its every other interest and entered into a government contract for the construction of wood ships. For the fulfillment of this contract the firm of Porter Brothers, large railroad contractors, became allied with Grant Smith & Company.

Composite Steamer of the Supple-Ballin Type just after launching

Almost over night two great yards arose, one on Grays Harbor and the other in Portland. In yard construction at Portland, wonderful feats were accomplished. Vast dredging and piling operations were necessary, office and other buildings were erected, and finally eight giant ways towered against the skyline. Expanded within a single year, a plant with 5500 shipbuilders launched twenty-six vessels. Probably no single wood yard in the United States made such a record for production.

In February, 1917, the Supple & Ballin Shipbuilding Corporation began work on a new plant for wood ship construction, and has to its credit ten first-class wood ships of the composite type.

At Astoria are three plants for wood construction, that of the McEachern Company with six ways, the Rogers Shipbuilding Company with four, and the Wilson Brothers' plant, also with four.


The McEachern Shipyard at Astoria

Bending Slab and Furnaces at the Columbia Shipbuilding Yard, Portland, Oregon

These three plants put twenty-five ships into the water.

The McEachern plant was started in March, 1916. Its first construction was the Astoria launched in October of the same year. A. O. Anderson & Co. were the chief owners, but later the company was reorganized, Max Houser of Portland being the chief owner, with Edward Wright, a well-known shipping man, as manager.

On Coos Bay two wood yards, Kruse & Banks and the Coos Bay Shipbuilding Company, launched fourteen ships.

With five ways for wood ship construction, the G. M. Standifer Construction Corporation launched five wood ships.

The only wood ship plant in the Portland district not under control of the Emergency Fleet Corporation was that of the Foundation Company, operating ten ways, which constructed twenty vessels for the French government.

Just here I want to make a brief reference to the activities of the steel yards in the Portland district. From December of 1917, when the first steel ship was launched, to October 1, 1919, this district has placed in the water just eighty-eight steel vessels, nearly 90 per cent of which were of 8800 tons.

I state the above because I want here to make reference to another very important factor in the achievement of Portland as a shipbuilding center. It is valuable, not only as a point of interest for the shipbuilder of the future, but for manufacturers in almost every line of industry. The question has been asked by persons who have wondered and been amazed, when confronted with the shipbuilding figures: "Why has Portland produced the most ships?"

First, perhaps, one might suggest the Portland Spirit, that "something" which made men toil in a time of great need. The suggestion would not be at all out of place. Loyalty did cut some figure, but there is another reason, probably more important to the manufacturer in peace times: Climate,—for be it known that the splendid efficiency of 40,000 men employed at the peak of the shipbuilding campaign was in large measure due to the wonderful climatic conditions which prevail in and about Portland, a climate which permits men to work every hour of every day in the year in comfort. Due to the mild climate, the absence of extremes of heat or cold, Portland workmen can do more work in a given time, with less fatigue, than in climates where the thermometer climbs high, where humidity is great, or where it drops low, or where cyclones and blizzards and other climatic inequalities sap the vitality of men. Perhaps the now nationally recognized loyalty of Portland in all war work may also be attributed to some extent to "climate." It is in the atmosphere.

Then again, labor conditions in Portland have always been more nearly ideal than in any other Pacific Coast city. Workers rarely have had grievances, and there have been few serious labor disturbances. All these things contributed to Portland's splendid record and will continue to contribute to her upbuilding as one of the most important industrial and commercial cities west of the Mississippi.

Let us turn to the steel construction record of the Portland district. It is a truly remarkable

Shipyard of the Northwest Steel Company, Portland, Oregon one. In spite of the fact that Portland is the largest lumber manufacturing city in the world, with dozens of mills tributary to the Willamette and the Columbia rivers, the center of a forestry containing over 550,000,000,000 feet of merchantable timber, the Portland district in less than three years launched eighty-eight steel ships, from four yards with a total of eighteen ways, and one plant, the Willamette Iron & Steel Company, manufacturing Scotch marine boilers, marine steam engines, deck winches, and other auxiliary machinery.

The Willamette Iron & Steel Company deserves particular mention for the reason that it is the largest builder of Scotch marine boilers in the United States, with a capacity of one complete boiler a day. Its product is shipped to many parts of the United States and to some foreign countries.

Organized in the sixties, the Willamette Iron & Steel Works has been identified with marine engineering work on the Columbia and Willamette rivers almost from the time the first vessels ploughed these waters. The firm established an enviable reputation, and in 1900 was reorganized under its present corporate title. Modern shops were erected and extensive works were prosecuted. Boilers were built and all kinds of machine work undertaken on a large scale. In 1917 the company considered steel ship construction, but certain business arrangements having been made with the Northwest Steel Company, it continued to devote its plant and the ability of its management to the making of the necessary machinery and equipment for vessels produced by the latter company.

In December, 1916, the Albina Engine and Machine Works began the construction of a five-way yard for the building of steel ships on a Norwegian contract. The production of this yard was confined to vessels of about 3800 tons deadweight capacity. It is the only steel yard in the Portland district making vessels of this type. In August, 1917, the plant was commandeered by the Emergency Fleet Corporation. It produced seventeen ships. The plant is now being dismantled.

The two largest steel plants in Portland, the Northwest Steel Company and the Columbia River Shipbuilding Corporation are located side-by-side. Both plants are engaged solely in the construction of steel ships.

The Columbia River Shipbuilding Corporation was established in February of 1917 with complete equipment for building and outfitting the ships after launching, and up to October 1, 1919, had launched twenty-nine vessels.

Pioneer among the steel yards was the Northwest Steel Company. Originally it was a structural steel plant, but in the spring of 1916 it was determined to convert the plant into one for the building of steel ships. The first contracts signed were for vessels to be built for Norwegian interests. In March of 1917 the War Baron was launched. It was never delivered to the Norwegian company, the United States government taking over the vessel. Later the War Baron was sunk by a mine in the English Channel.

Since the launching of the War Baron there have slipped from the ways of the Northwest Steel Company into the Willamette, a total of thirty-six ships.

Entering the steel ship construction program late in the campaign, the G. M. Standifer Construction Company has launched six steel ships. The plant is without doubt one of the best equipped in the United States.

ANNOUNCEMENT

Lieutenant Ellery W. Stone, recently released from the United States Naval service, has been appointed San Francisco manager for the Kilbourne & Clark Manufacturing Company of Seattle, specializing in marine wireless outfits. Ellery W. Stone was graduated from the University of California and for a number of years was Wireless Inspector in San Francisco for the Federal government. In April, 1917, he joined the service and was given the rank of lieutenant in the radio department of the Navy. He has compiled an excellent textbook on the Elements of Radio Telegraphy, which has just been published by the D. Van Nostrand Company.

Lieutenant Stone both by training and experience, is well qualified for this position and Kilbourne & Clark are fortunate in securing so competent a manager.

An 8800-ton Freighter

Portland's Port Facilities, Municipal and Private

WITH the construction and near completion of the Panama Canal began the movement among the principal north Pacific Coast ports to enlarge and modernize their port facilities. The construction and near completion of the Panama Canal, undoubtedly, was the direct and controlling factor to the general movement which at that time engaged the serious attention of practically all port authorities and port communities of the various harbors of the Pacific Coast of the United States and British Columbia. The concensus of opinion then seemed to be that preparations must be quickly made to enlarge and modernize port facilities to care for the increased ocean commerce expected on account of the opening of the Canal, and the increased traffic due to the rapid development and expansion of the great territory tributary to these ports.

As this movement grew and crystallized, it soon became evident that private capital could not be expected or depended upon to undertake this work, for, the more the subject was discussed, the greater grew the plans for reconstruction. Each port was ambitious to get into the field and measure well up to the "other fellow" in port development, and these ambitions were soon resolved into community—that is to say, municipal—undertakings. This was a happy solution, for in no other way could this important and absolutely essential development have been accomplished. This result was greatly aided by the slogan, "Get ready for the Panama Canal." It may have been a little overworked in places, but it did the trick from San Diego to Victoria and Vancouver, and, as is now apparent, undoubtedly saved the situation, for with the large port construction program which was first undertaken and has been practically continuous since 1912 at all the ports referred to, there still exists a shortage of dock space and these ports are still feverishly engaged in enlarging their port facilities. With the growing and rapidly increasing waterborne commerce of the Pacific, there does not appear much likelihood that there will be any let-up in port expenditures for some years to come.

Portland, realizing the vital importance of having its harbor and port facilities brought up to the highest standard, and, in keeping with the policy of other major ports of this coast, as early as 1910 began to give careful and comprehensive consideration to the question of providing municipally-owned and operated terminals for this port, and in the latter part of that year, a department of public docks was created, and the issuance of $2,500,000 dock bonds authorized for the purpose of constructing municipal water terminals.

Water Terminals Owned and Operated by the City of Portland

Actual construction of commercial docks by the municipality was not undertaken until 1913, when the necessary waterfrontage for two terminals, located in the upper harbor, was acquired. With funds from the $2,500,000 bond issue, there were constructed the following general cargo terminals:

Fifteenth Street Municipal Terminal:

(a) A quay dock 955 feet in length, 300 feet of which has two levels. This dock is covered with a transit shed 935 feet in length and 100 feet in width.

(b) A slip, at the north end of the quay dock, 120 feet in width and 484 feet in length, with an open pier, the full length of the slip, 60 feet in width.

(c) A warehouse, in the rear of the quay dock, 190 feet by 200 feet.

(d) A warehouse, along the open pier, 176 feet by 330 feet.

This complete installation furnishes a very compact terminal, adequately served by rail facilities, accommodating at one time, seventy 40-foot cars and a frontage affording berthing space for one 500-foot and two 450-foot vessels.

The mechanical equipment at this terminal consists of one 20-ton locomotive crane, electric dock winches, trucks and conveyors, cargo hoists and freight elevator.

East Washington Street Municipal Terminal:

A two-level quay dock, 526 feet in length, covered with a transit shed 100 feet in width the full length of the dock. The trackage of the dock has placement for twenty 40-foot cars. This dock is provided with cargo hoists, electric freight piling machines and elevators.

The structures at these terminals are protected with automatic sprinkler systems, giving a very low insurance rate.

Pittsburg Street Municipal Terminal:

A quay dock, 540 feet in length, covered with a transit shed 100 feet by 440 feet, leaving a space of 100 feet by 120 feet for open storage. The tracks have accommodation for twenty-seven cars. This dock came under the control of the commission when the former city of St. Johns was annexed to Portland. It has been greatly improved and provided with trackage facilities by the commission.

These three terminals have a combined berthing space for vessels of 2550 lineal feet, with storage

under shed of 367,400 square feet, capable of handling at one time 34,000 tons of general cargo.

As a result of an extensive investigation and survey by the Commission of Public Docks in 1917 and 1918, of the necessity of providing elevator facilities at this port for the handling and storage of grain produced in the port's tributary territory and shipped in bulk to tidewater at Portland and from there exported in bulk by vessels, the commission obtained from the voters of the city authority to issue and sell elevator bonds in an amount not exceeding $3,000,000 to provide such facilities. Immediately after the passage of this bond measure, the commission proceeded to obtain as a site for the construction of the grain elevator, piers and other facilities required for the efficient handling of grain and for a trans-shipping terminal, a tract of land in the lower harbor containing 153 acres, with a harbor frontage of 2500 feet. This terminal was designated as the "St. Johns Municipal Terminal."

The St. Johns municipal terminal will be one of the most modern joint rail-and-water terminals in the country, where freight can be handled and interchanged between rail and water carriers with economy and dispatch, equipped with modern mechanical freight-handling machinery, with trackage facilities which will permit of all necessary switching operations of freight cars to be performed on the premises, with surplus trackage for car storage.

When fully completed, it will have space for the berthing at one time of fourteen 500-foot-long vessels and a trackage serving the piers and elevator of thirteen miles. The trackage now constructed for the elevator and piers 1 and 2 is close to seven miles.

In acquiring this extensive site for the St. Johns municipal terminal, the commission had in mind the desirability of being able to furnish cheap and convenient locations for such industries as more particularly required the combination of rail and water transportation. There are about fifty acres available for this purpose. The location of this terminal is in the widest part of the harbor, the channel being 1600 feet in front of the site. Both the channel and the slips are dredged to thirty feet at extreme low water.

St. Johns Municipal Terminal:

Pier and slip construction is employed for the entire terminal and the improvements completed or now nearing completion are:

1. Pier No. 1—1500 feet long, covered with a transit shed 180 feet in width for the full length of the pier.
2. Pier No. 2—1500 feet long and 225 feet wide, to be temporarily used as an open pier for the storage and handling of lumber, steel and other bulk commodities.

The slip serving piers 1 and 2 is 280 feet wide.

Pier No. 1 has a storage capacity for 35,000 tons of general cargo or 56,000 tons of grain and flour at one time. This pier is provided with automatic sprinkler system.

Pier No. 2, if used for lumber alone, has a storage capacity in excess of 10,000,000 feet B. M.

The mechanical equipment now provided for piers 1 and 2 consists of one 15-ton and one 40-ton locomotive crane, cargo masts, electric trucks, tractors and crane, electric elevators and conveyors.

3. A fire-proof elevator for handling grain in bulk, having a capacity of 1,000,000 bushels; but the operating house of the elevator has been designed with the view of handling grain from a 1,000,000 bushel extension to the elevator.
4. An initial installation of six steel tanks, with pipe lines, compressed air and heating pipes, pumps, bulking tables, etc., for the handling and storage of vegetable oils and molasses in bulk or in cases. In connection with the oil and molasses business there are being constructed three large barges or lighters, provided with tanks for the bulking and storage of these commodities.

For the purpose of providing facilities in addition to those outlined above, and a large working surplus for probable future demands on the port, the voters of the city of Portland, in November, 1918, authorized an additional bond issue of $5,000,000 harbor development bonds, making a total appropriation of $10,500,000 for port development. Of this amount about $5,000,000 already has been expended, leaving a large available balance for future improvements.

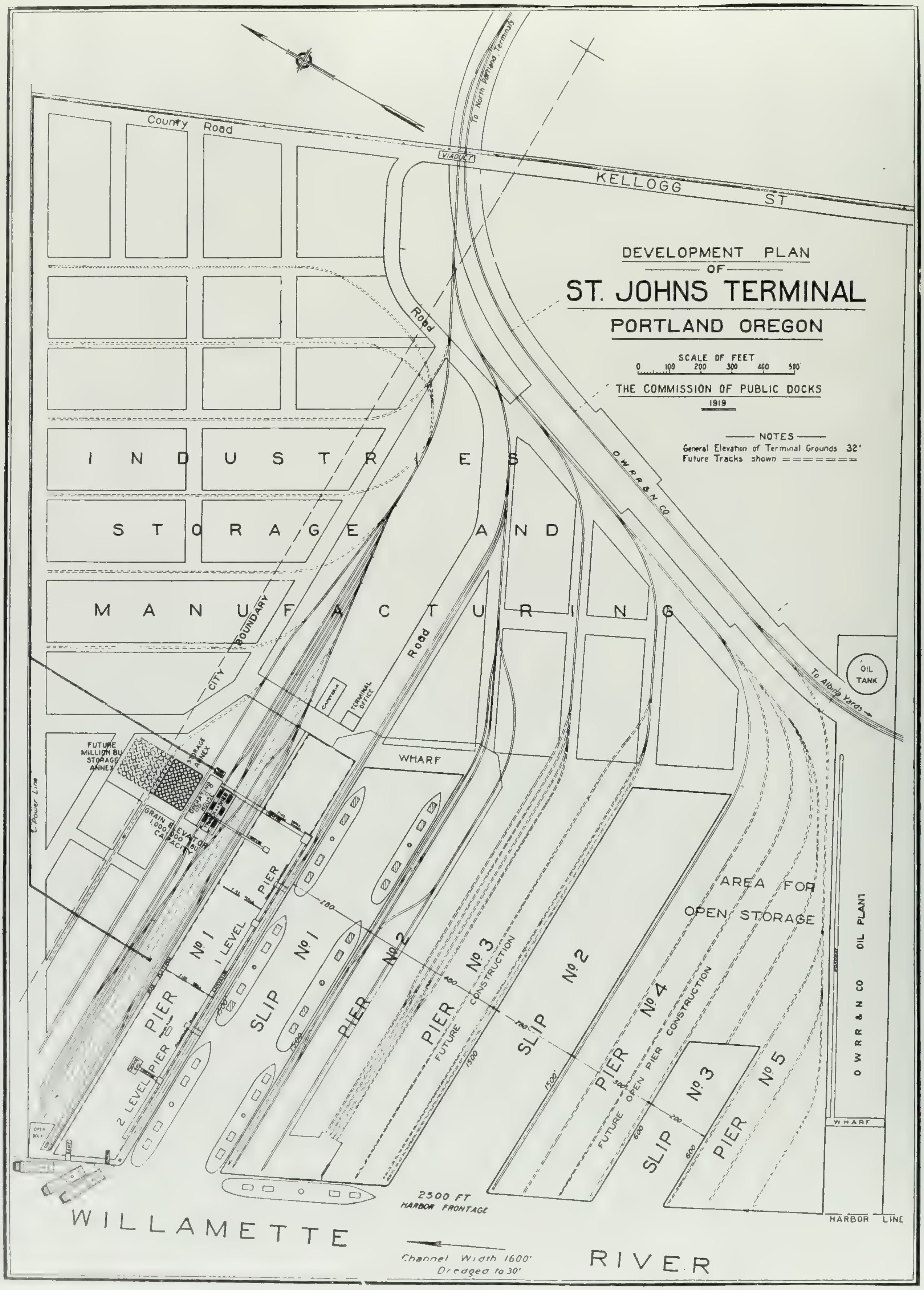
The commission has authorized the construction of a 12,000-ton floating dry dock, and plans for same are now being prepared.

Slip No. 2 at the St. Johns municipal terminal, serving piers 3 and 4, is now being excavated to permit of the early construction of pier No. 3, 1500 feet long and 225 feet wide.

Other port improvements which are under consideration and have tentatively been approved by the commission, include floating repair plant, floating coaling plant, increased mechanical freight-handling equipment for all the public terminals, warehouses, cold storage, etc.

Port Facilities Owned and Operated by the Port of Portland

The Port of Portland operates a sectional floating dry dock, near the St. Johns municipal terminal. It has a capacity for lifting a vessel weighing 10,000 tons; its length is 468 feet, inside width 82 feet and depth over keel blocks of 25 feet. An ad-


DEVELOPMENT PLAN
OF
ST. JOHNS TERMINAL
PORTLAND OREGON
SCALE OF FEET
0 100 200 300 400 500'
THE COMMISSION OF PUBLIC DOCKS
1919
NOTES
General Elevation of Terminal Grounds 32'
Future Tracks shown
County Road
VIADUCT
KELLOGG ST
To North Portland Terminals
Road
INDUSTRIES
STORAGE AND
MANUFACTURING
CITY BOUNDARY
O W R R & N CO
To Albina Yards
OIL TANK
CAFETERIA
TERMINAL OFFICE
WHARF
FUTURE MILLION BU STORAGE ANNEX
STORAGE ANNEX
OPERATING HOUSE
GRAIN ELEVATOR 1,000,000 BU CAPACITY
Power Line
PIER No 1
1 LEVEL PIER
2 LEVEL PIER
SLIP No 1
PIER No 2
PIER No 3
FUTURE CONSTRUCTION
SLIP No 2
PIER No 4
FUTURE OPEN PIER CONSTRUCTION
SLIP No 3
PIER No 5
AREA FOR OPEN STORAGE
O W R R & N CO OIL PLANT
WHARF
280
400
280
1500
1500
1500'
300
600
200
600
2500 FT HARBOR FRONTAGE
HARBOR LINE
WILLAMETTE RIVER
Channel Width 1600'
Dredged to 30'

ditional pontoon is to be added to it, making it possible to dock vessels 600 feet long, or two shorter vessels.

This public body has also provided a coal dock with a storage capacity of 5000 tons.

In addition to the fixed vessel fueling facilities of the port, there are a large number of barges and lighters which are frequently used for coaling vessels when at berth discharging and taking on cargo, and fuel oil barges are available for similar service.

Privately-Owned and Operated Waterfront Facilities

Having described, in considerable detail, the publicly owned and operated water terminals of the port, as being of more recent and, therefore, of more modern construction, mention is here made of similar facilities provided by private interests, exclusive of docks used wholly for industrial, shipbuilding and ship-outfitting purposes. They are:

(a) The large saw mill establishments located in the harbor which are well supplied with facilities for the shipment of lumber by water. There are eight large lumber docks, varying from 450 to 1012 feet in length, their total berthing space being 4742 lineal feet. Each dock has rail connection with the railroads serving the port, both in the yards and along the mills.

(b) Four fuel oil docks, each about 400 feet in length, with a combined crude oil storage of 422,913 barrels and refined oil of 156,259 barrels: Standard Oil Company, Union Oil Company of California, Associated Oil Company and Shell Company.

(c) A modern gravity discharge, ship-loading plant, with capacity of 300 tons an hour, loading from 5000-ton storage bunkers, with reserve ground storage of 10,000 tons. This plant is owned and operated by the Pacific Coast Coal Company.

(d) Grain being one of the principal commodities handled through the port, rather extensive facilities have been provided for its efficient accommodation. The nine grain docks of the port are:

Portland Flour Mills Company	560 feet long
Pacific Coast Elevator Company	560 feet long
Albina Dock	775 feet long
Montgomery Dock No. 2	550 feet long
Crown Mills Dock	300 feet long
Irving Dock	400 feet long
Mersey Dock	325 feet long
Globe Milling & Elevator Dock	380 feet long
Spokane, Portland & Seattle Railway Dock (one-half of the dock)	500 feet long

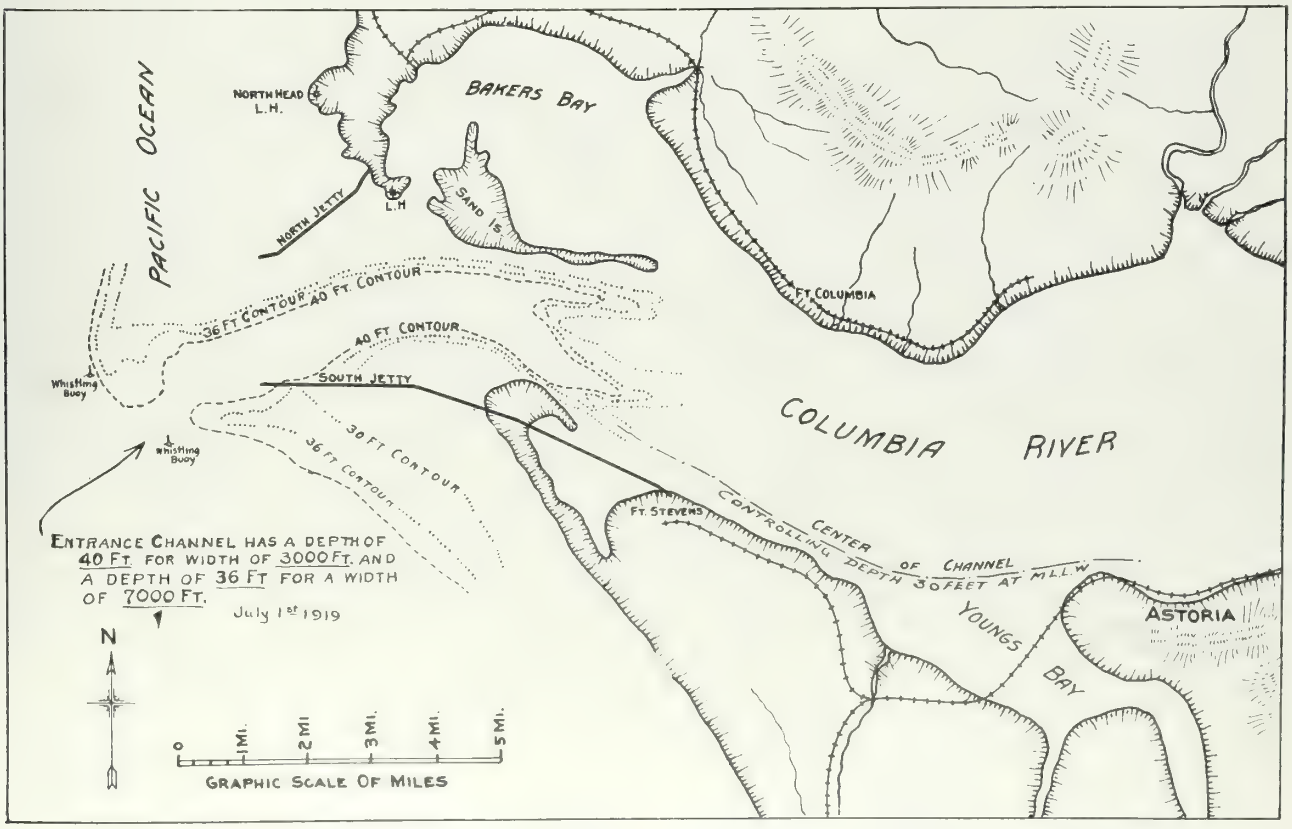
These docks are provided with cleaning facilities and electric conveyors for delivering sacked grain to vessels. They handle only sacked grain, but have some bin capacity for grain in process of cleaning. These docks have a total storage space for sacked grain of 159,000 tons at one time.

(e) A grain elevator of 280,000 bushels capacity. The flour mills of the port have, in addition, bulk storage capacity for about 750,000 bushels, and these mills have a daily output of 7750 barrels of flour.

(f) For the handling of general cargo there are seven docks, which have a total capacity at one time of 50,500 tons of cargo. They are:

Oregon-Washington Dock (Union Pacific)	560 feet long
Spokane, Portland & Seattle Railway Dock (one-half of the dock)	500 feet long
Columbia Dock No. 1	355 feet long
Albers Docks Nos. 2 and 3	460 feet long
Albers Dock No. 1	305 feet long
Ainsworth Dock (Union Pacific)	1000 feet long
Couch Street Dock	260 feet long

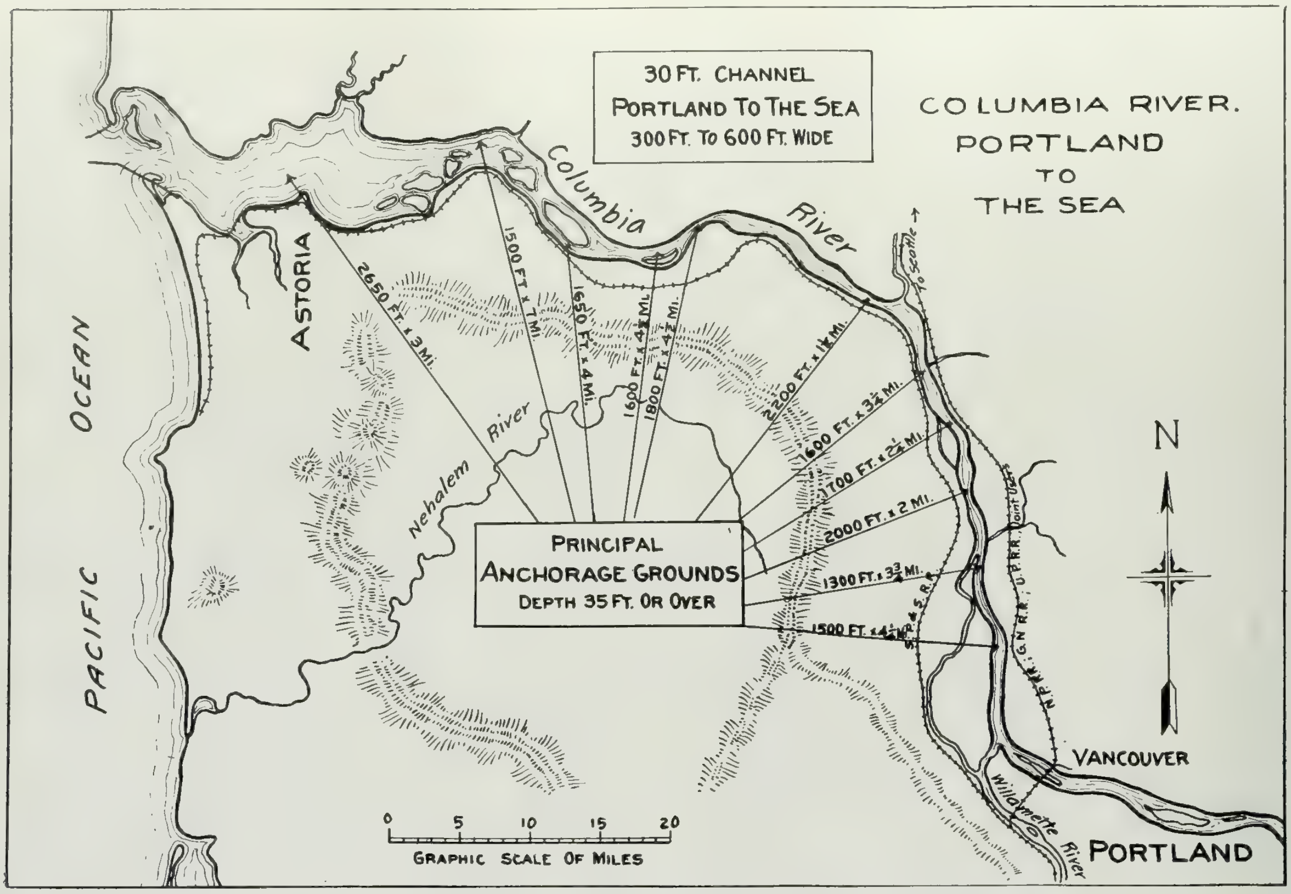
(g) Seven river steamer docks, with a total berthing space of 1610 lineal feet, and general cargo capacity of 14,500 tons.



ENTRANCE CHANNEL HAS A DEPTH OF 40 FT. FOR WIDTH OF 3000 FT. AND A DEPTH OF 36 FT FOR A WIDTH OF 7000 FT.

July 1st 1919

Outline Map showing the improvements at the Mouth of the Columbia River



The Columbia River from Portland to the Sea, showing Anchorage Grounds to the depth of over 35 feet

Portland's Water Highway to the Sea

By Wm. H. Crawford

PORTLAND, Oregon, is located, like Philadelphia, at the junction of two rivers, about one hundred miles from the ocean. The rivers at Portland are the Columbia and the Willamette; at Philadelphia, the Delaware and the Schuylkill. No question is ever raised about the lack of port and harbor facilities at Philadelphia and certainly no question should ever be raised about the situation at Portland, Oregon, because all the natural advantages are in favor of Portland. Considerable work has been necessary, of course, at the mouth of the Columbia River and in the river from Astoria to the junction of the Willamette at the fresh water harbor of Portland, but this work is much less than that necessary to keep Philadelphia on the nautical map.

There are many other world-famous ports that are far worse off than Philadelphia, but their success is never questioned because of the immense ocean traffic moving to and from those ports. The mere fact that they are so extensively used carries with it the implication of success. With Portland the water-borne traffic has not yet assumed very great proportions, and a false conclusion is sometimes reached that this is because of poor river and harbor conditions.

The real facts, however, are quite the contrary. Conditions in the Columbia and Willamette Rivers have, during recent years, been made ready for shipping and the port now awaits the coming of world commerce. The reason that commerce is not moving in and out of the Columbia River in larger measure is purely commercial and is based on peculiar trade conditions.

In the first place, the Pacific Northwest is a comparatively new country. Also, Pacific Ocean commerce is in its infancy, and the Columbia River gateway route, which will be the economical route of the future, has had but a minor part of a small total volume of trade, because the improvements of this port were the last to be completed.

Furthermore, when commercial routes have once been established, it is difficult to change the cycle of business. Ships could not afford to wait for cargoes and cargoes could not afford to wait for ships. Therefore, the cargoes that would have found a natural outlet through the Columbia River gateway have, to a great extent, been going north and south to the ports where the ships have been available.

But the Columbia River gateway is now at that stage in its development where the cycle is changing. An ever increasing tonnage, consisting of the natural products of this district, such as lumber, wheat, wool, etc., in raw state and wholly or partially manufactured, is accumulating at Portland in the shape of cargoes that are very attractive to shipping.

Of late, the natural water grade rail routes through the Columbia River gorge to the east are developing more and more through traffic to and from the Orient, which must be transferred from rail to water at convenient points on the Columbia River. Local business interests are now looking more to the sea and are not content with the former inland viewpoint; and the country at large is learning the truth about the Columbia River gateway route.

Three charts accompany this article—the first showing the present entrance to the Columbia River, where permanent improvements have just recently been completed, consisting of north and south jetties, which entirely eliminate the bar formation, giving a controlling depth of forty-two feet at mean low water with a clear channel three thousand feet wide for a depth of forty feet.

The thirty-six foot contour line at the river mouth shows a channel width of seven thousand feet. The main channel depth at average tide is forty-seven and one-half feet.

It may be interesting at this point to call attention to the fog situation at the Columbia River entrance. Fog, as an interference to navigation, is a most important consideration. Fog causes delay and increased operating expenses and causes a high percentage of marine disasters. According to the records kept by the United States Lighthouse Inspection Service at each of the United States light vessels off the main harbor entrances, as well as at inland points, the Columbia River gateway is shown to have less than half as much fog that interferes with navigation as the ports north and south of the Columbia River. This matter may be hard to explain, but the comparative record stands over a ten-year period showing a remarkably low average of fog hours a year for the Columbia river gateway.

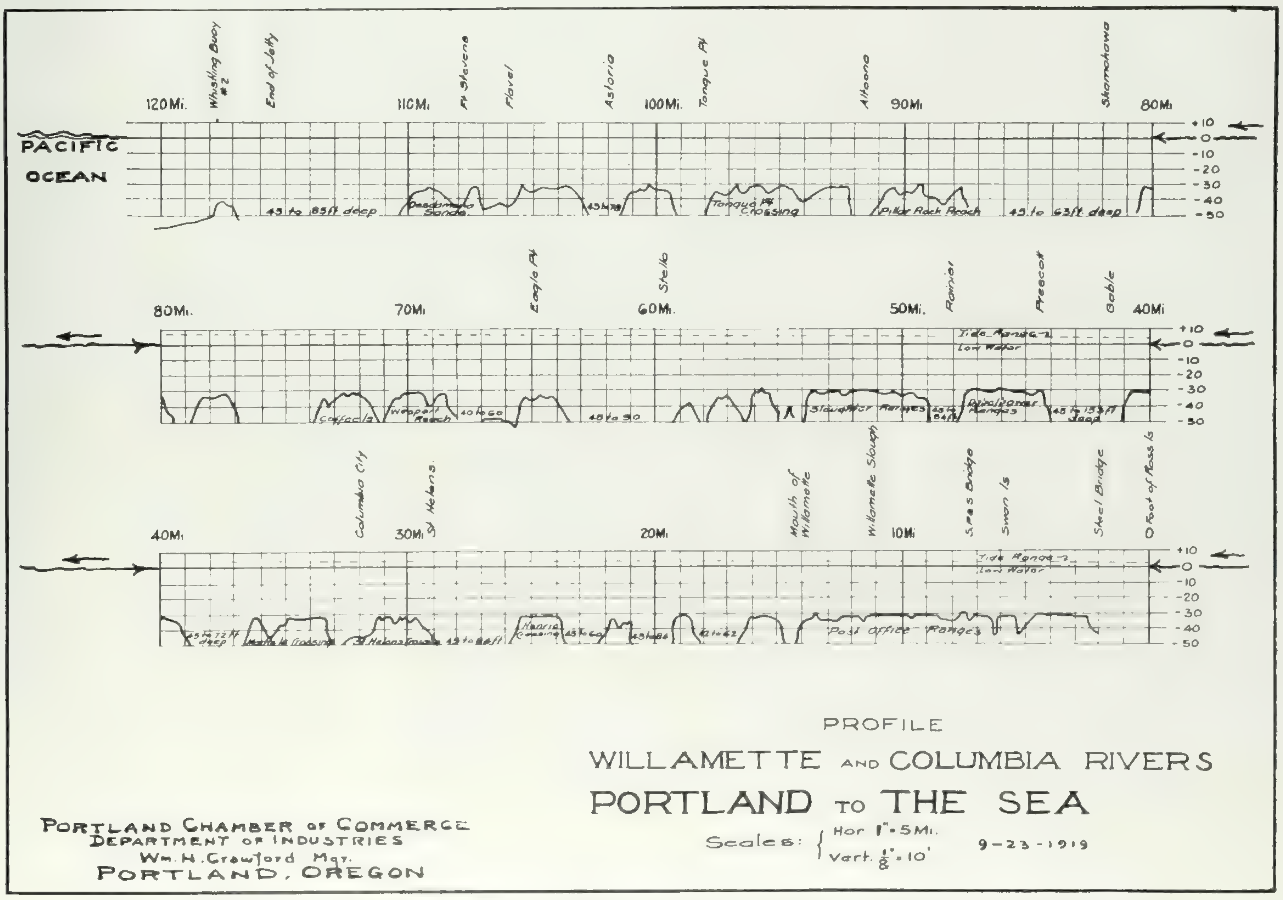
The second chart shows the rivers from Portland to the sea with a thirty-foot channel the entire distance, ranging in width from three hundred to six hundred feet. This is by no means a fair indication of the size of the river because at many points the depth and width are far greater than prevailing in the main channel. These bigger areas are sometimes referred to as anchorage grounds.

The second chart shows a few of these anchorage grounds where the depth is over thirty-five feet. The approximate width and length of these open spaces are properly indicated, and from this a much better conception of the size of the river can be acquired.

It may also be interesting to note that engineers have computed the water power possibilities in the Columbia River drainage basin to be something like twenty million horsepower, or one-third the total for the United States.

The distance from the mountain divides, to the mouth of the Columbia, is not nearly as great as the distance in the other direction to the Gulf of Mexico, so that some of the power possibilities in the Columbia River drainage basin are due to high head rather than large volume of water, but the fact remains that the discharge from the Columbia River is of immense proportions and far larger than generally believed.

The third chart is a profile of the Willamette and Columbia Rivers from Portland to the sea. This shows in very graphic form the relatively small amount of dredging that it is necessary to do to maintain a thirty-foot channel, or deeper if traffic demands and river use makes this necessary. It is largely a question of skimming off the top of a few ridges that form in the river from time to time as against the continuous digging operation that is necessary in some river channels of the greatest ports in the world.



Profile of the Willamette and Columbia Rivers from Portland to the Sea showing the ridges on the bottom of the rivers

Pacific Marine Review
The National Magazine of Shipping

576 Sacramento Street
SAN FRANCISCO, CALIFORNIA U. S. A.

Official Organ of the Pacific American Steamship Association

Subscription Price, per year (Domestic) $3.00
(Foreign) $3 50
Single Copies . . . . 25 cts

J. S. HINES . . . . Publisher
B. N. DeROCHIE . . . . . . Business Manager
A. J. DICKIE . . . . Editor
ANDREW FARRELL . . . . . . Associate Editor
J. G. BRAY . . . . Pacific Coast Adv. Mgr.

NEW YORK OFFICE
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M. B. STEWART, Manager

SEATTLE OFFICE
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PORTLAND OFFICE
1029 Northwestern Bank Building
F. E. SHORT, Manager

Pacific Marine Review is sold at all leading News Stands
Entered as second class mail matter at Postoffice
San Francisco, California

Published on the First of Each Month. Copyright
1919 in the United States by J. S. HINES

INDUSTRIAL UNREST

FOR the last few days the minds of the people of the United States have been very largely directed to a great industrial conference which is being held at Washington. At this conference, the representatives of capital and labor are considering the problems affecting their relationship one to the other, and are seeking to find some common basis for the future settlement of disputes arising from differences of opinion regarding that relationship.

In thinking over the relation of labor to industry, certain considerations have occurred to the writer which seem to have a vital bearing on the subject.

It can be shown conclusively and is admitted by every one who really puts any thought into the matter, that the average compensation of labor considered over any appreciable period in industrial history is dependent absolutely upon the marketable value of the products of labor. All labor leaders recognize this fact, and the only difference fundamentally between the attitude of labor and capital toward production is the difference of opinion as to what constitutes labor's proportionate share of the value of its products. Labor in many instances maintains the doctrine that the total value should belong to labor. Why cannot capital and labor subscribe to the doctrine that labor owns all the value in any article which is put into that article by labor, and that both labor and capital should combine to work out some form of organization which would secure to labor that total value?

In the present economic system, labor is being compensated not on any basis of production, but almost entirely on a time basis, and the great effort of organized labor is to increase the compensation per unit of time per individual. Under this system, we would naturally expect to find and do find several very gross abuses which have become almost fundamental in organized labor. Among these abuses can be mentioned what is known on the other side of the water as the "Ca' Canny" principle, by which the individual production per unit of time is limited so as to necessitate the employment of as many individuals for as many units of time as possible. Another abuse is the gradual elimination of any adequate apprenticeship system because there is practically no standard of proficiency or efficiency required for entrance to the unions representing any of the skilled trades. Another abuse indirectly growing out of this system is the "walking delegate," so-called, who is continually at work among employes directing their minds toward antagonistic organization when those minds should be directed toward production.

Keeping these conditions in mind, let us subjectively consider what might be possible under the following method of organization and cooperation between capital, management and labor:

For every manufactured article and for every product of the combination of industry and capital, there is a certain well defined labor value; there is a certain well defined profit or interest due to invested capital and there are certain not so well defined expenses incident to organization, management, depreciation of plant, etc., usually combined under the name of overhead expense. Let organized labor incorporate and determine and contract for the labor values of all industrial production. Let organized labor then determine its individual compensation per unit of time. Let organized labor determine and enforce all conditions under which its individuals shall work. Let organized labor be responsible only for the satisfactory delivery of the labor value in each industrial product for the contract price and in the specified time.

With such a system working, we would then see disappear immediately any symptoms of the "Ca Canny" idea, for each member of organized labor would know to a certainty that the greater his production the greater the benefits to himself in the way of compensation.

We would also under such a system very soon see a high standard of both proficiency and efficiency demanded as a criterion for entrance into any labor organization. We would likewise see that the "walking delegate," instead of being a political or industrial agitator, would of necessity be an efficiency production expert. Both labor and capital would be able to suggest, in such a system, methods whereby a great deal of the present overhead expense could be eliminated. This elimination would result either in higher compensation to labor itself, or indirectly effect the same result by a reduction in the cost of living.

There is no claim for originality in this suggestion; it has been successfully carried out in several different establishments; but in order that it may have any very universal application and in order that it may be of the greatest benefit to labor itself, in order, in short, that labor may be able to achieve its great ambition of receiving as compensation for its efforts the entire value accruing from those efforts, it will be necessary for organized labor itself to bring about in the industrial world the inauguration of some system such as that outlined above.

NAVIGATION LAWS REVISION COMMITTEE

WHETHER or not justifiable, there have for many years been criticisms of the navigation laws, including the steamboat inspection laws of the United States; many persons have claimed that the belated development of our merchant marine was due largely to antiquated requirements of the Federal government concerning the construction and operation of our merchant vessels. The Shipping Act of 1916 requires the Shipping Board to "examine the navigation laws of the United States and the rules and regulations thereunder, and make such recommendations to the Congress as it deems proper for the amendment, improvement and revision of such laws, and for the development of the American merchant marine." To aid the board in making these recommendations it recently passed a resolution authorizing a committee, composed of some of the leading men interested in shipbuilding, managing and operating merchant vessels in this country, to investigate the subject thoroughly and make a report to the board of such improvements or revisions as they deem advisable at this time. The board is composed of Mr. P. A. S. Franklin, president of the International Merchant Marine; Mr. Homer L. Ferguson, president of the Newport News Shipbuilding Company; Mr. Andrew Furuseth, president of the Seamen's Union; Mr. J. Parker Kirlin, an admiralty lawyer; Mr. Alfred G. Smith, president of the Ward Line; Mr. William S. Brown, president of the Marine Engineers' Association of America; Mr. Eugene E. O'Donnell, a Boston steamship manager; Mr. David T. Warden, manager of the Standard Oil fleet; Captain Pruett of the Masters, Mates and Pilots' Association; Mr. Darragh de Lancey, of the United States Shipping Board, and Mr. H. F. Alexander, president of the Pacific Steamship Company.

The board met at No. 11 Broadway and organized by electing Mr. P. A. S. Franklin its chairman, and Captain C. A. McAllister of the American Bureau of Shipping as secretary. It was determined to go into the matter very thoroughly and to hear from all persons interested in the subject. The secretary will have an office at Room 425, Custom House, New York, and will receive all communications relating to suggested changes. Criticisms or complaints of any particular statute or regulation should always be accompanied by a suggested remedy or betterment, as the committee hopes to make its report of a constructive, rather than captious, nature, the object being to bring to the attention of the Shipping Board only such recommendations as will be helpful in the rehabilitation of our American merchant marine. The board will meet at the Custom House as frequently as possible and carefully consider all suggested amendments, improvements and revisions, as contemplated by the law.

NEGLECT OF FOREIGN TRADE

COMPLAINTS are being received by those in close touch with overseas trade of a lack of interest on the part of American manufacturers in maintaining their present hold on foreign markets. The truth is that as almost every branch of industry is at the moment faced with a home market and an overseas market bare of stock and equally clamorous for supplies, it becomes exceedingly difficult to meet all demands. But it is contended that in too many cases manufacturers are filling up their books with orders on home account for many months ahead, leaving no surplus for export.

The National Foreign Trade Council is strongly of the opinion that manufacturers are not showing the interest they should in the export trade. What are the reasons? They may be summed up in the statement that the home trade is lucrative and manufacturers can get cash at once. The temptation, therefore, is very strong to say to the foreign buyer: "We are too full of home orders to trouble about you; come to us next year." But the foreign buyer will not wait. He will place his order in England, Japan or Germany. The shortsightedness of such a policy is evident when it is remembered that it is very difficult to recapture an overseas market once it has been lost. It cannot be too strongly emphasized that in a neutral market the buyer does not greatly care whether his goods be British, American, Japanese, or even German. If he becomes accustomed to non-American goods he will not readily change his source of supply in the future.

We do not think that the American manufacturer would readily give up his overseas connections, but it is true that many manufacturers find themselves in a serious dilemma. They must refuse to meet the demands either of some of their domestic trade or of all their foreign trade. We believe that the importance of export trade is, from a national point of view, so overwhelming that the manufacturer would be serving the interests of his country, as well as his own, if he could so arrange his order book that overseas demands should secure a fair share. The heads of our great business concerns should seriously consider the question as one of policy, and we have no doubt that the claims of overseas markets will not be disregarded. Our keenest competitors, England and Japan—to be followed sooner or later by Germany—are sparing no efforts to establish themselves firmly in overseas markets. Unless the American manufacturer is equally energetic he may find himself in the future bitterly regretting the fact that he did not add other strings to his bow in the shape of good overseas connections.

PRODUCTION AS A THERAPEUTIC AGENT

FALSE remedies will not do, in Mr. Hoover's opinion. "Every economic patent medicine," he says, "has flocked to the banner of socialism and communism, which claim alone to bespeak human sympathy and alone to present remedies. Extremists are loud in assertion that production can be maintained by the impulse of altruism alone, instead of self interest. Every country is engaged in political experimentation with varying degrees of these hypotheses, and so far every trial has reduced production."

The conclusion of this memorandum is forceful: "No economic policy will bring food to stomachs or fuel to hearths that does not secure the maximum production. There is no use of tears over rising prices; they are, to a great extent, a visualization of insufficient production."

The British Ministry of Food considered this memorandum of such interest that it published the complete text. Some laymen in England, however, refuse to take at face value so much seriousness in one moment.—The Nation's Business for October.

UNITED STATES COUNCIL OF NATIONAL DEFENSE, WASHINGTON

THE United States Council of National Defense, composed of the Secretaries of War, Navy, Interior, Agriculture, Commerce and Labor, has made a careful investigation of the high-cost-of-living problem, and finds:

That the nation's productive powers have not been fully utilized since the armistice.

That too few goods, notably the necessities of life, have been produced, and that even some of these goods have been withheld from the market, and therefore from the people.

That the high cost of living is due in part to unavoidable war waste and increase of money and credit.

That there has been and is considerable profiteering, intentional and unintentional.

The council believes that the remedies for the situation are:

To produce more goods, and to produce them in proportion to the needs of the people.

To stamp out profiteering and stop unnecessary hoarding.

To enforce vigorously the present laws and promptly to enact such further laws as are necessary to prevent and punish profiteering and needless hoarding.

To bring about better co-operation and method in distributing and marketing goods.

To keep both producer and consumer fully informed as to what goods are needed and as to what supplies are available, so that production may anticipate the country's demands.

Goods and not money are the means of life. Better standards of living are impossible without producing more goods. Man cannot consume what has not been produced.

At the war's end our Allies had desperate need of the essentials of life. We have had to share our resources with them, but this drain will gradually lessen. In so far as our shortage of goods is due to this cause we can well afford to be patient.

It is just as essential that we have patience with the economic situation here at home. The process of production requires time. If production is rapidly increased, vastly improved conditions will prevail in America when the results of present and future labor begin to appear.

Team work is imperative. It is just as essential between retailer, wholesaler and producer as it is between employer and employee.

JAPANESE MAIL SERVICE

AMERICAN and British companies doing business in and with Japan doubtless have learned, through bitter experience, how thoroughly unsatisfactory communications are, both cable and mail; those that newly have embarked upon the Japanese trade, or are about to enter it, will be interested in learning with what they will have to contend.

It probably is unnecessary to dwell in detail upon the cable. The American newspapers have had much to say regarding it. Let it suffice to state that cablegrams are delayed very badly and that mistakes in transmission often render the messages altogether unintelligible.

Less attention has been paid to mail communication. A few specific instances will be found highly illuminating.

A letter was postmarked at the United States postoffice, Shanghai, June 9. It was postmarked in Yokohama July 20; forwarded to Tokyo and postmarked July 22; delivered the morning of July 24—one month and fifteen days. A week would have been ample.

Another letter was postmarked at Manila June 17; received at Yokohama July 20; forwarded to Tokyo and received July 22; delivered the morning of July 24. It was stamped, "Passed by censor 1814," which would be grotesque if it were not annoying.

The following instances relate to letters mailed at San Francisco:

Postmarked San Francisco, June 11; Tokyo, July 17; delivered the morning of July 18. At least two steamers, judging from the sailing schedules, might have brought this letter, but did not, saving about two weeks.

Postmarked San Francisco, June 27; Tokyo, July 21; delivered the morning of July 24. Three days in the Tokyo postoffice.

Postmarked San Francisco, July 7; postmarked at Tokyo, July 22, and again July 27, indicating that it lay in the Tokyo postoffice five days; delivered July 28.

Postmarked San Francisco, July 2; postmarked at Tokyo, July 22, and again July 28, a delay of six days in the Tokyo postoffice; delivered July 28.

These instances are as nothing, however, to some cited by Dr. Clay MacCaulay in a letter to the newspapers, which deal with Japan service proper. On August 3, 1918, he posted a letter, containing a "good-sized" check, at Karuizawa, Japan, addressed to the Yokohama Specie Bank, Tokyo. It never was received. After long correspondence he received a duplicate check from the States, July 4, 1919, which he mailed, July 5, special delivery, in Tokyo, addressed to the bank, which was about a mile from the postoffice at which the letter was mailed. This check had not been received July 25. A letter, dated in America, February 25, postmarked in Tokyo, March 26, was delivered late in May, two months after it was received at the Tokyo postoffice. A special delivery letter, in Tokyo, was five weeks in reaching him. Another letter, mailed in Tokyo, addressed to him in Tokyo, went by way of Shanghai!

American companies would do well to take extreme care, to the extent of sending duplicates of all correspondence and of registering letters of any importance whatever.

Portland's Timber Trade

PORTLAND is the center of the greatest commercial timber area in the world.

Comparatively little of this timber has been developed, and when it is developed—as it must be within the life of the present generation—Portland will be the center of operations.

Within the next few years this country, and most of the entire world for that matter, must come to Oregon and Washington for its structural requirements.

When it comes to building wooden ships, docks, wharves, warehouses, freight cars, bridges, trestles, factories, public buildings and any and all kinds of structures where size and strength are factors, Douglas fir is the wood that the world is going to use. And that is to say nothing of its use, and the use of other native woods, in home building, in the arts, and for similar industrial purposes.

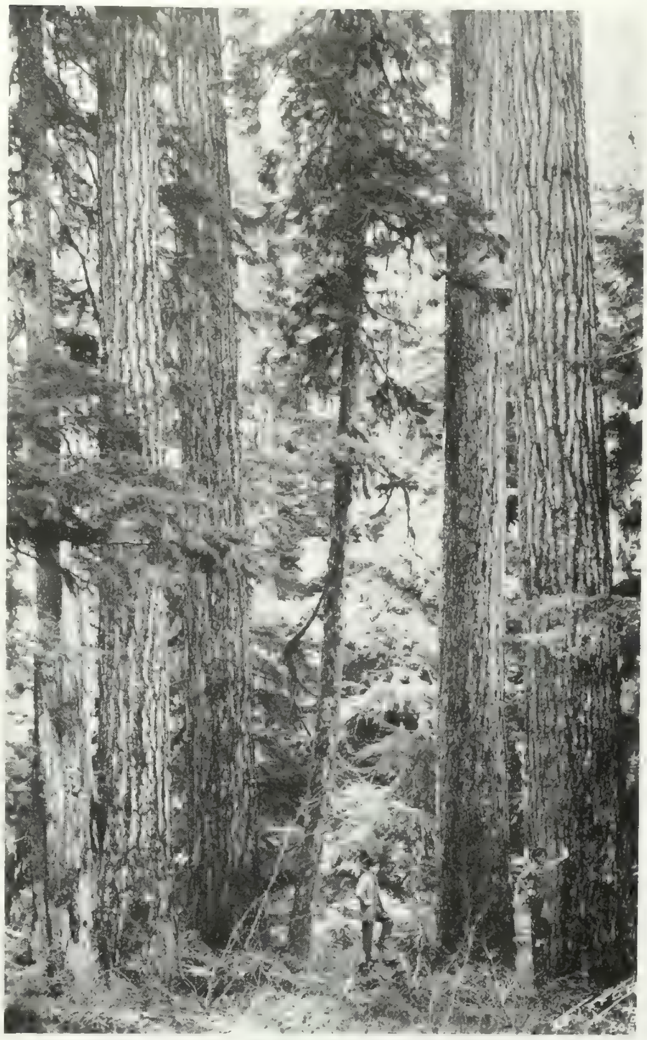
Virtually all the timber in the State of Oregon—estimated to aggregate 540,000,000,000 feet — and approximately 100,000,000,000 feet in the state of Washington is tributary to Portland.

Portland, therefore, is going to be the future financial center and distributing market for 640,000,000,000 feet of lumber. Portland will be the lumber capital of America.

Douglas fir, of course, is the principal stock in trade of the local lumber industry and will continue so as the industry develops. The Government Forest Service estimates that Oregon contains fully 350,000,000,000 feet of fir; probably 65,000,000,000 feet of the timber in Southwestern Washington is fir also. Other important species are Sitka spruce, western hemlock, western red cedar and western pine. The last named species predominates east of the Cascades.

As these timber resources are developed, Portland will develop. While it is not probable that a considerable portion of this timber will be cut by mills within the city itself, virtually all of it will be marketed here. The industry will be financed here. Much of the ever increasing export trade will be handled through this port and other ports on the Columbia River.

As everyone acquainted with the shipping industry knows, Douglas fir long has constituted the bulk of the cargoes moving out of the Northwest across the Pacific. China, Japan and other Oriental countries as well as the Antipodes have taken immense quantities of fir from Oregon and Washington for many years. More recently, immediately before the war, and again since the war, fir has been going to Africa, South America and to the United Kingdom. Now it is finding a market in the Mediterranean countries, in Africa, in Persia, Arabia, and in various other Asiatic countries. In fact, the whole world is its market.



In the Douglas Fir Woods

But the domestic market probably is the more important. Douglas fir, it will be remembered, produced the timbers that built the ships needed to meet the war emergency, and, with Sitka spruce, supplied the supple beams that gave shape and strength to the army airplanes.

Sitka spruce is secondary only to fir in its importance and is coming into increased commercial demand. It is the wood that made the airplane possible. It combines length and strength with light weight and resiliency. It is regarded as superior even to fir in forming the long wing beams of the modern airplane. It has many other commercial uses, such as interior finish, kitchen woodwork, sash, doors, boats and boxes. Most of the sounding boards of modern pianos are of spruce.

Western hemlock grows intermingled with fir and for many commercial purposes is interchangeable with it, but not possessing the strength or size of fir, it cannot be used for the same heavy structural purposes. Its bark is rich in tannin and is extensively employed in the tanning industry.

Everyone has heard of the famous red cedar shingles. This is the country where they are produced. Western red cedar trees, some of which grow to giant stature, are yielding from 5,000,000,000 to 6,000,000,000 shingles every year. Shingle manufacturing is an important branch of the lumber industry. "Rite Grade" shingles are a standard, nationally-advertised product and are marketed in every state of the Union. Next to fir, the red cedar is the largest tree of the Northwest.

Tests made by the United States Forest Laboratories at Madison, Wisconsin, show that fir is the strongest wood, for its weight, in North America. The large timbers that can be cut from these huge trees render it especially useful for shipbuilding

Columbia River Saw Mill and Log Pond —Photo by Gifford Studio

and heavy construction. It is also extremely valuable in the building trades, being used for beams, joists, heavy flooring, siding and for general purposes. One of its principal uses is in railroad construction, such as freight and passenger cars, ties, bridges, warehouse and other buildings.

Owing to its hardness, fir is in heavy demand for flooring, for which purpose it generally is cut vertical-grained. For interior finish it is recognized as one of the most beautiful American woods. On account of the distinct alternating rings of spring and summer wood, it presents, when cut "slash" grained, a most attractive appearance. Douglas fir hardens with age, and when polished is not readily marred or scratched, which quality renders it particularly useful for doors, panels, beams and other interior woodwork. It takes stain well, and can, therefore, be given a variety of finishes. Because of its soft, even texture, fir takes paints, oils, varnish and creosote to a decided advantage. It has been used successfully and extensively as a street paving block, giving most satisfaction in this capacity when creosoted.

The wood is remarkably durable in contact with moisture or when exposed to the elements under trying conditions.

With the development of foreign trade that is accompanying restoration of ocean-going traffic, Douglas fir will be sold in nearly every market of the globe. Before the war export markets absorbed only 9 per cent of the output of the Douglas fir mills. The rest of it was sold locally and in domestic markets.

While the foreign market of the future is going to take a greater proportion of lumber produced in the Northwest, the field right here at home offers equally promising opportunities.

Heretofore, Chicago represented the eastern edge of the territory in which Douglas fir, hemlock and spruce were extensively sold. Less than 2 per cent of the entire output of the Northwest was sold in New York territory. The New York territory and the rest of the Atlantic seaboard bought most of their lumber from the South—southern pine. But the southern pine supply rapidly is being depleted. Douglas fir is taking its place. Douglas fir is popular among lumber dealers and lumber users wherever it is known, and is growing in popularity wherever it is being introduced.

Within five or ten years Douglas fir will be the principal commercial and structural wood marketed and used in the East as it now is in the West and Middle West.

Douglas fir heretofore has gone chiefly to Australia, South Africa, Mexico, the West Coasts of South and Central America, and the Orient. The principal exports of Douglas fir during the war period consisted of airplane stock, cantonment lumber, and other material intended for use in direct war work.

With restoration of normal trading conditions throughout the world, manufacturers of Douglas fir lumber are experiencing a steady and increasing demand for foreign business.

Meanwhile Congress has enacted the Webb law, which is aimed to legalize co-operative effort on the part of American manufacturers in conducting export business. Under the provisions of this law the lumber manufacturers here may engage collectively in extension and exploitation of foreign mar-

Large Douglas Fir Log on the Deck in a Saw Mill Photo by Gifford Studio

Large square timber of Douglas Fir

kets. The administration of the Webb law is under the jurisdiction of the Federal Trade Commission, which has made a special study of the lumbering industry with a view of co-operating in the development of foreign trade.

Under these circumstances lumbermen can engage extensively in foreign trade without the legal restrictions that would prevent them from similar collective efforts in domestic markets.

And the foreign market for American lumber is growing. While production of lumber in the United States generally has slowly declined from the record cut in the calendar year 1907 of 46,000,000,000 board feet to 44,000,000,000 feet in 1913, 40,000,000,000 feet in 1914 and 33,100,000,000 feet in 1917, the exports of lumber have gradually increased each year from 1,920,698,000 board feet in 1909 to 3,452,641,000 board feet in 1913 and 2,996,672,000 board feet for the twelve months ended June 30, 1914. Thus the lumber exports for the years 1913 and 1914 were approximately 8 per cent of the lumber cut, while in the years 1909 and 1907 the proportion ranged from 4½ to 5½ per cent.

Export figures for the period subsequent to the year ended June 30, 1914, are not used, for they are influenced by the war's restrictions and do not reflect normal conditions.

Before the war the forests of Russia, Austria and the Scandinavian countries supplied the greater part of Europe. Chaotic political and economic conditions will keep Russia out of the market for five years, it is said. Austria will be a factor, probably, in less than two years, but is expected to confine trading to Italy, the Balkans and other states adjacent to the Austrian borders.

That will leave the whole world dependent for

A Huge Ship Knee of Douglas Fir

its timber supply largely upon the Scandinavian countries, the United States and Canada, for the next five years, at least.

Under those circumstances the opportunities for American lumber manufacturers are enormous.

Although Portland now is the world's leading lumber manufacturing center, the future development of the industry will bring Portland more into prominence as the commercial center for lumber manufactured outside of Portland—in the territory on both sides of the Columbia River tributary to Portland. And, as the trade with the outside world increases, Portland will become proportionately prominent not only as the lumber capital of America, but as one of the leading lumber markets of the world.

Cutting a Niche for Itself in International as Well as National and Territorial Commercial Banking

FROM a small banking institution to one of extremely large proportions, the Northwestern National Bank of Portland, Oregon, has leaped in a few short years. Nor was this result owing to a particular favoritism. Neither was it due to the absence of banking competition. It was more largely a matter of intensified progressiveness applied to constructing a serviceable institution on the inside and creating a favorable impression upon the outside. Not content with small transactions from small businesses, it began making those businesses develop. The evidence is seen ot the resultant growth of the Northwestern National in the quotation from a recent issue of the "Financial Age" of New York, which, in giving a resume of the progress of the country's largest banking institutions, gave this institution the place of honor as the most rapidly growing bank in the United States during the period November, 1914, to November, 1918—namely, a 615 per cent increase in deposits, or a gain of from three million to twenty-two million dollars.

Northwestern National Bank Building, Portland, Oregon

Local business of the Northwestern National grew into territorial business; from territorial business the next step was to a national scope; and from that it has developed the business that has given rise to its already famous slogan—"Services Cover the Northwest and Encircle the Globe."

Departments sprang up full-fledged upon the ground where only a desk or two stood before. One of its most recent demonstrations of elastic facilities was the opening of a department devoted entirely to the handling of present and the encouraging of future foreign trade transactions. In this respect its service covers every phase of foreign banking, including the issuance of commercial letters of credit, acceptance of time drafts pertaining to imports and exports, the buying and selling of bills of exchange, furnishing credit information to foreign firms, assisting with and handling correspondence relative to foreign transactions, disbursement of vessels in foreign and domestic ports, and other features necessary to place a strong and pliable connecting financial link between producer or manufacturer or seller and his ultimate markets.

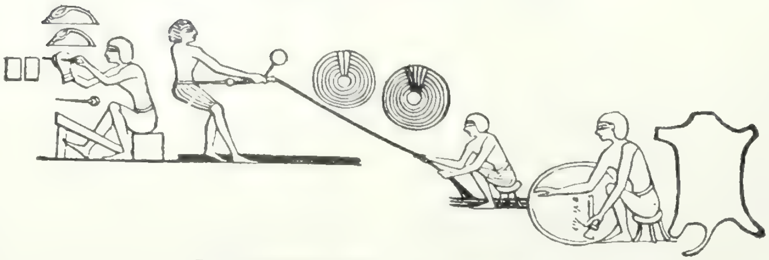
HATS OFF TO THE TIN CAN

A SIMPLE trade announcement to the effect that the United States is now producing three-fourths of the world's tin plate marked our arrival at the point of predominance over one of humanity's most necessary industries. Yet it caused very little excitement when it was made. No huzzas rent the welkin. So far as is known, not a hat was thrown into the air.

The tin can, past his period of usefulness, is not a lovely thing to look upon. He is a frequenter of ash cans and dump heaps. Yet he marks the trail of modern American progress.

As the whitened bones of the bison glisten in the prairie sun to mark the hazardous course that empire took across the plains in the 40's, so do the mounds of battered and rusty tin cans mark the course of armies and explorers. Through the Sahara and along the Great Wall informal heaps of him glitter a mute record of trade victories. It means that enlightenment has come to our heathen brother in the form of a well-known brand of coal oil or that an effort has been made to reach the inner recesses of his soul with an old and reliable mark of pork and beans.—The Nation's Business for October.

Rope Making



Rope making in the time of the Pharaohs

When and where rope was first made is obscured in the darkness of antiquity. Occasionally, however, a window opens in the historical sky, admitting some small amount of light, showing how made and the uses in which employed when inventive genius was yet in kindergarten.

Sculptured forms on tombs and temples of the ancient Egyptians prove that spinning and weaving of fibers were known far beyond the time when Moses wrote the biblical narrative of the Hebrew pilgrimage from Egyptian bondage.

Chiseled in stone on monuments is found picture language showing men twisting thongs of leather, one man walking backward, the strand fastened to a tube which revolved on a cord about his body, while the other man paid out the strands and kept them from becoming entangled (a primitive rope-walk). The skin on the wall indicated the material from which the rope was made. Reeds and rushes, also cocoanut fiber and flax, were doubtless used at a very early date in human history.

In the year 480 B. C., when Xerxes crossed the Hellespont, the means provided for transporting the army over the stream, is given by Herodotus as follows: "They joined together triremes (small boats) and penteconters (piling), 360, to support the bridge on the side of the Euxine Sea (Sea of Marmora) and 314 to sustain the other; and these they placed at right angles to the sea and in the direction of the current, relieving by these means the tension of the shore cables. Having joined the vessels, they moored them with anchors of unusual size that the vessels of the bridge toward the Euxine might resist the winds which blow from within the straits and those of the more western bridge facing the Aegean might withstand the winds which set in from the south and from the southeast. A gap was left in the penteconters in no fewer than three places to afford passage for such light craft as chose to enter or leave the Euxine. When all this was done, they made the cables taut from shore by the help of wooden capstans. This time, moreover, instead of using two materials separately, they assigned to each bridge six cables, two of which were of white flax, while four were of papyrus. Both flaxen were the heavier, weighing not less than a talent the cubit. When the bridge across the channel was thus complete, trunks of trees were sawn into planks, which were cut to the width of the bridge, and these laid side by side upon the tightened cables and these fastened on the top. This done, brushwood was brought and arranged upon the planks, after which earth was heaped upon the brushwood and the whole trodden down into a solid mass. Lastly, a bulwark was set up on either side of this causeway of such height as to prevent the sumpter-beasts (elephants and camels) and the horses from seeing over it and taking fright at the water."

This bit of historical information is here related to show the size of cables that were used under the bridge. As the Hellespont is some seven-eighths of a mile wide with a strong current, this lateral strength requirements of these cables must have been great. Ancient weights are rather uncertain, but considering the lowest standards of estimated weights of ancient usage of 480,000 grains for a talent, and using our 7000 grains avoirdupois per pound, would give approximately 69 pounds per cubit, or 46 pounds per foot, assuming a cubit to be 18 inches of modern measure. This would be an enormous rope of something over 20 inches diameter, if of the same material as used for hard fiber cordage at present, although flax would be somewhat heavier — and modern rope makers stand rather aghast as to how it could have been made. A moving army could have had no machinery, even if such were employed in rope-making at that period. Carrying the calculation a little further, seven-eighths of a mile equals 4620 feet, and with the foregoing weight, each rope would have a weight of something over a hundred tons. No possible means for making such coils could have been employed except by hand labor and these in such numbers as only an army, or captives without pay, could supply.

Many events in history have been enacted between the foregoing and the advent of the machinery which formed the nucleus for modern methods of rope making. The few records that can be found need not here be enumerated, but it was in the latter years of the eighteenth century

By courtesy of Bureau of Agriculture, P. I.

Four-year-old Abaca plants from which Manila hemp is stripped

—By courtesy of Bureau of Agriculture, P. I.
A Bicol man stripping hemp

—By courtesy of Bureau of Agriculture, P. I.
Above: Hemp fibre hung up to dry
Below: Delivering Manila hemp to the baler

that rope machinery was patented in England, with which a very good rope was made. This consisted of a series of machines in which many of the features of modern rope machinery were employed. Hemp was successively combed, straightened, spun into yarn, tarred, twisted into strands and finally laid up into rope. The foregoing machinery was not intended for working manila and sisal, the principal fibers of which are used for modern hard-fiber cordage. Inventions and improvements have kept pace with world advancement, so that cordage machinery is fully abreast with the times and the rope makers' art is in no way behind the age.

Manila fiber, as a world consumed product, is of comparatively recent usage. It is native to the Philippine Islands and produced nowhere else. The annual output from the Islands at present is approximately 100,000 tons and will continue to increase. It is the only fiber yet discovered that will withstand salt water and can be wet and dried without injury when made into rope.

For marine use, therefore, manila rope is in a class by itself. Until the middle of the nineteenth century the old "Rope Walk" was much in evidence in the United States because the investment was small. The growth of the merchant marine stimulated the market for manila cordage and machinery was rapidly brought into use to meet the growing demand. In the "Rope Walk" the operator placed a bunch of fiber about his waist and, fastening the ends of the yarns to a wheel operated by a boy, walked backward, pulling from the fiber just enough to form an even yarn. Upon reaching the farther end of the walk the yarn was placed to one side and others spun. So expert were some operators that a yarn could be spun with either hand. Strands were then formed and these laid up into a rope. Increasing demand made the old hand work too tedious and machinery was introduced and buildings enlarged. Enterprises grew and within a few years capital invested until cordage plants became institutions of worth and

Preparing hemp for yarns in a modern rope factory

Twelve-hundred feet in two pieces, sixteen-inch circumference Manila Hawser

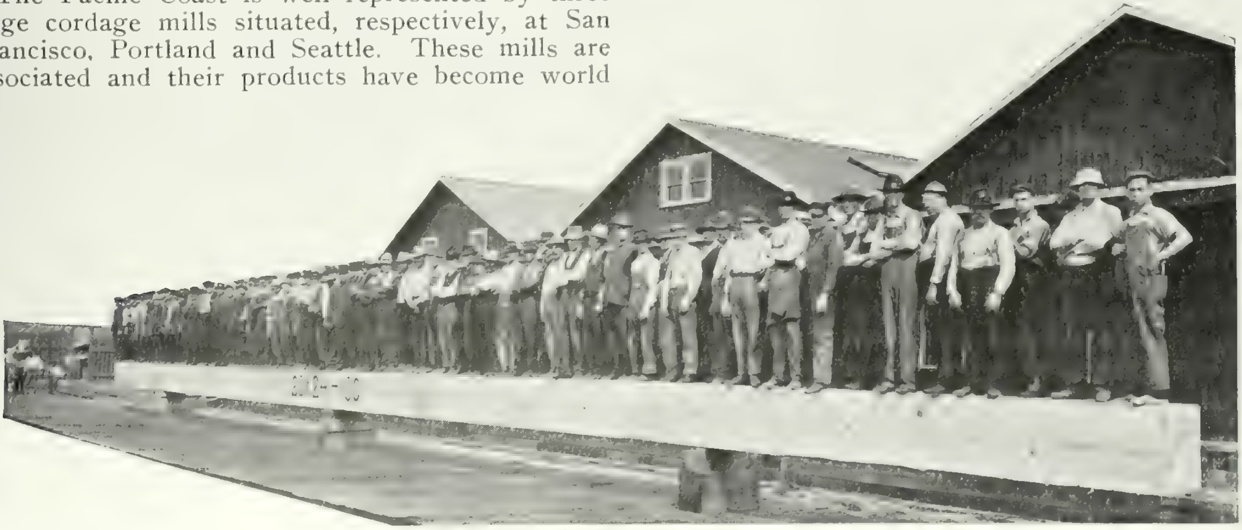
Where Manila cordage is used

importance in the industrial world. A few illustrations will exemplify the difference between modern rope manufacturing as compared with a like industry in the days of the Pharaohs.

The plant from which Manila fiber is obtained belongs to the palm family, it being a wild banana. The illustration shows full-grown plants. After cutting, the process of "stripping" or removing the pulp matter is observed. The fibrous portion thus obtained is successively dried, twisted into hanks, graded, baled and sent to all parts of the world for manufacture into rope. After receipt at mills, the various processes through which the raw material passes may be seen together with the completed product.

The Pacific Coast is well represented by three large cordage mills situated, respectively, at San Francisco, Portland and Seattle. These mills are associated and their products have become world renowned, being sent to the four quarters of the globe. Within the past few years the increased shipbuilding industry has given a wonderful stimulus to rope manufacturing, but plants have kept fully apace with demand, requirements at no time suffering because of material shortage in completed products.

The Portland Cordage Company, one mill at Portland, Oregon, and the other at Seattle, Washington, have been fortunate in supplying a large quantity of marine cordage for ships built in the Northwest, besides furnishing millions of pounds for the Panama Canal. The illustration of an equipped ship shows the use of this class of cordage.



One stick of Oregon pine

European Marine Notes

Exclusive Correspondence of Pacific Marine Review

MEN in shipping circles here were very glad to welcome the recent decision of the British Admiralty to stop work on warships and to free many building ways for mercantile work. During the war period it was frequently urged that men employed on warship construction were not suited for building merchant ships, owing to their work being too specialized and therefore costly. This theory is now being dropped, and this is all the more reasonable from the fact that a great many of the men taken into warship construction in 1914 to 1918 came from the mercantile yards. These men are now, of course, only reverting to their original business.

Furthermore, questions of the adaptability of craftsmen were more or less settled during the war, owing to the way in which it was found that labor could be transferred from one class of construction to another with very little delay or readjustments. "Green" hands were trained within a few weeks to undertake specialized work in the shipyards, as America well knows.

One of the things standing in the way of rapid improvement in our mercantile shipping output has of course been dock and harbor congestion, which has resulted in a great many of the available merchant ships being held up or kept from entering business. When passengers have to wait, as at present, many months and reservation dates cannot even be named, when cargo is waiting at every port and is depreciating while waiting, there is clearly not enough tonnage to meet the world's requirements. Indeed, Lloyds' Register recently showed that, allowing for the failure to build at a normal rate during the past five years, the net world's loss of shipping in consequence of the war was nearly 7,500,000 tons gross. Freights, too, are maintained by the present scarcity of tonnage, although it must be remembered that the present high level of building—roughly, three times the pre-war standard—must have its direct effect on future freight rates, if only because of the increased volume of interest to be earned on the greater capital expended and of the larger allowances to be made for depreciation. In view of the higher cost of everything, the British view is that the day of low freights is not yet in sight, but certainly one of the most pressing requirements, at any rate for this country, is more tonnage, and the attainment of this object should be expedited by the Admiralty decision above referred to.

State Ships Distributed

All the forty steamers that were acquired by Lord Inchcape from the government earlier in the summer have been allotted to British shipowners, and consequently no further applications need be forwarded. The announcement of the acquisition of these forty steamers, of 343,571 tons deadweight, for distribution to the shipping industry, was made in a letter addressed by Lord Inchcape to the Chamber of Shipping on July 19. Lord Inchcape then stated that the 156 steamers previously acquired from the government for distribution among ownerships which had lost tonnage heavily during the war had been allotted. As in the case of these vessels, the distribution of the forty steamers was to be made without any profit or commission to himself or his firm. The advantage was to be given to the companies with which he was associated. It was hoped that the prices at which vessels were to be offered would "bring him out without loss," and anything realized in excess of the amount paid to the government for the whole fleet was to be divided among the buyers when the transaction was closed. According to the London Times, a sum of $119,437,000 was involved in the earlier transaction, and the ships now disposed of represent a value of several million dollars. The distribution of ships seems to suggest a remarkable example of the creation of confidence. Originally the ships contracted for by the government were offered publicly to the shipping industry, but owners were very slow in bidding for them. However, directly the chairman of the Peninsula & Oriental Company boldly acquired a large number of the vessels and offered to distribute them among the shipowners, having regard to their war losses, shipping companies generally showed a willingness to take their share.

American Competition

E. Mackay Edgar (head of the London firm of Sparling & Company, which has large financial interests in America, Canada, Mexico, Russia and elsewhere) sends a communication to the press here regarding "a speech in which Sir Herbert Rowell controverted the confident views I had had occasion to express on the future of the British shipping industry, and, in particular, disputed my statement that the American yards could not yet, and would not be able for a long time to come, to turn out ships suitable for special trades." Mr. Edgar's remarks will be of interest to American shipbuilders and shipping men generally on your side of the Atlantic. It does not follow, of course, that his views are correct or indisputable, but what he says may be quoted as follows: "I adhere to my statement, for the reason that I had very recent proof of its truth. When I was in America, a month or two ago, I found that my American co-directors in two of the largest industrial concerns in the country—both of them big users of ships—were looking forward to the day when they could operate their vessels, as before the war, under British charter. After exhaustive inquiries, they discovered that it was useless to place an order in the United States for the special ships they required, and that their best policy was to wait until they could purchase the vessels in Great Britain, rather than pay the exorbitant prices demanded by American shipbuilders. Their prices are exorbitant—not because American yards are earning excessive profits; not because the cost of labor is high, but because (a much more important factor in ship production) the transportation charges which have to be met are abnormally severe.

"May I make my position on the general question a little clearer? I have never belittled the quality of American work or their capacity for mass production, either in the shipbuilding or in any other industry, but I maintain that running a merchant service is a very different thing from building ships, and that our organization and facilities and experience place us in this vital business of operating a mercantile marine far ahead of America. Furthermore, the United States has practically no seafaring population whose life and traditions and inclinations are bound up in the sea. The average American dislikes the sea. An American sailor can hardly go on shore at any of the Atlantic or Pacific ports without being bombarded with offers of work on land at higher pay and under more familiar and congenial conditions, and already American vessels are being held up by the week owing to the difficulty of obtaining crews. There will always be a place in the world—perhaps a considerable place—for American ships and American shipping companies; I have never suggested otherwise; but I do hold most firmly that in competition with the United States the odds are greatly in our favor, and that it will be entirely our own fault if we throw away advantages that are inherent in our position."

Shipping Exhibition

A shipping, engineering and machinery exhibition had been arranged just before the outbreak of the war. It is now to be held, and will be opened at Olympia, in the west end of London, on September 25. There will be important exhibits, and many conferences will be held during the show. Moving pictures will illustrate each day the work of the industries concerned, and there will be many working models and other things of interest to the general public. The exhibition will be opened by Lord Weir of Eastwood. If it is intelligently organized, as it must be, one will expect to see for the first time the war records of the mercantile marine presented in an interesting way, and relics and other exhibits bearing on the great deeds of the merchant service. There ought to be popular lectures on the merchant service and on the history of the great shipping lines and notable commanders, past and present, and other schemes to awaken the Londoner to the fact that he lives in a seaport and owes almost everything to that fact.

Cunarders at Southampton

A man who has just returned from the Isle of Wight tells me that, judging from the funnel markings, Southampton Docks seem to be in these days monopolized by Cunarders. As he passed up he counted ten black-topped, red funnels, and on closer observation found them to be on only three ships—the Aquitania, the Mauretania, and the Royal George. When he went down to the Island not long ago, the position was even more remarkable, for with the Compagnie Generale Transatlantique's France in dry dock there were fourteen "Cunard funnels" on four ships. With all the Union Castle liners reconditioned and back in service, liners with funnels which are not red with black tops will be rather lonely in the mercantile port of Hampshire.

Future of German Shipping

The Kosmos Shipping Company, Hamburg, one of the large German shipping companies, which before the war ran a service between Europe and South America, points out in a report just issued that, according to the terms of peace, the whole of its fleet will have to be handed over to the German government, who will then transfer it to the Entente Powers. It is quite impossible, therefore, to say when the undertaking will be able to recommence operations, as the extremely high cost of replacements and the great depreciation in the exchange value of the German mark will present serious obstacles. It is intended to do everything possible to acquire a new fleet, but it is feared that, owing to the unsatisfactory labor conditions in the German shipyards, contracts for new boats cannot be placed with German constructors. A similar report has also been issued by the Rickmers Shipping Company, Hamburg. They state that it will be out of the question to acquire a new fleet for a long time, but consider that it may be possible to come to some agreement with a foreign firm under which they will obtain a substantial interest in the concern, which will be advantageous to the German export trade.

Dutch Shipbuilding Enterprise

A large increase in the size of the steamers to be constructed in Holland has been made, and it will be possible in the near future to build vessels almost as large as those turned out in any other country. The Nederlandsche Scheepsbouw Maatschappij of Amsterdam, which has just celebrated the twenty-fifth year of its existence, has issued a souvenir in connection with the event, stating, among other matters, that two ships of a length of 485 feet are about to be built at the company's old yard for the Java-China-Japan service. It is also mentioned that a new shipbuilding yard is in course of construction on a site leased from the Amsterdam city authorities, and that no fewer than seven slips are to be laid down, three of which are already in course of construction. The first of the three is intended for ships of a length of 450 feet and the other two for vessels of 600 feet, while the other slips will be for longer ships.

AMBASSADORS OF TRADE

BRITAIN'S much-discussed plan for "trade ambassadors" already has been put into effect. This overseas exploitation scheme was conceived in 1916 simultaneously with the plan for organization of the Federation of British Industries. The federation includes practically every large manufacturer in the British Isles; smaller concerns now recovering their equilibrium are joining by the dozens weekly. The overseas trade department of the federation—the foreign office from which the trade ambassadors are accredited—is under the direction of brisk young army officers demobilized early because of their trade fitness.

"Ambassador" is a peculiarly good description to apply to the trade functionary. He does not travel about seeking orders like a drummer. He has been engaged for his important connections already established. If a Grecian city plans to erect a public building, and invites bidders for the supply of steel, electrical equipment, etc., public contractors will at once get in touch with the "ambassador" who by cable or letter will inform his London office, which immediately reports to interested members.

The overseas trade department makes a specialty of quick service. A constant stream of information is received from the trade embassies by the overseas department of the federation, which rushes the news out in bulletins. Minutes sometimes may mean millions.—The Nation's Business for October.

Japanese Marine Notes

AN enormous building program has just been announced by the Nippon Yusen Kaisha. During the next five years the company will have constructed seventy-nine steamships of an aggregate deadweight tonnage of 613,120, which, added to the ninety-three vessels of 571,025 tons now owned, will give a total of 172 of 1,184,145 tons. Nineteen vessels of 69,352 tons will be disposed of, leaving a net of 153 ships, 1,114,793 tons. There have been various announcements and reports of the intentions of the N. Y. K., but this latest program summarizes the others.

There will be three 20,000-ton, nineteen-knot liners for the Seattle service, which will make the voyage in about nine days, and three 12,000-ton, fourteen-knot vessels for the European run. Liners of this tonnage and speed on the North American service will compete directly with the large and fast Empress steamships of the Canadian Pacific Ocean Services and indirectly with the Toyo Kisen Kaisha, the liners of which, with one exception, now take the longer route to San Francisco via Honolulu.

Five fourteen-knot freighters are proposed for the European service. These would be one knot faster than the large carriers proposed for the United States Shipping Board by John H. Rosseter. The N. Y. K. must meet the keen competition of the Blue Funnel Line in the Liverpool trade—a good enough reason why slow cargo carriers must give way to fast. The other freighters for offshore service are: eighteen 10,000-ton vessels, one 8000-ton, six 6000-ton.

Two twenty-knot, 5000-ton passenger steamers will be built for the Nagasaki-Shanghai service and will reduce the time for the voyage to about twenty-eight hours. Other coasting vessels are: fourteen combination of from 2000 to 3500 tons; ten 5000-ton freighters; one 3000-ton freighter.

It is estimated that the average cost of the vessels, freight and passenger, will be yen 360 a ton, or a total cost of yen 220,000,000. Reserve funds and receipts from the sale of old vessels will supply the cash.

Seventeen thousand workmen at the Kawasaki yard, Kobe, have just struck. They demanded a 50 per cent increase of wages, payment of bonuses every six months and distribution of a 3,750,000-yen reserve fund. The 50 per cent increase was the stumbling block. Most Japanese corporations pay bonuses annually, and changing that system probably is relatively immaterial. It is one of the unusual features of Japan that most employes receive a certain wage or salary, usually small, but are given, in addition, bonuses that may be as great as 100 per cent or more a year. One reason for the existence of such a system doubtless is that the bonus of each person is not included in his income subject to taxation, which, from the standpoint of the individual, relieves him of a heavy tax burden, but also has the result of holding down the number of qualified voters, inasmuch as there is a tax-paying qualification.

The strike will have been settled before this is published, but it is worth while chronicling as showing that Japan workmen are, almost for the first time in history, "getting together." A significant feature of the strike is the plan of the workers to pay one day's wage each into a relief fund.

Japan has selected her delegates to the international labor conference in Washington after a series of conferences, the result of which apparently satisfied no one. Dr. S. Honda, editor of the Tokyo Asahi and Osaka Asahi, a dark horse, will be chief labor delegate; the government will be represented by Mr. Kamada and the employers ("capitalists," as the Japanese vernacular press persists in speaking of them) by S. Muto, managing director of the Kanegafuchi cotton mill.

To American ship-owning and operating interests, the principal point is that seamen had no voice in the selection of the labor delegate. The ostensible reason for this was that sailors work under different conditions than do laborers ashore. In reality, Japan does not desire standardization of seamen's wages, which would tend to deprive her of the great advantage she now has in the world's carrying trade; and, for that matter, other industries have urged that they should be excluded from consideration because of the unfavorable effect that standard wage scales would have upon them. Of course, literally making wages uniform the world over scarcely is conceivable; but Japan's position would be weakened by any pronounced increases, as her great strength is in cheap labor.

To the fact that there are no representative unions in Japan capable of selecting labor delegates was due the mode of selecting the labor representatives—by the appointment of electors by the local governors, these electors, in turn, selecting the delegate. On the whole, it will be quite interesting to observe the policy of the Japanese delegation, particularly with reference to wages at sea. It is noteworthy that steamship owners were not represented in the employers' conferences.

The first of thirty vessels building in Japan for the United States Shipping Board was launched by the Uraga Dock Company, August 26. She was christened the Eastern Breeze. The Kuhara Trading Company already has announced her sailing from Yokohama late in September and from Kobe early in October for the States, where she will be delivered. The Yokohama Dock Company also has launched one vessel, and Asano, Mitsubishi and Harima expect to send others down the ways soon, but the last vessel scarcely can be delivered prior to May, 1920.

Japan is casting an eye somewhat anxiously on the European industrial situation. The vessels charted for a single voyage in the spring to carry foodstuffs to Europe are beginning to be released at London. England's industrial unrest may result in paucity of cargoes, it is feared, and, inasmuch as about 205,000 tons were to be turned back at London in September and October, and a total of about one million tons gross at all ports from September to February, shipowners were studying the situation carefully. In general, the freight and charter markets declined in September, but whether this would be continued was not clear. Japan has seen so many fluctuations during the year that forecasts are decidedly unwise.

There is a revival of the rumor that the Nippon Yusen Kaisha is about to enter the marine insurance field. This talk is by no means new, but now the expected return of Baron Kondo, president of the N. Y. K., from Paris, where he was a member of the Japanese peace delegation, has lent more strength and directness to the reports, one of which is that the Fuso Marine Insurance Company is to be taken over and its capital increased from yen 10,000,000 to yen 20,000,000.

Returns of the Department of Communications show the distribution of Japanese merchant vessels of more than 1000 tons gross on the principal trade routes at the end of August. There were 733 steamers, totaling 2,305,481 tons gross, of which 380 ships, 715,141 tons, were in the coastwise and near-sea service, and 343, 1,572,933 tons, offshore. Ten vessels were under repairs. In the following summary the number of vessels and total gross tonnage for each route are given:

Pacific North America, 23, of 121,340 tons; New York, 10, of 61,034; Hongkong-North America, 16, of 140,460 (these vessels are principally the large liners); Australia, 28, of 97,418; South America, East Coast, 15, of 87,384; South Seas, 36, of 100,934; Straits Settlements and South Seas, 14, of 30,616; Europe, 117, of 607,368; India, 35, of 135,974; India-to-Mediterranean, 5, of 14,043; Mediterranean, 7, of 23,400; South America, West Coast, 3, of 24,862; Japan-South Seas-India, 8, of 21,218; Japan-Calcutta-New York, 2, of 8860; Japan-Mediterranean, 24, of 98,219. As compared with August, there was an increase of nine vessels, 43,162 tons.

What to do with the wooden ships is a problem in Japan. The latest suggestion is that the shortage of godown space ashore would make it profitable to use the hulls as floating warehouses, the owning company also to engage in the stevedoring business.

Entries of vessels at the principal ports of Japan during June, the latest months for which returns have been made, give Kobe a great lead, with 1247 steamers of 1,455,055 tons and three sailing vessels of 843 tons, as compared with Yokohama's 274 steamers of 764,422 tons and eleven sailers of 6031 tons. Moji's tonnage was larger than Yokohama's.

A Sino-Italian steamship corporation to be capitalized at lire 50,000,000 is proposed, to maintain a service between China and Italy. There is virtually no direct connection between Italy and China now, Marseilles being the port of transshipment for goods destined for Italy via Port Said.

The Chinese boycott of Japanese goods has begun to subside, according to Japanese sources, and the Osaka Shosen Kaisha has announced resumption of its direct Osaka-Yangtse-Hankow service, which had been suspended because of the Shantung agitation. The Nippon Yusen Kaisha maintained its Shanghai service throughout the boycott, however, for, although shipments from Japan to China fell off very greatly, there yet remained a brisk business the other way. Nevertheless, at this writing, China's purchases have not recovered as the Japanese expected them to do.

The N. Y. K. has announced two steamers for Germany, one in October and the second early in November. There has been no marked resumption of dealings with Germany, however, although some German samples were received early in September. If the reports received here of the great activity of Americans and British in the German field are well founded, Japan appears to be lagging behind those countries, although cargoes for other European countries may be finding their way into Germany, especially foodstuffs.

A NEW UNION-CASTLE LINER

MESSRS. HARLAND & WOLFF, LTD., have recently launched at Belfast the fine, large passenger steamer Arundel Castle, building by them to the order of the Union-Castle Mail Steamship Company, Ltd., London, for their South African mail and passenger trade.

The Arundel Castle is the embodiment of all the latest improvements in naval architecture and marine engineering, and marks a great advance on the previous vessels of this well-known line. Accommodation is provided for 273 first-class, 224 second-class and 566 third-class passengers, in all 1063 passengers; and very careful thought and consideration have been given by the owners and builders to ensure that the passengers shall have the utmost comfort and enjoyment on this favorite ocean route.

The vessel and machinery are being constructed under Board of Trade Survey for Passenger and Safety Certificates, also to the requirements of the British Emigration Survey and Home Office requirements. Dimensions, 650 feet long by 72 feet beam; gross tonnage, over 18,000 tons.

The Arundel Castle will be two-masted fore and aft schooner rigged, with a straight stem and a cruiser stern, which novelty will distinguish her from the earlier vessels of the fleet. The hull is a very strong structure with lower, middle and upper decks, continuous all fore and aft, and orlop deck forward and aft of boiler spaces; bridge and poop decks joined; top gallant forecastle, promenade and boat decks and navigation bridge.

The vessel is sub-divided into twelve watertight compartments by eleven watertight bulkheads; the double bottom extends right fore and aft.

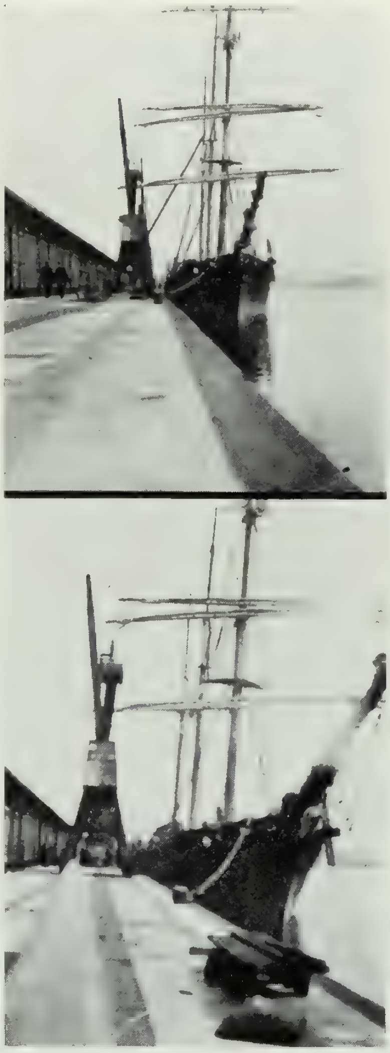
There will be a crew of about 400, the accommodation for whom will be arranged on the latest principle. The vessel has a large cargo and refrigerated space.

The vessel is propelled by twin screws, which are driven by two sets of geared turbines, each set consisting of a high and low pressure turbine. The steam required for the machinery is generated at a pressure of 200 pounds a square inch in eleven large cylindrical boilers working with natural draught. All the auxiliary machinery is of the most up-to-date type and is worked independently of the main engines.

A very complete electrical installation will be fitted on board the Arundel Castle. There will be four turbo-generators situated in the engine room, and in addition to this a Diesel engine driving a 75-kilowatt dynamo is installed well above the water line for supplying light and power in case of emergency.

The steering gear is of the builders' latest quadrant type operated by two electric motors. It is controlled by electric telemotor from the wheelhouse and by hand gear from the docking bridge aft. The watertight doors will be electrically operated and can be controlled by the captain from the bridge. The vessel will have a submarine signalling apparatus and wireless telegraphy.

The Cutty Sark


The Cutty Sark at her old home port, the East India Docks, London

THE pictures shown herewith were taken June 5th, 1919, and show the Portuguese bark Ferreira, formerly the clipper ship Cutty Sark, at the East India dock, London, June 5, 1919, just after her arrival from Accra with a cargo of cocoa beans. The Cutty Sark was in her day the most famous of the old British China clippers. She was designed by Hercules Linton for old John Willis. Messrs. Scott and Linton contracted to build her, but failed before she was completed and she was finished by Denny Brothers in 1869. The following measurements are taken from Lloyd's Register: Length 212′ 5″, beam 36′, depth 21′, tonnage under deck 892 tons, tonnage gross 963 tons, tonnage net 921 tons. Captain Moody, her first commander, has entries in the log showing speeds as high as 17½ knots an hour. He gives her best twenty-four hour run under him as 363 knots, which is the biggest run ever made by a British China tea clipper. Some years ago the following letter appeared in "Fair Play":

"Sir,—In your last issue are some remarks on the record-breaking of Captain Willis's famous Cutty Sark. Permit me to give my quota of evidence as to this ship's extraordinary performance. At an earlier period of her career she made 362 and 363 knots in twenty-four hours on two consecutive days.—I am, Sir, yours, etc., 'One Who Knows.'"

As late as 1892 she did a day's work of 353 knots, running down her "easting," and covered 2180 miles in the week. In 1890 she ran 3737 miles in thirteen consecutive days between the Cape of Good Hope and Leeuwin. In 1889 she went from Green Cape to Sydney, a distance of 220 miles, in seventeen hours, and on another occasion sailed 7678 miles in thirty days. All of these runs were made after she was cut down so that the 363 miles under her full sail plan seems a not unreasonable record. She has no more speed now than the ordinary windjammer, but all her beautiful lines are still there. The splendid figurehead of Burns' beautiful witch, Nannie, with her long hair and cutty sark flowing in the wind, her left hand stretched out to grasp the fleeing Tam O'Shanter, still graces her bow and still dances as a dogvane at her main truck in spite of fifty years' buffeting by the wind, drenching by the rain and scorching by the sun. As a work of art, the figurehead of this ship has few rivals and in the old days rounding the cape when:

"There was no talk of shortening sail by him who trod the poop,
And her boom with the weight of a mighty jib bent like a wooden hoop."

this figurehead pointed the lead in many an ocean race.

She was a great favorite among the old-time salts and so sprightly and graceful withal that the crews of her rivals, though bested in the race, was always willing as she passed them by to wave the cap and shout:

"Weel done, Cutty Sark."

Foreign Trade and San Francisco

FOREIGN trade is the most important commercial occupation of man.

Through foreign trade he seeks great adventures, broadens his vision, enlarges his borders. Many nations depend upon foreign trade for their very existence.

Whether carried on the swaying dromedary across the desert sands, or in the holds or tramp steamers down the long ocean lanes, the development and issues of foreign trade have largely molded the political destinies of the sons of Adam.

What volumes of history are here compressed in two words.

As old as the human race and as new as tomorrow is Foreign Trade.

San Francisco is the front door of the United States.

San Francisco has always enjoyed a unique position toward foreign trade on the Pacific.

Around her land-locked harbor, the best on the western shore of the two Americas, if not in the world, there have grown up cities aggregating about 1,500,000 inhabitants.

Here is the center of the financial strength of the great Pacific slope; here is great store of experience in the ways of the Orient; here is much energy and youthful vigor and enthusiasm.

San Francisco has a great hinterland. Into the northern branch of her wonderful bay flow the two rivers which drain the central valleys of California. She thus reaches through direct water transportation an area of good agricultural land which greatly exceeds the area of such land found in many of the older countries that have become great foreign traders.

The island of Honshu, main bulwark of the Japanese group, has a total area about equal to that of Central California tributary to San Francisco. This island supports a population in excess of 37,000,000.

The central valleys of California support less than 1,000,000 population. Great areas of their most fertile soil are practically untouched, awaiting development. The wealth and influence of San Francisco wisely directed toward the development of this great island empire would bring to her down the Sacramento and the San Joaquin rivers great volumes of produce for overseas shipment. The increase in population due to this development would create a great market for imports.

San Francisco during the past three years has witnessed a very remarkable industrial and manufacturing growth incident to the great shipbuilding program. The shipyards will be kept busy on new work for a year or two and busy on repairs and alterations for many years, but already many of the splendidly equipped and efficiently organized shops that have been manufacturing ship auxiliaries and fittings are close to the end of their activity.

Right here is another opportunity for San Francisco's financial strength and overseas connections to make developments for the lasting benefit of the foreign trade of the city. There is a tremendous demand just now, both domestic and foreign, for many lines of manufactured articles. The great centers of American industrial life are attending first to the domestic market, as they there get quicker cash returns and there is less red tape. Here on the Pacific slope we do not have a great domestic market. It would therefore seem a very opportune time to divert the potency of our manufacturing plant and organization to foreign trade. Our small manufacturers are not sufficiently established to extend long foreign credit, but our banks and great shipping houses certainly are strong enough to handle that phase of the situation.

San Francisco has a strong position on the great ocean trade route, between the centers of Occidental and Oriental populations. She will always be a port of call on that route. In order that she may most fully benefit from that circumstance, San Francisco should establish a free port zone with sufficient area to permit of many manufacturing processes and repacking and trans-shipping of cargoes. This free port zone should be so equipped with material handling machinery as to give maximum speed in the discharge, distribution and loading of general cargo.

San Francisco's waterfront is the property of the State of California. Its piers are controlled and managed by a state board appointed by the state legislature. By throwing the influence of its representation in the legislature into co-operative work with the representatives of the central California agricultural sections, the combination can control the legislature and initiate the measures necessary for the greater development of Central California and of San Francisco's waterfront.

Foreign trade is essentially barter. In the old days goods were taken overseas for straight exchange for other goods without the use of currency as a medium. In our complex modern system of international trade, individuals and localities very often overlook the fundamental nature of this limit to international buying and selling. To take a concrete example, China's power to buy from or through San Francisco, ultimately and finally depends on the capacity of San Francisco and Central California to buy from or distribute for China. There may be individuals who can for a limited time sell to China or any other nation and amass fortunes without buying or distributing a single Chinese commodity. These are exceptions and every such exception disturbs and delays the rational development of real trade with China. In order to command overseas markets for our own products, we must develop here a market for overseas products. This is necessary not only that our customers' purchasing power may be preserved, but also in order that transportation charges be reasonable.

San Francisco has ships. She has a shipbuilding, shipowning, ship-operating chief executive. She has around the shores of the harbor a number of shipbuilding plants whose aggregate capacity is easily 750,000 tons of cargo steamers a year. These plants are adequately equipped to take care of San Francisco's shipbuilding and ship-repairing needs. There is no industry in the world today that employs more labor in proportion to the value of its product than does shipbuilding. Therefore it is of primary importance that shipbuilding and its allied industries be fostered by the merchants and land owners of this city. In this connection the relation of local shipbuilding to the local market for outside products should be stressed. There are at several of our logical overseas trading points large bodies of good iron ore conveniently close to tide water. The electric smelting of iron ore and its immediate reduction to a good grade of mild steel are now at a stage of development where our low-priced hydro-electric power makes the process commercially practicable on this coast.

These three facts point the way to developments which should make possible in conjunction with our climatic conditions a tremendous expansion in local manufactures.

That San Francisco produces men of "telescopic vision" is amply proved in the history of the city. Many a shipping operator on California street sees with his mind's eye far afield. The walls of the office disappear and commercially in a broad sense the teaming millions across the Pacific are envisaged as a market with almost infinite possibilities. If he is wise he will reverse the vision and in imagination take the place of the foreign merchant choosing the point of contact with the markets of the world. What he then sees will convince him of the necessity for providing here a market for the goods of the foreign merchant.

To summarize: San Francisco's advantages in foreign trade are:

Position.
Financial strength.
Unexcelled harbor.
Shipping.
Shipbuilding and repairing facilities.
Manufacturing plant.
Rich, undeveloped hinterland.

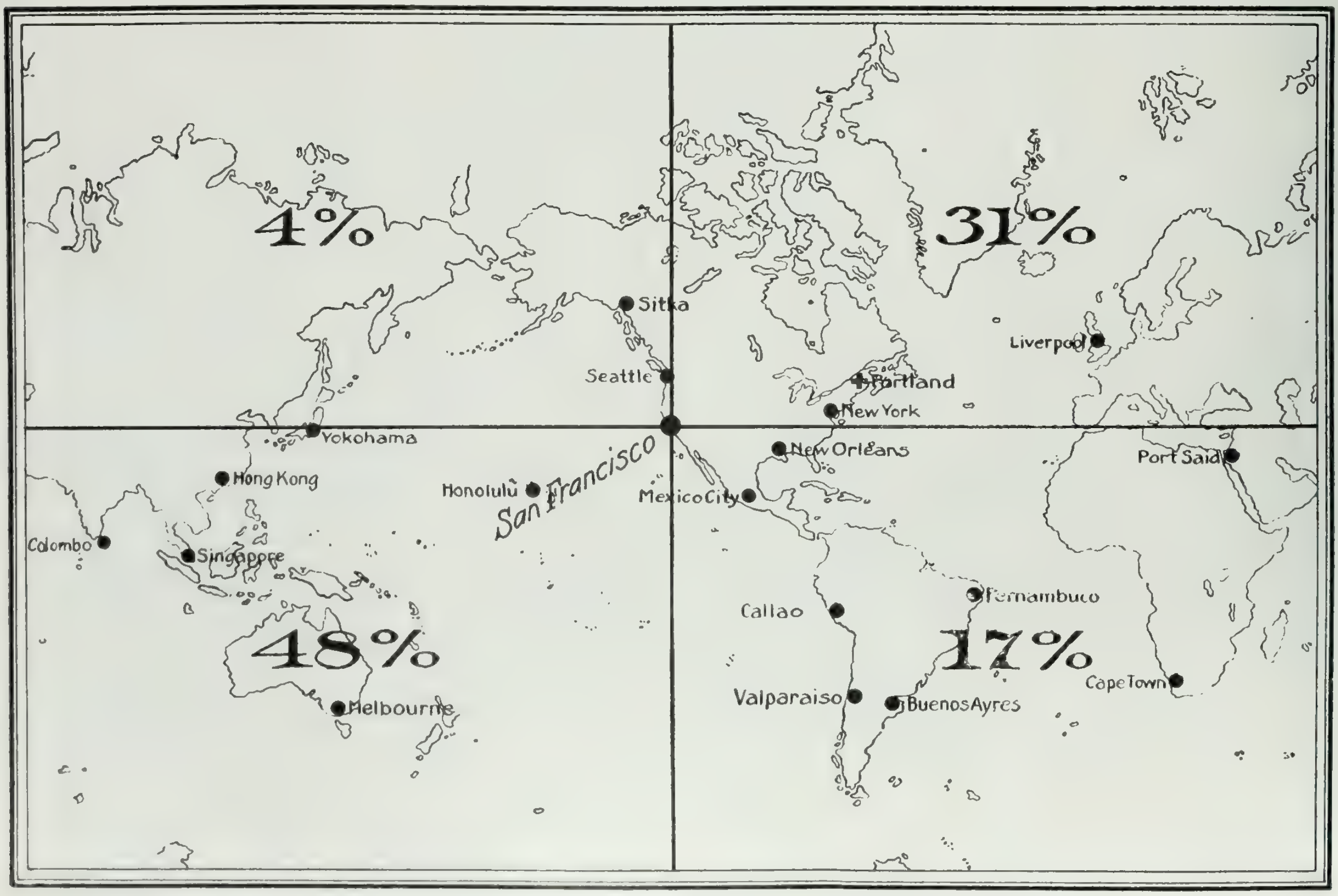
San Francisco's needs in foreign trade are:

Free port zone.
Development of hinterland.
Development of manufactures by the local reduction and manipulation of raw materials.
Arrangement of connections to create markets for foreign goods.
Arrangement for the extension of foreign credits.

In San Francisco will be held in 1920 the Seventh National Foreign Trade Convention. The National Foreign Trade Council, under whose auspices the conventions are held, was organized in Washington in August, 1914, at the First National Foreign Trade Convention. The second convention was held at St. Louis, the third at New Orleans, the fourth in Pittsburgh, the fifth in Cincinnati, the sixth at Chicago. These conventions have been wonderful factors in showing the great Middle West section its vital interest in foreign trade.

Now the convention, in the words of Chairman Farrell, "will be held at the gateway of the twentieth century ocean, San Francisco."

San Francisco will be shown at this convention how the problems of foreign trade are intimately associated with the economic problems of all her merchants, her agriculturalists and her manufacturers. San Francisco will vitalize this knowledge into foreign trade expansion and achieve for herself a name among the great cities of the earth.



Skeleton map of the world showing relative distribution of world population in respect to San Francisco

Panorama from the harbor of the Mitsubishi Dockyard and Engine Works at Nagasaki. The shipyard at Tategami can be seen at the extreme left and the engine works at Akunoura on the right

The Three Water Caltrops

By Andrew Farrell

MITSUBISHI, a word known throughout the world, is not the name of a family. He probably would be grievously disappointed who sought for an individual of that name in all the Mitsubishi offices; because Mitsubishi is a trade name only, having been derived from "mitsu" (three) and "hishi" (the water caltrop), although by what process the "h" of "hishi" became a "b" must be another story. Nevertheless, the derivation of the name will explain the three lozenges, or, as an American would speak of them, diamonds, which form the emblem of the house.

In 1870, Iwasaki Yataro, one of the first of the modern millionaires of Japan, started a line which, under the name of the Mitsubishi Mail Steamship Company, became the first commercial company of the empire, and in 1885 was amalgamated with the Kyodo Unyu Kaisha, a rival with which competition had become ruinous, into the present Nippon Yusen Kaisha.

By 1917 the affairs of Mitsubishi had grown enormously. Therefore, the varied enterprises had been carried on by one company, which handled many different ventures, but in that year the company was divided, and the Mitsubishi Zosen Kaisha arose. It succeeded to a long-established shipbuilding business.

Of its three yards—Nagasaki, Kobe and Hikoshima—Nagasaki is best known. It was founded by the Shogunate in 1856, for the primary purpose of repairing small steamers owned by the shogun. When the imperial dynasty was restored, the yard passed under control of the public works department and was enlarged greatly, No. 1 dock being constructed in 1879, and other extensions following. A patent slip at Kosuge was purchased, and in 1883 the Kosuge Maru, a wood steamer of 1500 tons gross, was built.

The Mitsubishi company leased the yard when the department of public works was abolished in 1884. In 1887 the Mitsubishi interests acquired title and a shipyard was opened at Tategami. The first iron steamer, the Yugawo Maru, 206 tons gross, was built in 1889, to be followed by three steel steamers, each of about 700 tons gross, and the steel steamer Suma Maru, 1592 tons gross, built in 1895, which was a record at the time. The Sino-Japanese war and the shipbuilding encouragement act increased the Mitsubishi business, and the Nippon Yusen Kaisha, opening its European service, ordered six 6000-ton steamers, one of which Mitsubishi completed in 1898. This again was a record for Japan. Since that time Mitsubishi has built such vessels as the T. K. K. liner Tenyo Maru, the battle-cruiser Kirishima and the superdreadnought Hyuga of the Japanese navy.

There are six building ways at Nagasaki. The lengths are: No. 1, 767 feet; No. 2, 605 feet; No. 3, 602 feet; No. 4, 540 feet; No. 5, 500 feet; No. 6, 480 feet. A gantry crane at No. 1 way is fitted with one 30-ton, two 10-ton and four 5-ton hoists and has a length of 790 feet, width of 116 feet and height of 154 feet. The other berths have steel derrick posts, the winches of which can lift up to three tons. The yard locomotive cranes range from three to five tons.

Two vessels will be built at the Nagasaki yard for the United States Shipping Board—the Eastern Crown and Eastern Victor, both of 8400 tons deadweight. The keels were laid April 26 and May 27. The launchings probably will be in December and January, with delivery at an American port two months later.

The Eastern Crown and Eastern Victor will have these dimensions and general equipment: Length, between perpendiculars, 400 feet; beam, molded, 54 feet 6 inches; depth, molded, 30 feet; gross tonnage, about 5760 tons; deadweight, including

The Toyo Kisen Kaisha Steamship, Tenyo Maru, 13,500 tons gross register, built at the Mitsubishi shipyard at Nagasaki bunker coal and stores on Lloyds' summer draft, about 8400 tons; engines, direct-acting, inverted-cylinder, working on three cranks, set at 120 degrees, to be constructed for a working pressure of 200 pounds a square inch.

Nagasaki employs 15,500 workmen and 1200 engineers and other staff men. The area of the engine works, shipyard and drydocks is about 140 acres, and the water frontage about 10,000 feet. The Nagasaki yard enjoys a high degree of independence, having to bring in from the outside only patented articles, and its lead in this respect has been followed by other Japanese plants.

The Nagasaki shipyard, known as the Tategami yard, to distinguish it from the other Mitsubishi plants nearby, has: Mold loft, bending slabs, plate shops, equipped with ten shearing and punching machines; a hydraulic flanging machine, a hydraulic manhole punch, two sets of plate rolls, five planing machines, two mangles, a guillotine shear, besides other machines; angle-bar shop; machine shop; galvanizing shop; blacksmith shop; anglesmith shop; sawmill; joiners' shop, and so on.

There are three graving docks, all of granite, and a slip, the last at Kosuge. No. 1 dock was constructed in 1879, but was enlarged in 1895. In four hours, at high tide, 33,236 tons of water can be pumped from No. 1. From No. 2, built in 1896, 15,850 tons of water can be pumped in three hours; at low tide, pumping requires 2 hours and 23 minutes. No. 3 dock was opened in 1905. At high tide, 71,250 tons of water can be pumped out in four hours, and, at low tide, pumping requires 3 hours and 25 minutes. The Minnesota and Dakota were docked here. The dimensions of the docks are:

No. 1—Length over all, 523 feet; length on keel blocks, 510 feet; breadth at entrance, top, 89 feet; breadth of entrance, bottom, 77 feet; depth of water on blocks at ordinary spring tide, 26 feet 6 inches. No. 2—Length over all, 371 feet; length on keel blocks, 350 feet; breadth at entrance, top, 66 feet; breadth at entrance, bottom, 53 feet; depth of water on blocks at ordinary spring tide, 24 feet. No. 3—Length over all, 728 feet; length on keel blocks, 714 feet; breadth at entrance, top, 96 feet 7 inches; breadth at entrance, bottom, 83 feet; depth of water on blocks at ordinary spring tide, 34 feet 6 inches. The patent slip, at Kosuge, is 228 feet long and can lift vessels up to 1000 tons gross. The length of the rail is 750 feet and the width 30 feet.

The engineering department of the Nagasaki yard has: Pattern shop; foundry, brass, steel and iron; smith-shop; coppersmiths'; machine; turbine, in which Parsons' turbines, for which the Mitsubishi company holds the Oriental licenses, are built; electrical; turbine-erecting; boiler, the last of which is unusually well equipped. There are, besides, rigging and sail lofts, electric welding shop, testing house, power plant, pneumatic plant, hydraulic power system, and an experimental tank.

This last is the source of much pride to the company's officials, inasmuch as it is the only one in Japan and one of the few private tanks in the world. The waterway extends 430 feet. There are wet and dry docks at the north end. A mechanics' shop makes it possible to do all kinds of wood and metal work required, without jeopardizing the secrecy of any tests. There is a complete hot-water pipe system for maintaining the water at a uniform temperature. The tank was designed by Sir Archibald Denny and is virtually a reproduction of the Brown tank at Clydebank.

On the jetty there is a 150-ton hammerhead electric cranes for handling engines and boilers, and, on the reclaimed land at Akunoura, where the engine works is situated ,a 300-ton crane recently has been erected. The Akunoura plant was enlarged greatly in 1895. The main office is situated here.

Nagasaki has two floating cranes of forty and sixty tons, in addition to the 150-ton giant crane on the jetty.

On the grounds of the Nagasaki plant is the Mitsubishi elementary technical school, which has accommodations for three classes, 250 in all, and for

The Mitsubishi Steel Works and Rolling Mills at Kenjiho, Korea. The product of these mills—

200 postgraduates, who take a four-year course. Baron Iwasaki founded the school in 1899. A hospital can care for fifty patients, and both employes and their families may obtain consultation free of charge and medicine at cost. Two club houses, a library and a gymnasium are maintained by the company.

Foreigners generally display a lively interest in the pensions and savings bank. The protection plan first was started in 1897. For injury a workman is paid from yen 50 to yen 3000, the amount depending upon the class of the man and the injury received. To the pension fund each employe contributes a fixed part of his wages, the company adding a like amount; pensions are paid upon retirement for old age, or for other acceptable reasons, and range from yen 90 to yen 700 for ten years' service and from yen 400 to yen 3000 for twenty-five years' service. Another fund is known as the "sick, marriage, birth and death insurance," to which the employe and company contribute equally. From 12 sen to yen 4.50 a day is paid for illness of four months; yen 4 to yen 20 for marriage expenses; yen 2 to yen 7 for the birth of each child; yen 20 to 120 for death; yen 5 for conscription, and so on. In the savings bank a bi-monthly deposit of one yen is made for nine years and ten months, at the end of which term the company adds yen 50 to the yen 300, to which the deposits, with interest compounded bi-monthly, amount. One may have as many deposit accounts as he wishes. There also is an ordinary savings bank.

The Kobe works of Mitsubishi were opened in August, 1905. Their history has been of continued expansion, both in shops and drydocks. No. 1 floating dock, of a lifting capacity of 7700 tons, the first built in Japan (so completely had the country gone in for granite graving docks), was built at and towed from the works at Nagasaki. The construction of No. 2 dock, of 12,000 tons, was begun before two years had elapsed. It was put in operation late in 1908; and a third dock, of 16,000 tons' capacity, has been installed since.

No. 1 dock, sectional pontoon type, has these dimensions: Length over all, 412 feet 6½ inches; length on blocks, 387 feet 6½ inches; breadth over pontoon, 84 feet; breadth inside rollers, 60 feet; maximum length of ship taken in, 460 feet; maximum beam of ship taken in, 56 feet; maximum draft of ship taken in, 22 feet; time required for pumping out for a vessel of 7000 tons gross, two and one-half hours.

No. 2 dock, sectional pontoon type: Length over all, 532 feet 6 inches; length on blocks, 505 feet; breadth over pontoons, 100 feet; breadth inside rollers, 70 feet; maximum length of ship taken in, 580 feet; maximum beam of ship taken in, 66 feet; maximum draft of ship taken in, 26 feet; time required for pumping out a vessel of 12,000 tons gross, four hours. No. 2 dock was built at Kobe.

No. 3 dock requires only three hours for pumping out a ship of 16,000 tons gross. It can accommodate a vessel 470 feet in length, 98 feet beam, drawing thirty feet.

Kobe has four ways, but is not building for the United States Shipping Board. It employs 11,000 workmen and 880 engineers and staff men, considerably fewer than does Nagasaki. The works occupy about eighty-five acres and have a sea frontage of more than 5000 feet, which affords room for more berths, when needed. A 1000-foot breakwater protects a fourteen-acre basin, on the quay wall of which is a 100-ton steel sheerlegs derrick. There is a forty-ton floating sheerlegs, built at Nagasaki. The works have two machine shops, a boiler shop, a brass and iron foundry, forging, blacksmith, joiner, pattern, electric and two shipyard machinery shops and two power houses; erecting shop, coppersmith shop, mold loft, bending and pattern shops, sawmill,, and testing departments. The Kobe works, in addition to building and repairing vessels, can manufacture water turbines, refrigerators, stationary and marine boilers, engines, hoisting machinery, dredges, steel girders and pillars, pipe, generators, motors, transformers, con-

—is largely used by the Mitsubishi Shipbuilding and Engineering Plants verters and other kinds of electrical machinery.

Formerly the Kobe plant operated a salvage steamer, but it has been sold, as was one owned by the Nagasaki yard.

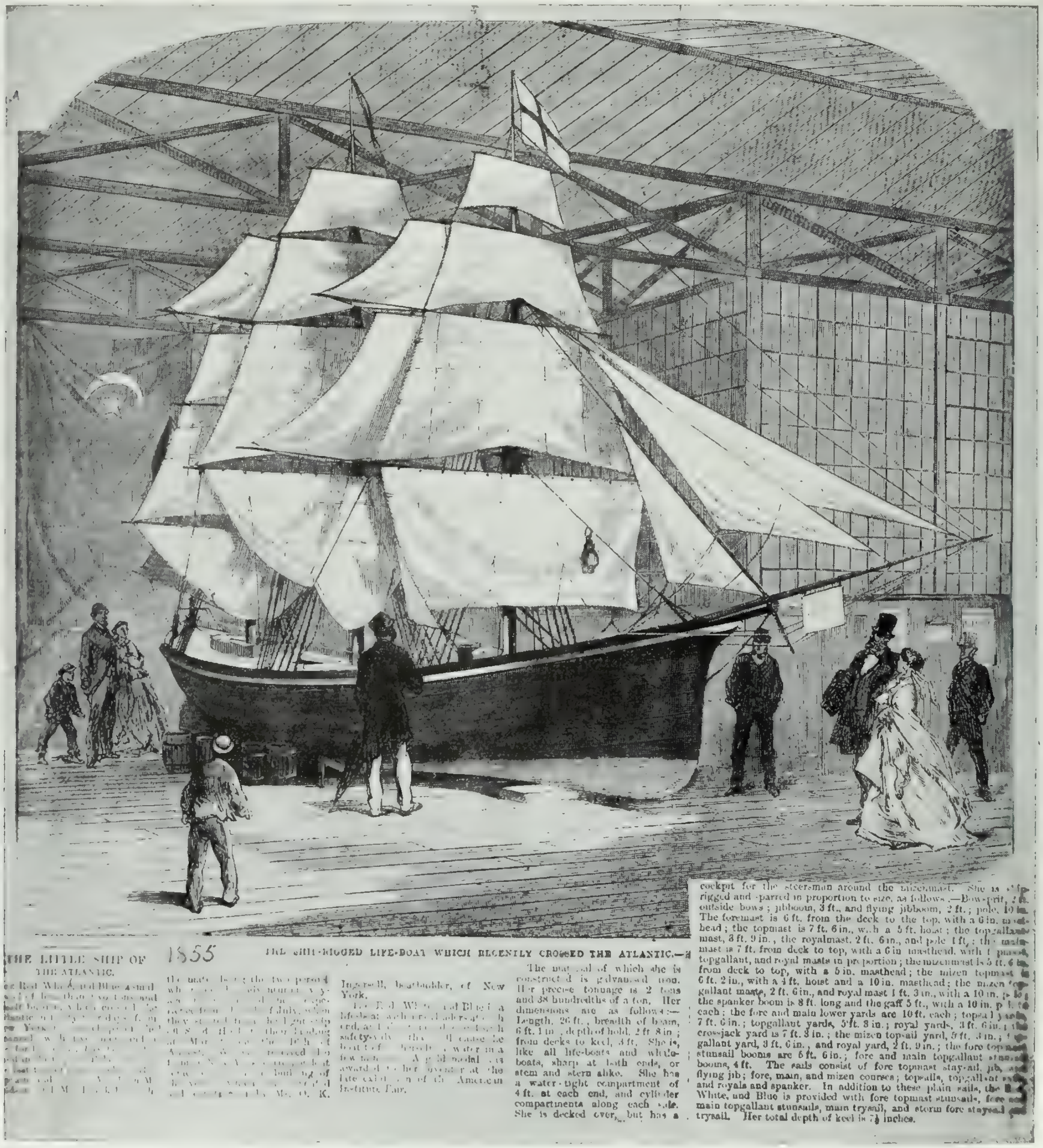
Until recently the Kobe works manufactured Diesel engines, and, more recently, engines for airplanes, automobiles and others of that design, but these operations have been turned over to the newly-established Kobe Nainenki Seisakusho, the president of which is Dr. Kumezo Ito, who had had charge of this department of the Kobe Mitsubishi plant and of the Stal turbine shop. The organization of the new company was prompted by a desire to facilitate its operations.

The Kobe works have a "Workmen's Friendly Association," a pension system similar to that of Nagasaki, and a hospital.

Both Kobe and Nagasaki build as well as repair vessels; Hikoshima does repair work only. It was opened for business in December, 1914, and is situated at Shimonoseki, which is the western outlet of the Inland Sea. Thus it is in position to command patronage from offshore vessels as well as from Japanese coasting vessels and trawlers. It employs about 800 workmen and sixty engineers and staff men. The concrete graving dock has these dimensions: Length over all, 382 feet; length on keel blocks, 360 feet; width of entrance, top, 80 feet 2 inches; width of entrance, bottom, 56 feet 2 inches; depth of water on blocks, 25 feet 7 inches. Less than three hours is required for pumping out at high tide.

No. 2 dock is 456 feet 6 inches long on the keel blocks; 70 feet width of entrance at bottom, and has 25 feet 7 inches of water on the blocks at spring tide. Under construction there is a third dock, 260 feet long on the keel blocks; 29 feet wide at the entrance, bottom, and to have 18 feet 6 inches of water on the blocks at spring tide. Hikoshima has a twenty-ton floating crane.

A pattern shop, foundries, machine shops, fitting and erecting, boiler, plate, blacksmith, coppersmith, joiner and carpenter shops, electrical shop and power house complete the yard equipment.



THE LITTLE SHIP OF THE ATLANTIC.

1855

THE SHIP-RIGGED LIFE-BOAT WHICH RECENTLY CROSSED THE ATLANTIC.—

[illegible]

Ingersoll, boatbuilder, of New York.

[illegible]

The material of which she is constructed is galvanised iron. Her precise tonnage is 2 tons and 38 hundredths of a ton. Her dimensions are as follows:— Length, 26 ft., breadth of beam, 6 ft. 1 in., depth of hold, 2 ft. 8 in.; from decks to keel, 3 ft. She is, like all life-boats and whale-boats, sharp at both ends, or stem and stern alike. She has a water-tight compartment of 4 ft. at each end, and cylinder compartments along each side. She is decked over, but has a cockpit for the steersman around the mizenmast. She is [illegible] rigged and sparred in proportion to size, as follows.—Bowsprit, [illegible] outside bows; jibboom, 3 ft., and flying jibboom, 2 ft.; pole, 10 [illegible] The foremast is 6 ft. from the deck to the top, with a 6 in. masthead; the topmast is 7 ft. 6 in., with a 5 ft. hoist; the topgallant mast, 3 ft. 9 in., the royalmast, 2 ft. 6 in., and pole 1 ft.; the mainmast is 7 ft. from deck to top, with a 6 in. masthead, with [illegible] topgallant, and royal masts in proportion; the mizenmast is 5 ft. 6 [illegible] from deck to top, with a 5 in. masthead; the mizen topmast [illegible] 6 ft. 2 in., with a 4 ft. hoist and a 10 in. masthead; the mizen topgallant maste, 2 ft. 6 in., and royal mast 1 ft. 3 in., with a 10 in. pole; the spanker boom is 8 ft. long and the gaff 5 ft., with a 10 in. p[illegible] each; the fore and main lower yards are 10 ft. each; topsail yards 7 ft. 6 in.; topgallant yards, 5 ft. 8 in.; royal yards, 3 ft. 6 in.; the crossjack yard is 7 ft. 3 in.; the mizen topsail yard, 5 ft. 3 in.; [illegible] gallant yard, 3 ft. 6 in., and royal yard, 2 ft. 9 in.; the fore top[illegible] stunsail booms are 6 ft. 6 in.; fore and main topgallant stunsail booms, 4 ft. The sails consist of fore topmast stay-sail, jib, and flying jib; fore, main, and mizen courses; topsails, topgallant [illegible] and royals and spanker. In addition to these plain sails, the [illegible] White, and Blue is provided with fore topmast stunsails, fore [illegible] main topgallant stunsails, main trysail, and storm fore stay[illegible] trysail. Her total depth of keel is 7½ inches.

This illustration was made from a photograph of a page from the Illustrated London News, 1855, through the courtesy of Captain Lincoln Rogers of Victoria, B. C.

Labor Unions in Japan

IN common with the remainder of the world, Japan did not escape the intense labor unrest which began to manifest itself last year. The immediate cause, in Japan, was more simple and elemental than elsewhere: It was the cost of living. There was no suggestion of Bolshevism; even socialism, which, with its relative conservatism, the world welcomed in Germany, was frowned upon in Japan as almost heretical; there were no unions to make of recognition or non-recognition a cause of agitation. The high price of rice led directly to the riots of last year, and again, in the summer of 1919, to many strikes and much excitement.

But there are stirrings, though somewhat vague, which indicate that Japan is about to enter upon the labor union stage of economic development. In the popular discussions of the numerous strikes, the organization and recognition of unions have come to occupy a place of considerable moment. Some of the arguments advanced, for and against, are highly amusing to the Occidental accustomed to taking unions for granted, to regard them as integral to industrial life; it is as though Japan realized that they must come, but was abashed at her own temerity, doubtful and hesitant, struggling to reconcile herself to one more twist of that amazing vortex into which Perry cast her. She does not set her feet into the ways of the West without trepidation; it is not so easy as one might expect.

It is interesting and illuminating to consider the state of mind in which the nation approaches this latest problem. Japan's endeavors to settle this, as well as other national questions, often are confused by the strange nimbus with which government officials, journalists and the general public persist in surrounding things Nipponese, as though a medieval code of samurai morals obtained today, as though the Oriental, who requires food and shelter no less than the Occidental, was actuated by dissimilar motives in seeking them. Recently, a vernacular newspaper, in discussing the demands of school teachers for more pay, referred to the "bushido" principle that to think of money was disgraceful, despite its admission of the inadequacy of salaries. The effect of strikes upon children's minds is a subject of grave debate, although doubtless consideration also is given to the effect of hunger upon their stomachs. This is from the Tokyo Yomiuri: "A friend of the writer who has long resided abroad and is familiar with conditions in Europe and America says that there is an extremely deep-seated ill feeling between capitalists and laborers in Europe and America. Laborers regard capitalists as if the latter were their sworn enemies, and in some places capitalists always carry revolvers with them when going out. All the strikes that occur relate to wages and working hours, the whole issue being of a material character. Things are different in Japan. There exists warm feeling between capitalists and laborers, and the workers strike in order to get better moral treatment rather than for the purpose of getting wages increased or working hours reduced. This is characteristic of Japan, and we should preserve and develop it."

The editorial writer, to his credit, says that he "cannot endorse these remarks." In any event, it is evident that the New York, Chicago and San Francisco police are sadly remiss in not combing Wall, LaSalle and California streets for deadly weapons. The arsenals of our great corporations would make interesting photographs.

Prince Tokugawa, Baron Shibusawa and other leading Japanese have organized a society to harmonize labor and capital. To quote from an editorial in the Japan Advertiser: "Responsibility is laid on three parties—the state, the employer, the worker. The first named must alter its course to conform to the times—whatever that may mean. If it is a delicate way of hinting that the old method of 'policing' labor by prohibiting unions, meetings and strikes is obsolete, it is timely and sound. As for capital and labor, they are merely told that employers must improve the position of the worker and the worker must strive to improve his own. This is very like the antiquated 'onjo shugi' or kindness principle which we are often told is out of date—as it so obviously is in this age of shareholder-owned industries." Naturally, the society has been regarded with mixed feelings, and the vernacular newspapers find charity and patronage in the program. On behalf of the workers, they wish neither—a bit of clarity in singular contrast to much that they publish.

Bunji Suzuki, the Japanese labor delegate to Paris, has returned from Europe and the States, where he had abundant opportunities to observe what laborers abroad were doing; the flattering cognomen of "the Gompers of Japan" has been bestowed upon him; he has been heard of as about to form a central association after the pattern of the American Federation of Labor; and has announced a series of meetings in Kobe, Kyoto and Osaka, where he doubtless will have something interesting to say. The Japanese even are speaking of walking delegates.

So much for the psychology of things. The cost-of-living agitation is more immediately real. In considering this, it is necessary to bear in mind that Japan subsists very largely upon rice (although even rice is a luxury for the very poor), the cost of which is the unfailing index of food prices. During the summer, it reached unheard-of heights, so that scarcely a day passed without attacks by the Japanese newspapers upon the Hara administration for its failure to force prices down. Unrest grew until a recrudescence of the riots of last year was feared; but alleviative measures were taken, such as the free transportation of rice by the Imperial railways, the opening of municipal markets and the importation of foreign-grown cereal; and the market receded somewhat, although it continued to fluctuate. The inflation of currency was blamed as one, or perhaps as the prime, cause of the high prices. The total in circulation at the end of June, 1919, was yen 1,520,321,035, an increase of yen 378,068,895 as compared with June, 1918. The large issue of Bank of Japan notes was particularly striking.

Thus one found strikes, large and small, existing or threatening in such diverse industries as shipping, newspapers, street railways. Wages already had increased over recent years to a degree that caused the conservative to doubt Japan's ability to compete in the world markets with other nations more favored in possessing adequate sources of raw materials; but the so-called middle classes, the salaried, as opposed to the wage-earning, men, had had little relief, and their state was unenviable. Besides the increased cost of living, which probably counterbalanced higher wages, the spectacle of great industrial and steamship corporations paying almost fabulous dividends led employes to reason that they also should share in these huge profits.

Labor agitations such as these point the way to unionization. Sabotage, said the vernacular press, had been resorted to, although instances were not given; there were sympathetic strikes, a curious phenomenon in Japan; and increases, once granted, were followed by newer demands. On the whole, there was little disorder. Unless the government should adopt a policy of actually forbidding unions, the indications are that Japan soon will find itself in a new era; and although doubtless the government could go far toward preventing the formal organization of unions, how far it really could succeed in crushing the demand for them and the spirit tending to create them is by no means so clear. It is noteworthy that the police did not interfere with strikers, as they might have been expected to do—and the average Japanese stands in as much awe of the policemen as an army recruit does of his officers.

The times are ripe for the change. It has been said, and justly, that Japan is in the period of transition from the "cottage" to the "factory" system—fairly on the road, in fact. Students of the economic history of England have had dinned into their ears the remarkable industrial revolution of the eighteenth century, consequent upon the great inventions of that age; and, if analogy is a guide, Japan is about to witness a similar change, leavened by the ideas of the Occident. That the "cottage" system remains of the first magnitude is clear to anyone who walks through the streets of Tokyo and observes the countless little shops, occupying the front of a building which also serves as living and sleeping quarters, where clogs are made, thread is carded and a score of other businesses carried on; and that the newer industrial age has come is no less apparent. The factories of Osaka would be striking almost anywhere, and the great shipyards are well-nigh the last word in organization. If Japan adopted the ways of the West in a single generation (and she did adopt many of them, although she often is content with the shadow and not the substance, willing, for example, to let systems go by the names of "telephone" and "street railway," but leaving them models of inefficiency); if Japan adopted the ways of the West so quickly, there is no valid reason why she should have to enter upon this latest development through all the stages witnessed by Europe—she can adopt labor unions almost synchronously with the great combinations of capital, however much mental torture there may be in reconciling new facts with old theories.

To cite specific instances of the trend of events: a painter foreman said that he was paying his men yen 2.50 an eight-hour day, as compared with yen 1.20 a ten-hour day a year ago and 90 sen (100 sen equals one yen) for a twelve-hour day two years ago. The newspapers have been forced to raise their subscription rates, in some cases by 100 per cent within two years or less. Shipyard workers are demanding increases of 30 per cent and are declining offers of 15 per cent. There have been strikes of school teachers, who, with policemen, probably are the most woefully underpaid. Officers of steamships, as well as crews, recently given raises of 25 and 30 per cent, are reported to be demanding 60 per cent, and an "Alumni Association," of graduates of the Tokyo Nautical School (Shosen Gakko), bears many of the ear-marks of a union

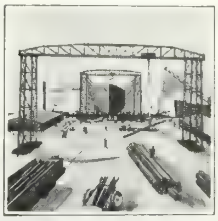
There is no unemployment in Japan, the industrial bureau of the Department of Agriculture and Commerce has announced, despite the fact that 408 factories, employing 7590 men and 4344 women, closed from November, 1918, to July 1, 1919; and, besides, 210 of the larger factories curtailed their operations and dispensed with 15,681 men and 1256 women. Those discharged changed their occupations or found work in similar factories, and only a few returned to the agricultural districts.

On the other hand, there appears to be an actual shortage of labor in some industries. The Kure navy yard, it is stated, needs 2000 men, and there are hints that the private yards will endeavor to entice still more from the government works, which lost many last year; although it had been the hope of yard managers that the somewhat frenzied bidding for men would disappear, and the labor market become normal. The organization of the Kokusai Kisen Kaisha, which will own 500,000 gross tons of shipping, leads seamen to believe that they will benefit by the competition between companies for their services, and so on.

That wages must climb hardly can be gainsaid, even though the unionization of labor should not materialize to any great degree. What effect, then, will increases have upon Japan's foreign trade? He must be a prophet or the son of a prophet who would answer that question adequately; but, considering the great dividends paid by many corporations, it appears that the larger cost of labor well might be met, not by advancing the prices of goods, but by decreasing the returns to capital.

And, furthermore, Japanese labor can be made much more productive. It will not flatter Japan's pride to be told that her labor in many cases is not efficient; nevertheless, it is a fact, despite flowery compliments paid by many Englishmen and Americans. There is, at times, a strange inability to think in straight lines, to get the maximum of return with the minimum of effort; and why it is "cheaper" to employ a score of persons, many of them women with infants strapped upon their backs, to drive piling by hand, than to use an American mechanical driver, passes comprehension. If the greater cost of labor, whether through unions or without them, results in the introduction of labor-saving machinery; if vessels cease to be coaled at Nagasaki and Kobe by passing baskets, hand to hand, from the lighter up the ship's side; if men cease to waste their lives dragging creaking carts of heavy goods about the streets; if the time comes when it no longer is "cheaper" to use human, in preference to horse or mechanical, power—then Japan will have benefited from the impending changes. Her goods will be little or no more expensive laid down in Seattle or Liverpool, and life will have become vastly more worth living in the Sunrise Kingdom.

Material Handling



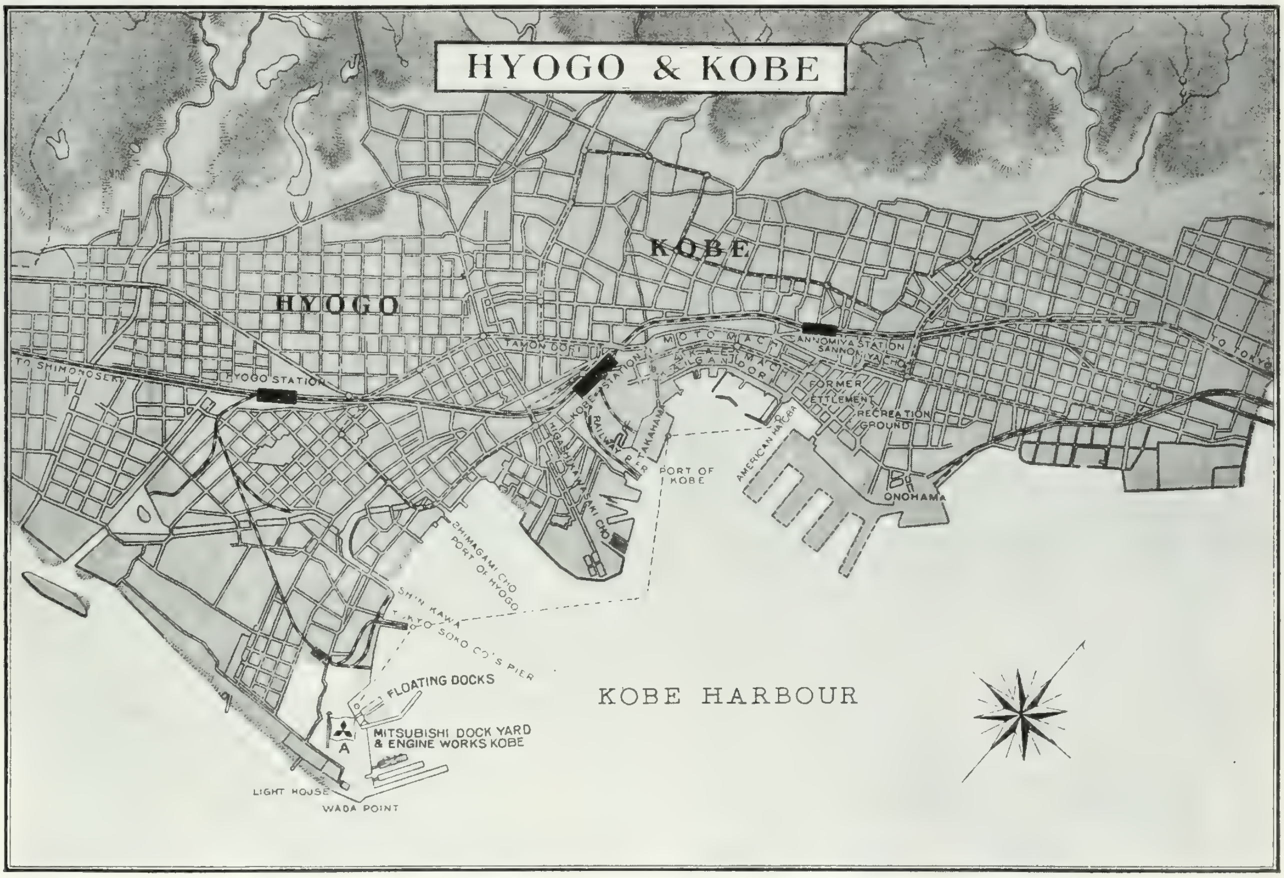
Port Facilities at Kobe, Japan

TO find a fitting parallel to the growth of the lusty young port of Kobe, it is necessary to seek, not in the Orient, where most of the larger cities are of almost immemorial antiquity, but in the States, where some of the largest centers of commerce stand on what was wilderness or desert when the still young "oldest resident" arrived. Kobe was opened to foreign commerce in 1867. At that time it was merely a fishing village or villages. Today it is, to quote the words of Robert Frazer, Jr., American consul, in an article in Commerce Reports, "the principal port of the Pacific, east or west, in the volume of foreign trade transacted. Kobe alone imported more than half of the total amount of merchandise brought into Japan (in 1917) and, with Osaka, exported almost half of that shipped out." Kobe and Osaka should be considered together, because only twenty miles separates the two cities, and Kobe is the principal port of call of ocean steamships, although much of the cargo landed there is for Osaka.

In the eyes of American business men, Kobe is certain to have a greater and greater importance. Not only is it the first port of Japan and next door to the great manufacturing center of Osaka, but it also has what is considered to be the best climate of Japanese cities (which is not without importance) and the number of Americans is increasing, despite the fact that the British remain greatly in the majority. Physically, Kobe bears a close resemblance to Honolulu, being ringed about by hills, which force the growth of the city along the seashore.

Kobe lies on Osaka Bay, near the eastern end of the Inland Sea, 375 miles by rail from Tokyo. Steamships from Yokohama, having rounded the southernmost point of the Island of Honshu (the principal one of Japan), on which both Yokohama and Kobe are situated, pass between it and Shikoku into the Inland Sea, and so to Kobe.

As a port, Kobe not only is progressing with great rapidity, but it is answering the call upon its facilities with unusual vigor. In 1868, two customhouses, four landing places and three warehouses were built; more work was begun in 1873; the construction of steel piers was begun in 1905;



Diagrammatic map showing the arrangement of port facilities in Kobe Harbor

Kobe from the Bay

but a more comprehensive program, requiring eleven years for its completion, was started in 1907. At the present time, Kobe harbor improvements may be divided into three parts—the first, second and third programs.

The first program has almost been completed. It finds Kobe with an eastern breakwater 632 ken (3792 feet) in length, which, although not quite finished, has progressed to the point where it answers the end for which intended. Work also is going forward on the south breakwater, 500 ken, or 3000 feet, in length. There are four piers, having berths for nineteen vessels, all told. The length of the piers averages about 2400 feet, and the width of the slips at the inshore end between is 480 and 540 feet. Berths at portions of Nos. 1 and 2 piers, the two on the east, were designed to accommodate vessels of the Minnesota class, then the largest steamship on the Pacific, of which there is no rival today. Thirty-six feet of water at low tide was provided. The other berths were for steamers of the Manchuria-Mongolia class, the second largest, with thirty-three feet of water, and of the Siberia-Korea class, with thirty feet. In those days American vessels had such standing on the Pacific that they gave their names to their several classes. Inasmuch as the Minnesota, Mongolia and Manchuria went to the Atlantic, these depths of water remain more than ample for any vessel left on the Pacific. Sheds were built as follows: Pier No. 1, 1260 tsubo (one tsubo equals thirty-six square feet) and 1092 tsubo in area; No. 2, 1176, 1176, 840 and 672 tsubo, four in all, with space for still another; No. 3, two of 2205 tsubo each, temporary, to be replaced by permanent sheds; 672, and with space for one more; No. 4, 840, 672, 672, 840, 672, 672, six all told. Between piers 1 and 2 there is a temporary shed of 1596 tsubo. For freight handling there was, in June, 1919, this equipment: Nine 1½-ton traveling electric gantry jib cranes, besides 5-ton and 30-ton hand cranes. Furthermore, the plans call for the installation of 3-ton traveling electric gantry jib cranes between each set of 1½-ton cranes on each pier, or seven in all, and for

The Bund and the Junk anchorage, Kobe

Handling American cotton at Kobe

six more of the smaller cranes. There are several small floating cranes also. It will be seen that Kobe is much better equipped than many other Pacific ports for freight handling, and that she is going ahead without delay.

Tracks of the Imperial railways run to piers 1, 2 and 4 and will be laid on pier 3 as well. Besides the shed areas enumerated above, there are still others, but those given include all available for immediate reception of goods discharged from steamships moored at the piers.

The former coast line was inshore from all these works. The area of reclaimed land was 67.8 acres; the length of railway, 12 miles; the area of sheds, 60,641 square yards. It was estimated that another two years, or until the summer of 1921, would be required for the completion of this first program, which would cost about 20,000,000 yen total—17,000,000 for piers and 2,700,000 for the breakwater. All the piers had been completed by midsummer, 1919; work remained to do on the breakwater and on pier sheds.

With the present facilities thus described, the second program remains to be considered. It is for the expenditure of 13,000,000 yen, which has been appropriated, one-third to be paid by the municipality of Kobe and the remainder by the Imperial treasury, requiring ten years for its completion; 8,000,000 yen to be spent on breakwaters and 19,000,000 yen on piers.

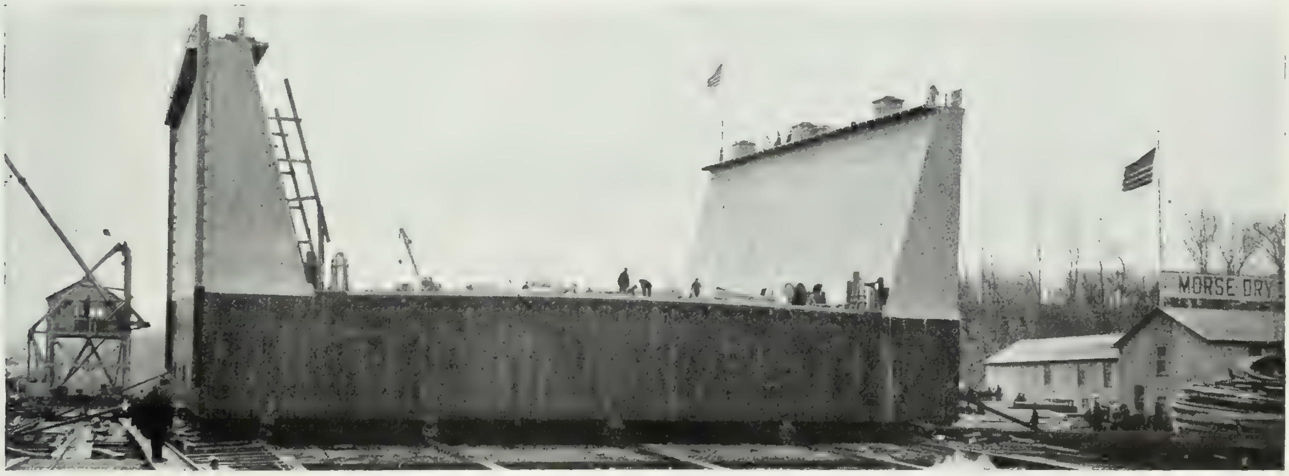
Three new offshore and three coastwise piers, besides seawall landings, are to be built.

The offshore piers are to be built east of the present piers, and forty feet of water at low tide is to be provided in one slip and thirty-three feet in the others. The forty-foot slip is to be 1800 feet in length; the others, 1470 feet long—the aggregate being: Eighteen hundred feet quay length, 40 feet of water; 5700 feet quay length, 33 feet of water. The whole of the channel will be dredged to forty feet, low water.

At the coasting piers there will be from twenty-four to thirty feet of water, low tide. The three offshore piers (those to be built east of the present group) will berth seventeen vessels; the three west, or coastwise, piers, twenty-two vessels.

Ferro-concrete caissons will be used for the new, as it was for the old, piers. Their mode of construction, dimensions, and so on, more interesting from an engineering than a marine standpoint, were described in detail in American publications several years ago.

The World's Largest Floating Dock



Third section of the new Morse Drydock ready to slip into the water

INDUSTRIAL growth is sometimes measured by the things that have been and are being done. Use that standard in calculating the growth of the Morse Dry Dock & Repair Com-Company of Brooklyn, New York, and this plant will rank as one of the world's largest ship repair yards.

While the Morse Company can point with pride to its many new buildings, housing departmental work such as acetylene and electric welding, pipefitting, heavy marine forging, blacksmithing, carpentry, and so forth, particular interest centers in its new dry docking facilities.

On September 26 the company put into operation in its Brooklyn yard five sections of its new 30,000-ton floating dry dock, the largest of its kind in the world.

Three sections of this dock could raise a vessel of 15,000 tons net and of 475 feet in length. The fourth and fifth sections have increased the capac-

S. S. Patria lifted on four sections of the new Morse Drydock in record time

ity in proportion. With the sixth and last section in use the dock can accommodate vessels of 720 feet in length and of more than 30,000 tons.

The immensity of the task of constructing a new dry dock of this size can better be appreciated when it is understood that each section or portion required considerably over one million feet of timber. Every seam had to be caulked with special care so that the pontoon is made absolutely watertight.

The large motordriven pumps operating the dock are of special design to raise or lower the dock in record time. Thus it is seen that the building of a 30,000-ton floating dry dock is a task not to be compared with the building of a ship. It involves infinitely more preparation, study and thought before the actual work of construction begins.

For six years Mr. Edward P. Morse, Sr., head of the Morse Company, labored with his assistants over the task of designing a floating dry dock that would be superior to anything in use. The task further necessitated the erection and equipment of buildings suitable for the construction of the enormous pontoons.

When the final plans were approved, waterfront property at the foot of Sixty-third street in Brooklyn was acquired and graded, and to George MacLaurin, carpenter superintendent, was assigned the work of building the plant and erecting the dock sections.

In connection with his task, Mr. MacLaurin conceived and perfected a cut-out saw capable of cutting at any angle required, and for which there was urgent need; and again, when the government wanted the property facing the new dry dock yard, he vacated, permitting the government minimum loss of time, while at the sale time he continued to rush construction work on the new dock.

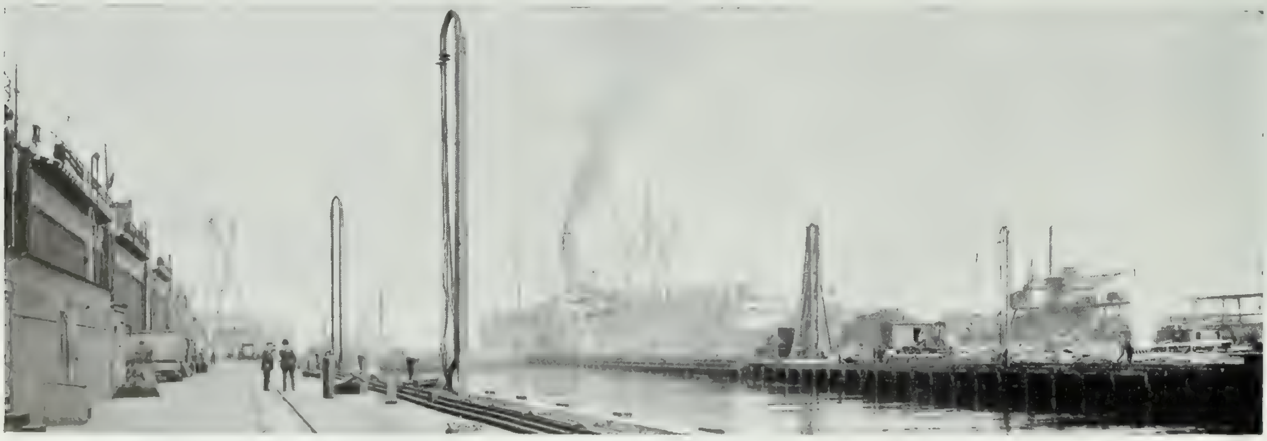
Foundations for the building of the dry dock sections were made by driving piles. Stringers were laid and covered by four-inch yellow pine planking and heavy launch ways were built. On each side of these an elevated railway structure was erected and two heavy electric traveling cranes were installed, each with a heavy boom of sufficient length to handle timber from the center of the property to the center of the section while building.

The elevated rail structure was extended out into the bay to facilitate the unloading of vessels and lumber rafts as they delivered timber alongside. These traveling derricks unloaded barges and distributed lumber to the different parts of the yard with remarkable efficiency.

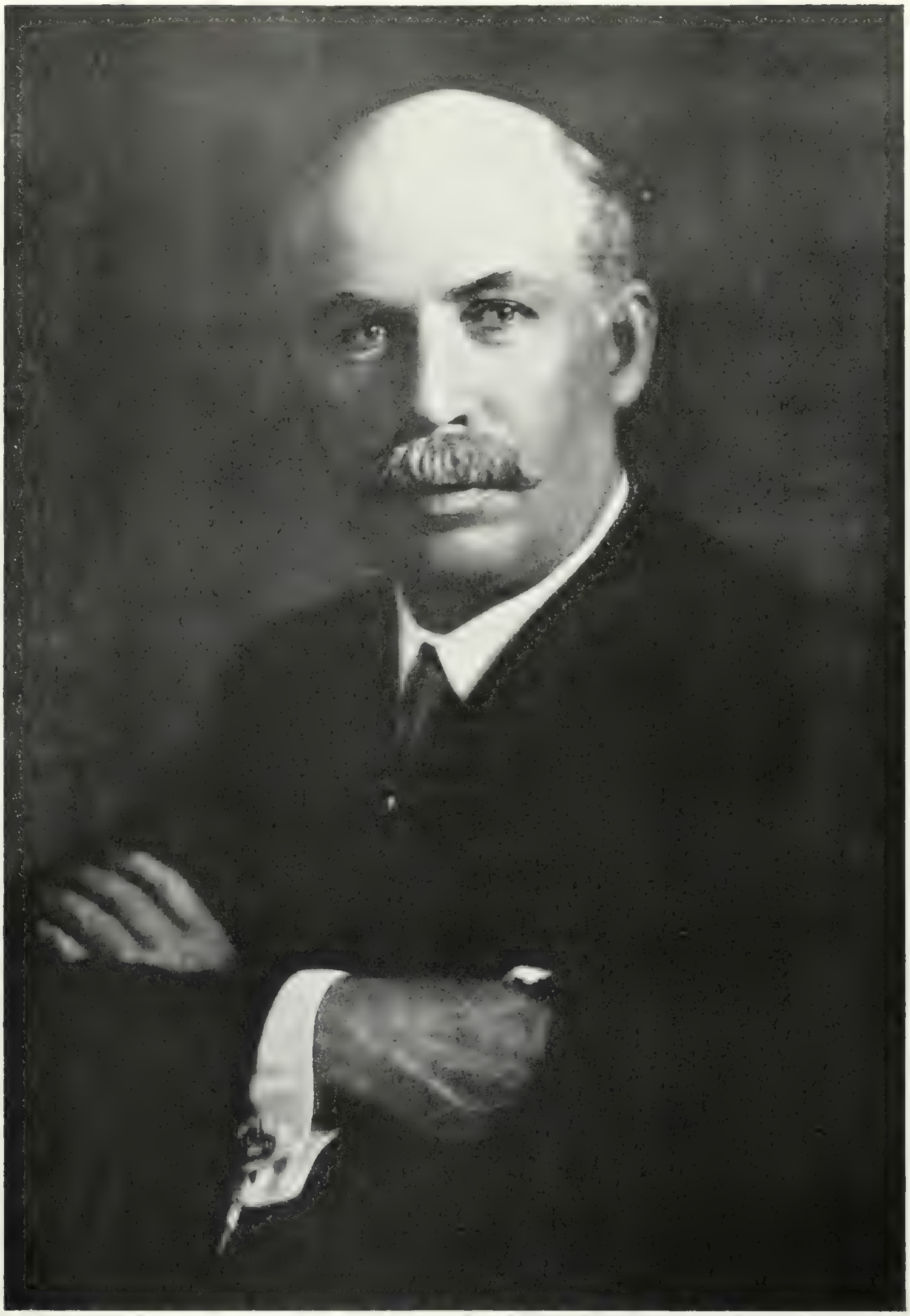
An incinerator was built for the burning of debris in the yard and a very complete blow pipe system was installed to carry shavings and dust from the different machines. A large electrically operated air compressor was installed to furnish motive power for the necessary boring and driving machinery. Stationary derricks, one to feed the different saws, were also part of the equipment.

As concerns its method of operation, the new dry dock is a duplicate of the old dry dock which was the first electrically equipped dock in the world, the first on which centrifugal pumps were used, the first on which alternating current induction motors were used, and also the first to be equipped with an auxiliary draining system. In many respects the old dry dock has been the most successful and efficient dry dock in this country.

The launching of the huge sections of the new dry dock were events of more than passing notice. A channel of sufficient depth was dredged in the main yard of the Morse Company preparatory to



The slip at the Morse Drydock & Repair Company's plant which is occupied by the new drydock.. The Company's other dock is seen at the extreme left



Edward P. Morse, President of the Morse Dry Dock & Repair Company, Brooklyn

the floating of the big sections. These sections were slipped from the ways at intervals of several weeks.

As the sections are uniform in size, save the first and sixth, on which there are large aprons, a description of the launching of the fifth section, with its million feet of timber attached, together with 210 tons of galvanized iron bolts, is typical of all, excepting, of course, the weather conditions.

Exactly sixty-four days after the first timber was laid, the fifth section was floated. Without a hitch, the big mass of timber, clumsy though it seemed, slid off the well-greased ways into the water of New York harbor. Tugs of the Morse towing fleet swarmed about it, and at a given word, cables running from the section to the tugs became taut. Instantly the great section moved, churning the water in its path.

Later it was attached to other sections in operation in the Morse Company's Brooklyn yard.

The Black Arrow was the first vessel to try the lifting power of the new dock. This ship, 409 feet 5 inches long, with a beam 52 feet 7 inches, and a depth of 28 feet, was raised from the water at the rate of a foot a minute, with only three sections of the new dock in use.

Since then other notable lifting records were established and by only four sections of the new dock. In June the steamship Chicago, 508 feet in length, 57 feet 8 inches in breadth, and 11,127 tons in weight, was hoisted in twenty-one minutes, her enormous hulk standing high in the air.

Later the twin screw steel French steamer Patria was lifted. The Patria, a seven decker, is 487 feet 2 inches long, with a beam of 59 feet 2 inches and a registered depth of 40 feet 1[illegible] inch. In tonnage she exceeds the Chicago by several hundred tons; yet she was lifted quickly and easily by the new dry dock.

Cold Storage Plant of the Port of Seattle

THE city of Seattle, metropolis of the great Northwest and the gateway to Alaska, always enterprising in projects for community benefit, has provided for the disposal of foodstuffs to its citizens by the erection and operation of a large electrically operated cold storage and ice plant.

The plant is located at the Spokane street terminal, where ample transportation facilities are provided by both rail and water. The refrigerating plant serves the following: A fish warehouse, including four fish freezers; a 500-ton ice storage house; one general cold storage building, containing thirty-six cold storage fruit rooms and twenty low temperature rooms for meat and miscellaneous commodities.

Fish, meats, fruits and vegetables of all kinds are handled, all on a wholesale basis, no retail business being done. Ice is also made and sold on the same basis, a considerable business being done in icing railroad cars, and also ships that sail from the port of Seattle.

During the war the United States government made good use of the facilities of the plant for supplying Camp Lewis and other government activities in the neighborhood of Seattle. The refrigerating plant machinery consists of three 110-ton ammonia compressors, each belt driven by a 150-horsepower 380-r. p. m. Westinghouse wound-rotor motor, and a 7½-ton ammonia compressor used as a pump-out machine, driven by a 7½-horsepower 580-r. p. m. motor. This auxiliary compressor permits work to be done on any one coil without the use of one of the large machines.

The three 150-horsepower motors are controlled by what might be termed a semi-remote control, consisting of a magnetically operated contactor connected in a series with the motor switches. The contactor is controlled through a push-button switch located at the motor controller which is placed near the machine. The controller and contactor control circuit are inter-connected to avoid the closing of the primary circuit of the motor with a short-circuited rotor. An automatic master relay is provided for each machine to prevent excessive ammonia pressure, which is so connected as to open the contactor when the pressure reaches a predetermined value. A number of auxiliary push buttons are also connected into this circuit and located conveniently to the main valves so as to afford a ready means for shutting down the compressors instantly, if desired, from these points.

Thirty-six one-horsepower motors are used to drive centrifugal blowers for discharging air into as many rooms, located six on each floor, and used for the storage of fruit, as previously mentioned.

In addition to furnishing refrigeration for a 7-story building, the plant also serves a 100-ton ice plant from which ice is furnished at wholesale.

The ice tanks are served by an electric overhead traveling bridge crane with a capacity for lifting eight blocks of ice each weighing 400 pounds. A 5-horsepower motor operates the hoist and a motor of similar rating is used on the travel.

To operate the plant, which is electrically equipped throughout, there are installed a total of fifty motors aggregating 600 horsepower in capacity. These motors are all of Westinghouse manufacture.

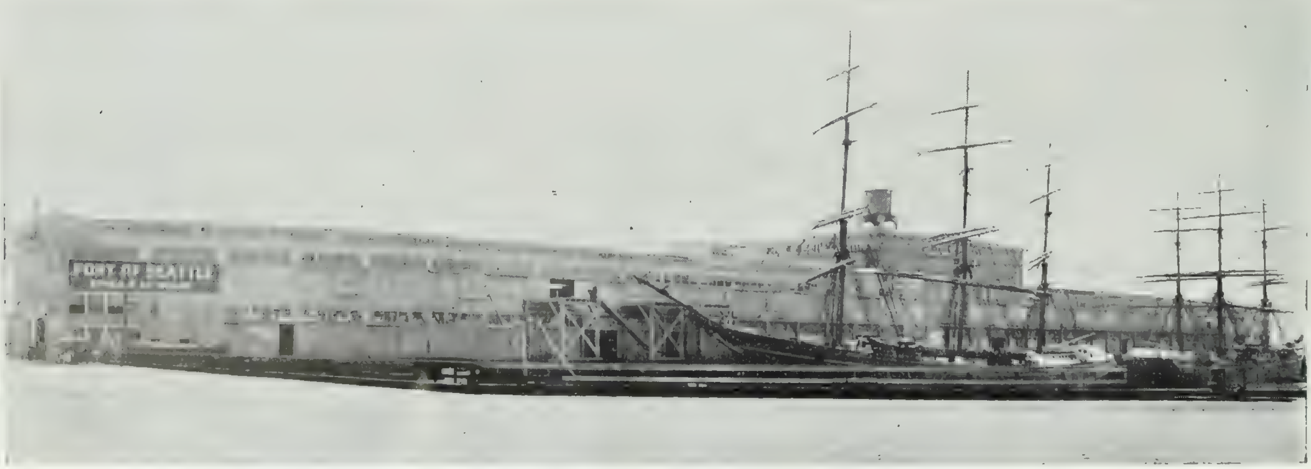
Three-phase, 60-cycle current at 440 volts is supplied from the city plant. According to those in charge of the cold storage plant, the electrical system has operated to their entire satisfaction, no defects having developed during the three years the plant has been in operation.

F. GRIFFIN & COMPANY, LIMITED

TO successfully organize a large importing and exporting business in a few years requires the selection of executives characterized by great resourcefulness and initiative ability.

The exporting and importing firm of F. Griffin & Company, Limited, was organized in Vancouver, B. C., during 1911 and has since grown to include offices in Seattle, Portland, San Francisco, New York, London and Rotterdam. In addition to the establishment of general offices in these cities, F. Griffin & Company have agents and connections in every port of the world.

The remarkable growth of this firm may be partly attributed to the fact that the men in charge of the business have made a careful study of market conditions and the particular requirements of the fields which they cover. Cargo surveying and appraising form an important part of the business of this firm. F. Griffin & Company act as steamship agents for various lines operating vessels to the Orient and Europe.



The Spokane Street Terminal at the Port of Seattle; cold storage warehouse in the background

Tow Boats and Barges for American Inland Waterways

At the present time the railroad administration has under way a large building program covering tow boats, towing barges and self-propelled barges for freight transportation on the various inland waterways of the United States. All these vessels were designed by Cox & Stevens, naval architects of New York, who are supervising the construction. The construction is practically all of steel, assembled in sizes and shapes to meet the requirements of the American Bureau of Shipping. The program comprises two sizes of tow boats especially designed for shallow-draft work with twin screws and funnel stern, two sizes of towing barges, and two sizes of self-propelled barges. We are describing in this article the larger size of each type. The following statement shows the scope of the building program with the general dimensions, number under construction and name of builder for each type:

150-Foot Canal Barge—150 feet by 20 feet by 12 feet:
Railroad Administration for New York Barge Canal—

Dravo Construction Company, Pittsburgh, Pa.	12
Ferguson Iron & Steel Company, Buffalo, N. Y.	16
Terry & Tench, New York City	20
Downing Marine Construction Company, Glen Cove, N. Y.	3
Total barges	51

Funnel Stern River Tow Boat—200 feet by 40 feet by 6 feet:
Railroad Administration for Mississippi River—

Marietta Manufacturing Company, Point Pleasant, W. Va.	4
Charles Ward Engineering Company, Charleston, W. Va.	2
Total boats	6

Canal and Harbor Steel Barge—230 ft. by 45 ft. by 11 ft.:
Railroad Administration for Lower Mississippi—

American Bridge Company, Pittsburgh, Pa.	25
Dravo Construction Company, Pittsburgh, Pa.	15
Total barges	40

Funnel Stern River Tow Boat—140 ft. by 24 ft. by 6 ft.:
Railroad Administration for Warrior River—

Howard Shipyard & Dry Dock Company, Jeffersonville, Ind.	3

Steel Self-Propelled Barge—280 ft. by 49 ft. by 10 ft.:
Railroad Administration for Warrior River, etc.—

St. Louis Boat & Engineering Company, St. Louis, Mo.	4

Steel Self-Propelled Cargo Barge—149 ft. 6 ins. by 20 ft. by 12 ft.:

Terry & Tench, New York City	12
Dravo Contracting Company, Pittsburgh, Pa.	4
Starr & Benett, Newberne, N. C.	4
Total barges	20

These barges are designed to carry miscellaneous cargo and bulk oil on the Mississippi River between St. Louis and New Orleans and have a capacity for 2000 tons of freight on a draft of eight feet. It is intended that barges of this type will be towed in groups of six by the tow boats described below. The lines of this barge show a scow form with long, easy raking end and round bilges designed to reduce to a minimum the resistance in towing up-stream in swift river currents. The cargo box is provided with sixteen hatches, eight on each side, 14 feet by 16 feet, and eight double sliding doors on each side, so arranged for convenience in handling freight. The hold is divided into eighteen compartments by wing and transverse bulkheads, the wing compartments being oil tight and arranged with pumping facilities for the handling of bulk oil. Suitable towing bitts, chocks, cleats and capstans are provided. Dimensions of the barge are as follows:

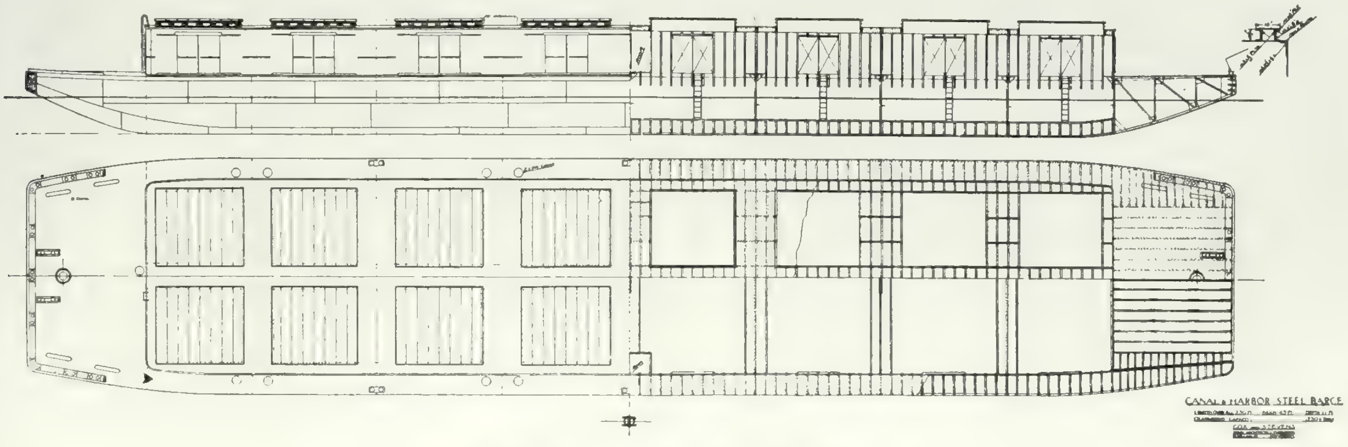
Length on deck	230 feet
Beam molded	45 feet
Depth molded	11 feet
Length of cargo box	184 feet
Width of cargo box	37 feet
Depth of cargo box	19 feet

200-Foot Twin Screw Shallow Draft Tow Boats

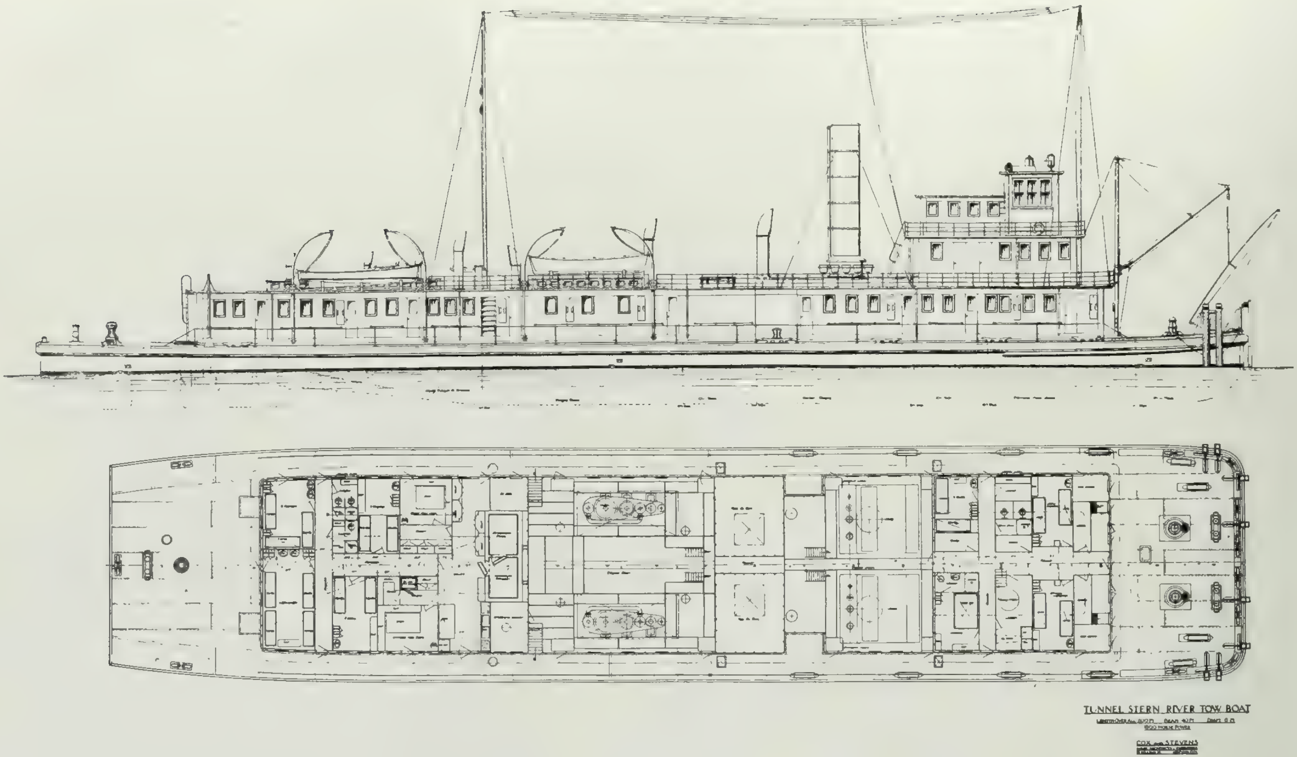
These tow boats were designed by Cox & Stevens of New York especially for service in the lower Mississippi in towing barges described above in groups of six, and the design, as will be noted from the outboard profile and plans shown, consists of a single deck vessel fitted with a continuous deck house about 150 feet long, an upper deck house about 30 feet long, and a pilot house above about 20 feet long. The general dimensions are as follows:

Length over all	200 feet
Beam molded	40 feet
Depth molded	10 feet
Draft	6 feet

The vessel is built of steel, all structural material being to the requirements of the American Bureau of Shipping. The lines of the vessel were developed after an exhaustive study of the type necessary to meet the peculiar conditions of service on the Mississippi. They show a flat section with slightly round bilges worked into an easy fore body and a tunnel arrangement aft.



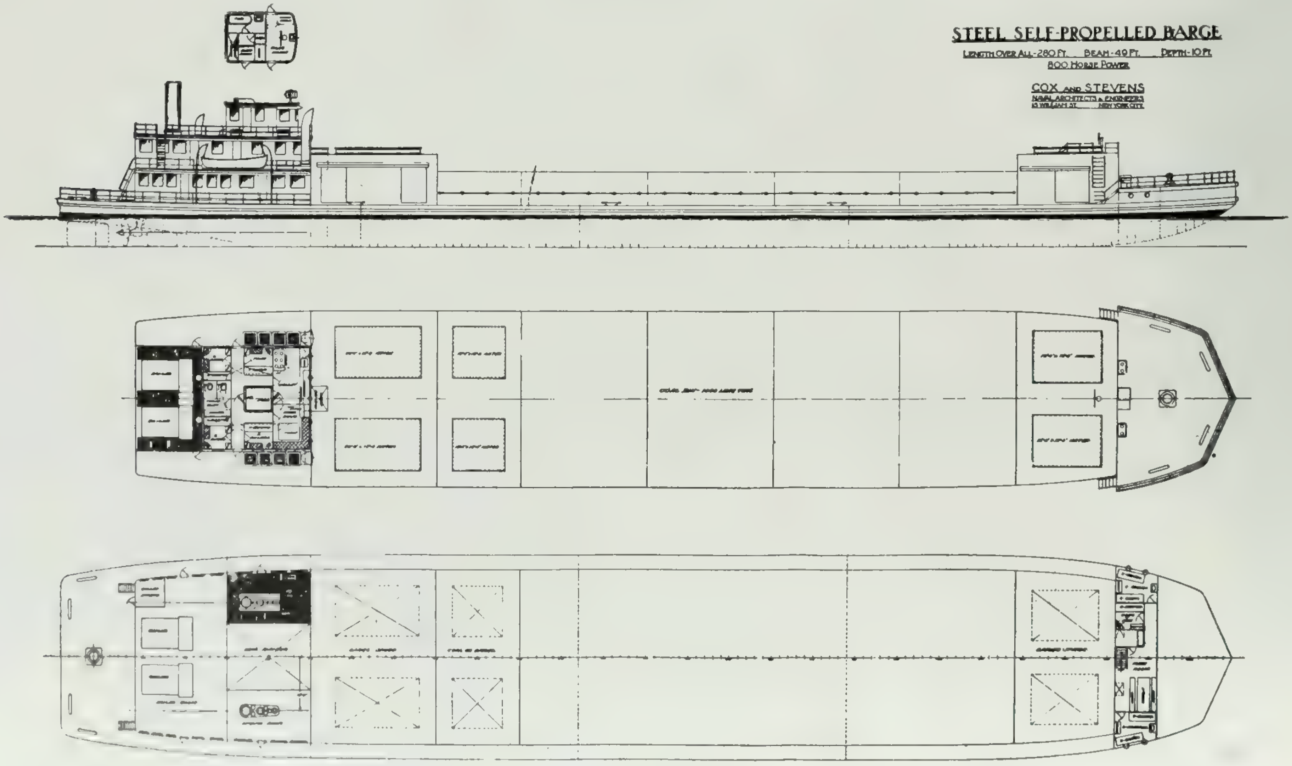
Steel Cargo Barge for Canal, River and Harbor Use



Light draft, tunnel stern, twin screw, oil burning towboat for river and harbor use

There is no sheer except at the end. Special fenders are rigged at the bow to give a bearing for pushing barges either light or loaded without danger of their fouling under the overhanging deck of the tow boat.

The power plant consists of two inverted triple expansion engines, 15½ inches by 25 inches by 44 inches by 26 inches, developing about 900 I. H. P. each. One surface condenser of 2400 square feet cooling surface is provided for the two engines. Steam is generated by two water tube boilers, oil fired, having a total heating surface of about 8000 square feet at 250 pounds' working pressure. The usual auxiliaries are provided for, independent of the main engine, and steam driven. Two electric generating sets, 10 and 5 kilowatts respectively, at 110 volts, are driven by direct connected steam engines. The vessel is electrically lighted throughout, provided with searchlights, and has a wireless set with a radius of about 600 miles. Double bottoms are fitted under engine and boiler rooms and are used as fresh water tanks, having a capacity of about 100 tons. Oil fuel is carried in tank compartments, one forward of the boiler room and one between the boiler and engine rooms, their total capacity being about 335 tons.


STEEL SELF-PROPELLED BARGE
LENGTH OVER ALL-280 FT. BEAM-40 FT. DEPTH-10 FT.
800 HORSE POWER
COX AND STEVENS
NAVAL ARCHITECTS & ENGINEERS
15 WILLIAM ST. NEW YORK CITY

Self-propelled River Barge for handling coal and general cargo on Southern Rivers

Special attention in the design of the ship has been given to watertight bulkhead construction, so as to best protect her in case of damage by snags or collision. For ease in maneuvering, the design includes four rudders, two forward and two aft of the propellers. The main deck house is arranged to accommodate the crew, oilers and firemen, stewards' department, galley, mess rooms, laundry, lavatories. The upper house accommodates the pilot, wireless operator and equipment, engineers, spare rooms, lavatories, officers' saloon and deck lockers. The pilot house has its forward part raised to give the helmsman a clear view in all directions. This house also affords accommodations for the captain's stateroom. These boats will carry a complement of thirty men.

There will be two masts to carry wireless antennae and two small derrick masts forward for the handling of heavy pieces of freight. The principal towing arrangement is a steel bridle and traveling hook fitted on the upper deck and supported from the after engine room bulkhead by heavy I beams.

These barges are designed for use on the Tombigbee, Alabama and Black Warrior Rivers for carrying general cargo and coal and will have a deadweight cargo carrying capacity of about 2000 tons. General over-all dimensions are:

Length over all	280 feet
Beam molded	49 feet
Depth molded	10 feet
Draft, maximum	7 feet

The general design of the hull lines and propelling machinery is practically the same as that described above for the tow boats. The propelling engines are triple expansion, 10¾ inches by 17 inches by 18 inches, designed to operate at a working pressure of 225 pounds and to develop 400 I. H. P. at 200 r. p. m. They are provided with one surface condenser with 1100 square feet cooling surface. Steam is generated with two watertube boilers with 1400 square feet heating surface each and 39 square feet of grate surface arranged for bituminous coal, hand fired, natural draft.

Launch of 300 foot Steel Barge at Stillwater, Minnesota

BALTIMORE DRY DOCKS & SHIPBUILDING COMPANY

DURING the last month, the Baltimore Dry Docks have been very busy on repair jobs on a great variety of ships. Among others, the American-Hawaiian Steamship Company's steamship Texan is at the south plant being converted from a troop carrying ship to a cargo carrier. The steamship Mahaska is having rudder repairs and overhauling of boiler and engine room. The steamship Defiance is at the upper docks for general repairs to shell plating and frame. The steamships Jessup and Lake Clear are being painted and generally overhauled, and the steamships Sutherland and Wabash are also at the lower yards.

The company has also received the contract for the conversion, repair and reconditioning of the Julia Luckenbach and Alloway. This, in addition to the new construction work undertaken and being carried on at a rapid rate, has kept all three plants going full speed ahead.

The Dauperata, 8800-ton deadweight cargo carrier, built for the United States Shipping Board, passed a very successful trial recently, making a speed of twelve knots. The Dauperata is the last of a contract of eight similar vessels.

STEEL BARGES FOR MISSISSIPPI

The accompanying illustration shows the first steel barge built for the United States government as it hit the waters of the St. Croix River at Stillwater, Minnesota, on Saturday, September 27. This barge is one of six being manufactured by the Minneapolis Steel & Machinery Company at the big fabricating plant in Minneapolis. These barges are being leased by the government for the purpose of carrying ore from the Twin Cities to St. Louis and bringing back coal.

Each barge is 300 feet long by 48 feet wide, and contains 500 tons of steel. The unloaded draft is 18 inches.

ANNOUNCEMENT

Mr. H. W. Philbrook, formerly with the General Electric Company of Schenectady, has been appointed district manager of the Schutte & Koerting Company's New York office, 50 Church street.

The Schutte & Koerting Company have lately issued a pamphlet entitled "Our Part in the War," and will take pleasure in mailing a copy to those applying for same.

The World Through German Goggles

German Made Projections in Common Use Are Not Portraits of Mother Earth but Gross Caricatures

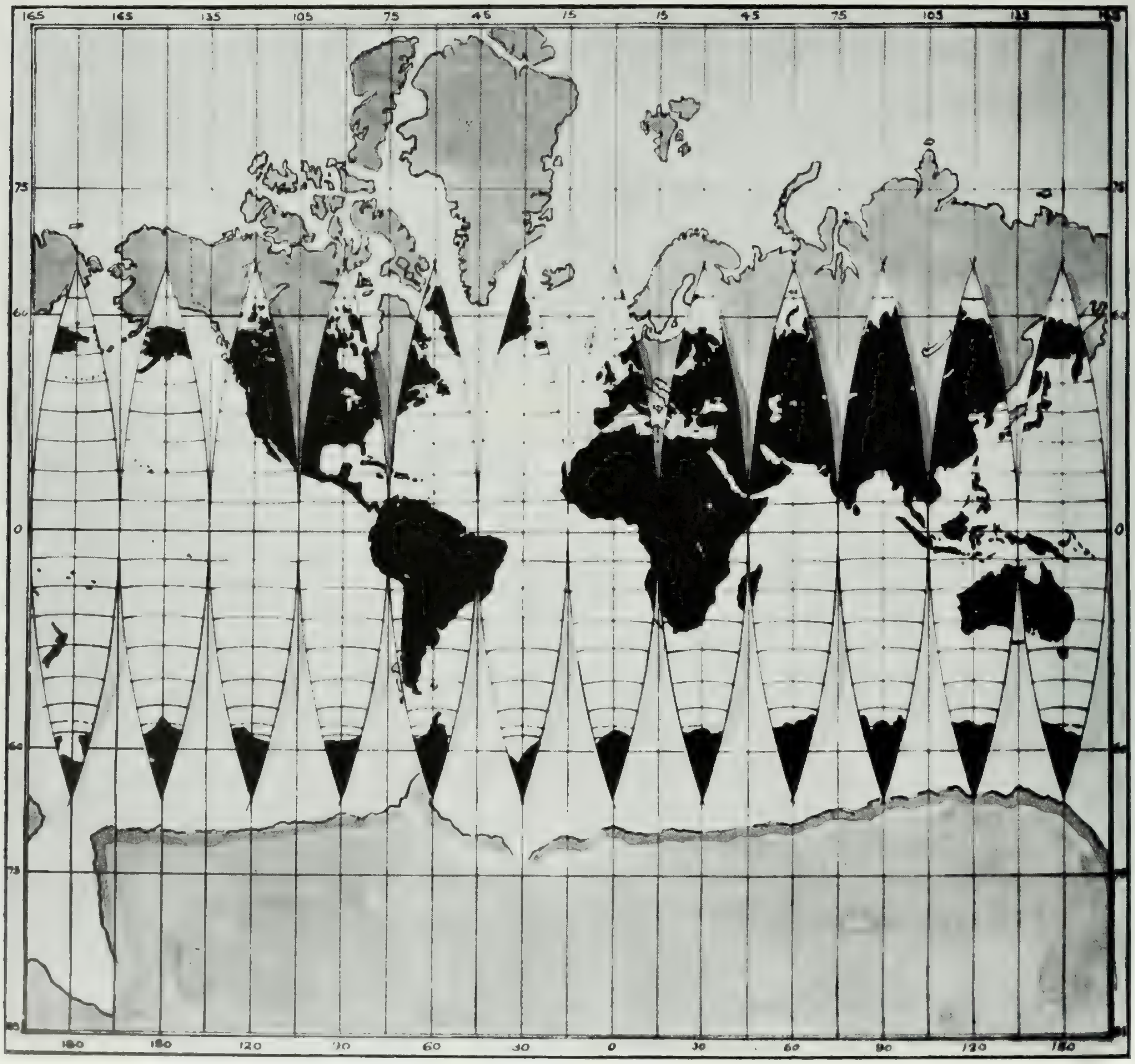
By B. J. S. Cahill, F. R. G. S.

NO one who reads these lines has ever seen a large published single map of the world that even resembles the form and features of the actual surface of the globe. They have seen instead violently magnified or twisted representations as much resembling the real picture of the earth's surface as your evening shadow on the ground or your reflection in a curved mirror represents your actual form and features.

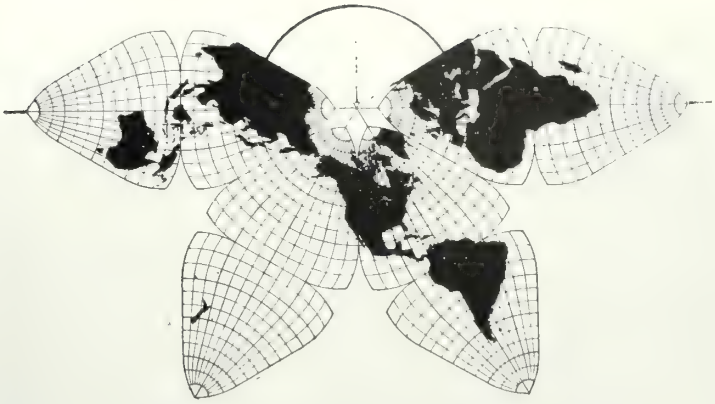
Nor are these most extraordinary comic views of the world intended for geographical jokes. Quite the contrary, for they were both conceived in the most solemn and scientific manner, the one for the use of navigators by Gehrard Kremer, the other for the use of statisticians by Herr Professor Möllweide. Other even more curious distortions in the shape of a heart or a fan were excogitated by other learned, Herr Doktor Professors Werner and Lambert—Germans all. These four worthies have conceived more generally adopted ways of presenting the sphere on a plane than the efforts so far of the savants of all other nations combined.

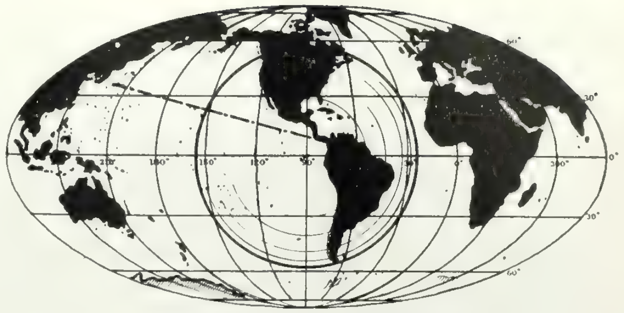
And one naturally inquires why. The answer is perfectly natural and simple. It is that German physical vision is defective while his mental vision, as if in compensation, is prodigious. And the popular conception of a German instantly corroborates this. If the teacher of a class in psychology collecting first impressions were suddenly to announce the words "A German," nine out of ten of his pupils would think of a professor wearing spectacles—that is, they would conceive a German as a man with powerful brains and weak sight; a man that is of subjective rather than objective perception.

And what could better illustrate this than that most perfect of international fables—how the Frenchman, the Englishman and the German de-



Mercator's Map of the World with gores from a Globe of the same scale superimposed. All Land and Water showing outside of the gores is in excess of the actual surface of the Globe





A Map of the World on a Butterfly Projection at the right and to the same scale on Herr Professor Mollweide's projection above

fined a camel. The Frenchman with his artistic skill sketched a camel in the Paris Zoo; the Englishman took his gun and shot a camel in his native desert, but the German retired to his study and evolved a camel from his inner consciousness.

How accurately this story hits off national characteristics could be shown in numberless ways. It summarizes the fact that in a final appraisement the French are technical and artistic, the English practical and objective, and the Germans intellectual or subjective.

In their arts the English excel in the drama, the most objective of all; the French in architecture, painting and sculpture, the most technical; the Germans in music, the most subjective.

The work of Shakespeare is so detached from himself that he is said to hold the mirror up to nature—of himself we know nothing. The work of Beethoven is utterly detached from anything in all visible nature; it is utterly and purely subjective. Shakespeare looked out on the actual world of men and things. Beethoven looked in on to an equally diverse and wonderful world of the emotions.

So persistently do these contrasts run through all the achievements of these three nations that we see them even in their manufactures. The English, being materialists, excel in making material; the French, being strong in fashioning things, furnish the fashions, and the Germans, loving abstraction, provide the chemical abstracts to give the color. Hence the creator of milady's gown gets the goods from England, the mode from France and the dye from Germany. And please note that the last is an almost metaphysical addition, for form can be cast in iron and felt in the dark, but color is intangible and subjective — a thing in the eye and mind of the beholder, and like music, an intellectual abstraction.

In dealing with the surface of the world the three nations again remain true to type. In fact, we can paraphrase the famous fable. The technically minded Frenchman with infinite skill actually measures a huge arc of a circle, takes it home to Paris and gives us the meter and metric system—an accurately measured drawing of the camel. The practical Englishman takes his gun and neither bothers with measuring nor mapping the world, but appropriates it bodily—annexing as much of it as he can so that he owns and controls most of the land and all of the water. The dreaming German, as usual, remains in his study and evolves projections of the world from his mathematical inner consciousness.

The German's inability to see the rest of the world in a detached objective way, disassociated from his own conceptions, was one of the most remarkable revelations of the war.

No wonder German projections are mental subjective diagrams of the world and in no sense portraits or scale plans of our planet. In other words, the German sees the world through lenses of the mind. And of course in justice to the Germans we must admit that many things can be seen through glasses not visible to the naked eye.

Mercator's projection, and Möllweide's in a much less efficient degree, both achieve one single thing in cartography at the sacrifice of all others. Mercator's chart was made for the helmsman's use, and together with the mariner's compass is still indispensable in the pilot-house. For all other purposes it is misleading and absurd. Möllweide's map is only an approximation, even in the one particular it claims to excel in. It does not show the world's surface to the correct area nor are its parts proportionately equivalent. Its distortions get worse and worse east and west of the center just as Mercator's symmetrical distortions and exaggerations get worse and worse north and south of the equator.

The following humorous squib from a New York daily is of course unjust to Mercator in a waggish sort of way, but the dig at the map publishers is well merited:

BRAND MERCATOR A FAKER IN MAKING WORLD MAP

Natural History Museum and Geographical Society Discredit Accuracy of Cartographer of 400 Years

"Mercator is now haled before the bar of science, for yesterday it was announced that the American Museum of Natural History and the American Geographical Society were in a joint plan to discredit him and his projection of the map of the world, after nearly four centuries of respected credence.

"Mercator is not here to defend his name, and as it was an assumed one it is just as well. He was really born Kaufmann, and translated his patronymic into the Latin equivalent for 'merchant' when he attained fame as a geographer and an engineer.

"It is no easy task to transfer a map of the spherical earth to the flat. Mercator craftily imagined to himself that the earth was a cylinder, and to carry out that idea he straightened out the meridians and made them parallel each other. In order to get this convenient arrangement past the public the venerable cartographer filled in the gaps with fictitious land and sea."

By Special Correspondent

Comte de Fayolle, managing director, Societe General de Transports Maritimes a Vapeur

PARAMOUNT among the developments in Seattle shipping during the past month has been the visit of Comte de Fayolle, managing director of the Societe Generale de Transports Maritimes a Vapeur, and the announcement that this powerful French shipping concern has completed plans for a direct steamship line with monthly sailings between Puget Sound and Mediterranean ports. The vessels of the fleet will call in the West Indies both on outward and homeward voyages. The ports of call on this coast will be Seattle, Vancouver, B. C., and San Francisco.

With Comte de Fayolle during his visit in Seattle were S. S. Norton, of Norton, Lilly & Company, of New York, agents for the French company in America, and W. J. Edwards, representative of Norton, Lilly & Company on the Pacific Coast with headquarters in San Francisco. Mrs. Norton was also a member of the party. Comte de Fayolle announced that the new service will be inaugurated by the steamship Mont Cenis, a steel steamship of 6700 deadweight tons. The Mont Cenis will be followed by the steamship Southport, according to Comte de Fayolle.

The Societe Generale de Transports Maritime is the oldest French shipping corporation in existence and controls a total of forty-two vessels by either ownership or charter. The company is now building seven steel steamships in England and France for its overseas services. The headquarters of the concern are in Marseilles.

There is a great demand in Southern Europe, we understand, for all the products of the Pacific Coast, particularly lumber and canned goods, and the ports of call on the Mediterranean will include practically all the important harbors, special attention being given to the development of trade between Marseilles and Genoa and the Pacific Coast. Kingston, Jamaica, will be the principal port of call in the West Indies of vessels of the Mediterranean-Pacific Coast fleet.

The Nippon Yusen Kaisha is seeking more modern terminals in Seattle as the Great Northern pier, Smith Cove, which its vessels have been using for years, is not adequate for the present fleet and far too small for the expansion of service planned by the Japanese shipping corporation. Conferences were held by Baron Kondo and officers of the Seattle Port Commission in regard to the Nippon Yu-

The Admiral line Steamship, President, leading the Pacific Fleet into Puget Sound sen Kaisha using the new Smith Cove public terminal, which is now being built at a cost of $2,000,000, and plans considered for constructing passenger accommodations as a part of the huge dockhouse. The Great Northern Railway Company, some time ago, submitted plans to the Nippon Yusen Kaisha for rebuilding its present terminal at Smith Cove, but delay in carrying the plans into execution has caused the Japanese company to seek other terminals.

The Nippon Yusen Kaisha has announced the following plans for increasing its fleets:

For the American Line, Seattle-Oriental service: Three new passenger steamships superior in speed and accommodations to the Empress liners of the Canadian Pacific Ocean Services, Ltd., now plying between Vancouver, B. C., and Victoria, B. C., and ports in the Orient; the vessels to be of 20,000 tons gross register.

For the European Line: Six steamships of an improved type of the Katori Maru, now operated between Seattle and the Orient.

For the Japan-Shanghai Line: Fast vessels of the same type as the English Channel steamships.

According to present plans, the Nippon Yusen Kaisha will withdraw the liners Katori Maru and Kashima Maru of the Seattle service and replace them with three 20,000-ton steamships of the latest type and highest speed. The new liners will be operated in connection with the steamships Suwa Maru and Fushimi Maru, now in the Seattle - Oriental trade.

The United States Shipping Board has awarded the contract for maintaining the radio apparatus on 438 of its ocean-going carriers to the Shipowners' Radio Service, Inc., the operating subsidiary of the Kilbourne & Clark Manufacturing Company of Seattle. The contract went into effect October 15. The Shipping Board has divided the maintenance of wireless apparatus on its ships equally between the Marconi Wireless Telegraph Company, the new Independent Radio Company of New York and the Kilbourne & Clark Manufacturing Company. Each company will maintain wireless apparatus on one-third of the government's huge fleets.

Plans for the establishment of an industrial sites department which will have jurisdiction over all public lands available for factories, are being considered by the Seattle Port Commission and county and city officers. It has been suggested that the port be made custodian of all public factory sites in the county and that an aggressive campaign for new industries be inaugurated. The first conference of port, city and county officers in regard to the project has been held and a committee appointed to take up the work of establishing the department. A tabulated report of idle lands in King County, Washington, submitted at the conference, shows 600 acres of unimproved property, sufficient to provide sites for hundreds of new factories. Port, county and city officers hope to inaugurate a more definite and concerted campaign in obtaining industries for Seattle by making sites for factories of all kinds more reasonable.

Completing a successful season, the whaling steamers Star I, Star II and Star III of the United States Whaling Company have arrived in Seattle from the company's station at Port Armstrong, Baranof Island, Southeastern Alaska. The three whaling steamers bagged a total of 121 whales during the season. About one-half of the whales taken were of the sperm and blue species.

The biggest whale bagged during the season was killed by Star II, Captain Fred A. Hovick, during a cruise off Cape Edgecomb in July. The big fellow was 86 feet long and gave the officers and crew of the Star II an exciting battle.

Captain Charles M. Nichols, representing the Foreign & Domestic Transportation Company of New York, which recently purchased five wooden steamships built in Seattle by the Patterson-MacDonald Shipbuilding Company for the Australian government, has arrived in this city and is preparing to take over the vessels for their new owners.

The fleet consists of the steamships Wisteria, formerly the Berriwa; the Dahlia, formerly the Beringa; the Bellata, the Bundarra and the Bethanga. The vessels will be loaded by George S. Rush & Company, who have taken over the agency of the Foreign & Domestic Transportation Company in Seattle. All the vessels are carriers of 4200 deadweight tons. E. McConalogue, manager of the steamship department of Bush & Company, will have charge of the loading of the vessels. The Dahlia has had her trial voyage and speed tests and has been chartered to the L. D. Carpenter Lumber Company. After a heating plant has been installed, she will go on berth at the Stimson mill in Ballard, where she will load a cargo of 1,400,000 feet of lumber for Cuba. The Dahlia will be followed by the Wisteria, which is soon to go on berth in Seattle.

The steamships Bellata, Bundarra and Bethanga will load coal in Australia for Honolulu, coming to Seattle in ballast.

Captain Nichols, who has arrived in Seattle to take over the five vessels for their new owners, is a veteran of the American-Hawaiian Steamship Company, and was formerly in some of the famous clipper ships sailing from Atlantic ports.

After a visit in Seattle of several days, in which he was entertained by the Chamber of Commerce and the Port Commission, James J. Rafferty, commercial agent in the United States for the Philippine Islands, has left for New York, where he will open a branch office. Before leaving here, Mr. Rafferty intimated that, owing to this city's growing importance in the commerce of the Pacific, a branch office also may be established in Seattle. He said that this city should make every effort to obtain fast and commodious passenger and freight vessels for a line of carriers for direct operation between Seattle and the Philippines. Mr. Rafferty will sail for the Philippines in December and will probably visit Seattle on his way to the islands.

The Seattle Port Commission has decided to join the new Foreign Commerce Association of the Pacific Coast in its efforts to defeat the bill pending in Congress providing for heavy increases in the tariffs on raw products from the Orient and aimed particularly at vegetable oils. At a recent meeting of the commission, Executive Secretary C. J. France submitted a report calling attention to the concerted efforts of domestic producers of cottonseed oil, beans, peas, peanuts and rice to have duties on these commodities advanced until they become prohibitive. The Port Commission passed a resolution declaring that the bill is a menace to the commerce of Seattle and the entire Pacific Coast.

By Special Correspondent

In spite of the strike of shipyard workers, more steel tonnage was turned over to the Shipping Board by the builders in the Oregon district in October than in any previous month, not excepting the period when four steel yards were operating instead of the three working at present. Four 9500-ton deadweight carriers were completed by the G. M. Standifer Construction Corporation, three 8800-tonners by the Northwest Steel Company, and one of the latter type by the Columbia River Shipbuilding Corporation—a total of 73,200 deadweight tons.

The strike of shipyard labor called October 1 for the adoption of the wage scale agreed upon in September had the effect in Portland of closing permanently every wooden shipyard but one, and closing the steel yard of the G. M. Standifer Construction Corporation for seven days. At the end of the week's shut-down, the management of the Standifer plant devised a plan whereby the difference between each employe's pay under the old Macy scale and under the September scale should be credited to him on the company's books and handed to him in a lump sum when the company receives a final payment from the Emergency Fleet Corporation. This arrangement was satisfactory to the union, and work was resumed on this basis in both the wood and steel yards of this company. The Northwest Steel Company and the Columbia River Shipbuilding Corporation paid the new scale beginning October 1, and no trouble was experienced in either of these yards.

Owing to the strike in the Standifer plant, Portland had the distinction last month of sending two 9500-ton ships, fully laden with general cargo, to the Orient in two weeks. The first of these, the Waban, was scheduled to sail in September, but was delayed in building. She was within two days of completion when work on her was stopped by the strike. She went on her berth immediately after the labor trouble was settled, however, and was followed a week later by another vessel of the same tonnage, constituting the regular October sailing from Portland to the Orient in the Admiral Line.

Direct service from the Pacific Coast to Mediterranean ports was inaugurated last month by the French steamship Mont Cenis, owned by a French shipping Company, the Societe Generale de Transports Maritimes a Vapeur. The Mont Cenis, after loading part cargoes at Vancouver, B. C., and Seattle, took on Portland's offering of freight for Marseilles and Genoa before going to San Francisco to finish loading. A monthly sailing from the Pacific to the Mediterranean is planned by this service, which is operated for the French company by Norton, Lilly & Company, represented in Portland by the Mann-Titus Shipping Company.

Probably the most important step ever taken for the development of Portland harbor was the action of the two port administrative bodies, the Port of Portland Commission and the Commission of Public Docks, when in a recent joint meeting they resolved to employ a competent harbor engineer to investigate by means of a thorough survey the needs of this port and to formulate a general plan of harbor development. This engineer is to be selected jointly by a committee from each of the two port bodies, and half his salary is to be paid by each commission. Ever since Secretary of the Navy Daniels looked at Swan Island in the lower Willamette and said, "Dig it out," there has been a good deal of discussion among those interested in harbor development as to whether or not this is really the best plan of procedure. The idea of engaging an expert harbor engineer was decided upon as a means of reconciling these differences of opinion.

A record in the loading of wooden Shipping Board vessels is believed to have been established in Portland when the 4000-ton Peninsula type steamer Brentwood put to sea with 1,551,716 feet of ties for the Atlantic. This cargo was originally placed on the Ballin type steamer Dertona, and she was loaded to capacity. In fact, stevedores claimed a record at the time for having placed so large a cargo on this vessel. On her sea trial, the Dertona developed a leak in her fore peak, and had to be brought back to Portland to be repaired in drydock. Her cargo was discharged into the Brentwood, and although this vessel had 500 tons less cargo space, she took every stick that had been loaded on the Dertona.

The thirty-sixth and last hull to be built for the Emergency Fleet Corporation by the Northwest Steel Company, the 8800-ton steel steamer West Jaffrey, was launched the last day of September. One steamer remains to be launched for the Shipping Board by the Columbia River Shipbuilding Corporation, and four by the G. M. Standifer Construction Corporation.

Steel vessels are being built on owner's account in the Northwest Steel and Columbia River yards. One of these, the J. R. Gordon, named after the vice-president and traffic manager of the purchasing company, has already been sold to the Union Sulphur Company of New York. The J. R. Gordon is scheduled for delivery in November and will probably take a cargo from Portland to New York on her way to enter the sulphur trade on the Atlantic.

LOS ANGELES

By Special Correspondent

THE investigation held by Colonel Frederick B. Downing, United States engineer in charge of this district, to learn what improvements are required by the harbor of Long Beach and Los Angeles, developed several large projects which are contemplated for the local harbor.

The hearing was attended by representatives of Long Beach, Los Angeles, San Pedro and Wilmington. Probably the most important announcement made was that of Engineer Ralph Reed of the Union Oil Company. He submitted a request for the dredging of the west basin to a depth of thirty-five feet. In supporting this request Mr. Reed told of the rapid increase in the business of the Union Oil Company since the installation of the new refinery in the west basin and their expectations for the future.

The San Pedro Chamber of Commerce had prepared a lengthy report of the improvements which it considers necessary if the port is to assume the position to which it is entitled. The San Pedro recommendations were indorsed by the Wilmington and the Los Angeles representatives and included four major projects. These were: The deepening of the main channel from thirty to thirty-five feet; deepening the turning basin and the west basin to thirty feet; deepening the east channel to thirty feet; extending the breakwater from a point 2500 feet easterly of the end of the present breakwater toward Long Beach and thus making a harbor enclosing nine square miles.

In his communication to Colonel Downing, Mr. Reed says: "It is the desire of the company to develop from this port a large export business in refined and lubricating oils, and such business cannot be satisfactorily developed until we are able to use the 1500 feet frontage on city tide lands and on the west basin directly in front of our present refinery site. We cannot plan the development of such business until we are assured that we can bring our own and other ships of thirty feet draft into the west basin and properly handle them at that point.

"In addition to this outgoing business there will necessarily arise a considerable amount of incoming business both in shipments of box shooks and packages for shipments which cannot be made in bulk, and due also to the fact that we plan to ship from our Mexican properties by tank steamer large amounts of refining crude and tops for further treatment at our refinery.

"We have already shipped from Mexico to our Oleum refinery on San Francisco Bay a large number of cargoes of Mexican crude and wish to handle such cargoes on a large scale as soon as possible at our Los Angeles refinery.

"It will be of interest to you to know that this company operates a fleet of sixteen tank steamers and barges, with a deadweight tonnage of 116,049 gross tons and that it expects to add to this fleet from time to time as necessity demands. The largest of these steamers have a draft of more than thirty feet and consequently we could not load them in the inner harbor at the present time."

The question of flood control which has been agitated ever since the disastrous floods of 1914 which caused the Long Beach and a portion of the local harbor to be filled with silt has reached a new stage as the result of the forest fires in the mountains.

Within the last few weeks the county supervisors reached an agreement with the city officials of Long Beach whereby the latter turned over and vacated streets in the flood control channel so as to facilitate the work. This move was made after United States harbor engineers pointed out the possible danger of silt damage to the harbor and requested early action so that the appropriation by the government could be made available at the same time the county funds were spent.

That Oriental, European and American steamship companies are contemplating regular service to this port was made known recently through inquiries received by I. G. Lewis, secretary of the San Pedro Chamber of Commerce. All the inquirers were agents of big concerns and requested data on docks, wharves, warehouses, channel depths and other similar information. The inquirers represented the Osaka Shoshen Kaisha, Mitsui & Company, The Norwegian American Company and Austin & Baldwin of New York. All intimated that service to the Pacific Coast including the local harbor would be a regular feature of the companies' business.

Much interest is being attached to the visit of Clarence Matson, traffic manager of the harbor commission, to San Francisco in an effort to procure a differential rate on cotton from the cotton growing States to this port. The local harbor commission and others declare that the rates from Louisiana and other Gulf States should be less to Los Angeles than to San Francisco or Puget Sound ports owing to the shorter rail haul. Washington authorities have been requested to take some action in favor of Los Angeles.

The present season for the canners has been one of the largest in the last few years. E. D. Seward, manager of the Canners' Clearing House Association, recently reported that 14,000 tons of fish had been passed through the clearing house. This fish was distributed to all the canners in Los Angeles and Long Beach harbor. Included in the total were 4229 tons of albacore, 6389 tons of tuna, 547 tons of bonita, 53 tons of yellowtail and 1654 tons of other varieties of fish.

TACOMA

By Special Correspondent

FOLLOWING the walkout of the men employed at the plant of the Todd Drydock & Construction Corporation, October 1, no word had been received by the local officials of the company up to the middle of the month regarding resumption of work at this plant. About 6500 men are affected by this labor trouble. As in other yards of the coast, the walkout came as the result of the action of the Shipping Board in refusing to meet an advance in wages said to have been adopted at the conference of employers and employes held at San Francisco in July.

There are many rumors regarding conditions which brought the present situation about. So far company officials refuse to make any statement. The workers say they were promised an increase of eight cents an hour per man on the basic scale. This was signed in good faith by them and they allege that the yards broke faith with them in failing to make good in their contract.

It is held by some who are acquainted with the situation confronting the Todd yard that the company, on its own account, will not be able to pay the eight-cent additional wage which it will have to do under the ultimatum given by the Shipping Board and Navy Department. It is pointed out that the yard is working on a cost-plus contract of 10 per cent. This 10 per cent would be more than wiped out by the additional wage increase added to the yard. It is said that the Seattle yards now operating and paying the additional rate are building on a direct tonnage contract and are better able to meet the added cost. Some builders, however, hold that such yards are figuring on a very close margin.

The situation confronting the shipyards here is not reassuring, and they certainly are "between the devil and the deep sea." It is doubted on some sides whether the Todd interests really signed any agreement on a new scale, and if anything was signed tending to show that this yard was agreeable to an advance it was some joint action with the belief that all yards would acquiesce.

The closing of the yard here is having its effect on business conditions and the financial loss to all concerned will be heavy. As it is, some definite word from the executives in the East is anxiously awaited by the plant officials and heads of labor organizations between whom the most cordial relations exist.

Another big Oriental cargo left Tacoma during October for the Orient. This freight, made up of lumber, was taken on the steamer West Ira. About half of the lumber was from Tacoma mills and the remainder from Bellingham. The West Ira took approximately 4,300,000 feet of lumber. A similar cargo was shipped on the West Hepburn in September.

The offices of the International Stevedore Company, formerly in the Pacific Cold Storage building, have been moved to the Perkins building, up town. The former offices were occupied for about twenty-eight years. The firm was then known as McCabe & Hamilton. Both the original founders are dead. The new offices are finely fitted up. Captain W. Frank Andrews, vice-president of the company, with headquarters in Tacoma, is very proud of their new home.

Local manufacturers of box shooks report a big inquiry from all parts of the world for box shooks. It is believed that the mills of Tacoma and Grays Harbor in this special line of manufacture will have all the business they can attend to in the next few months. The business rests around the capacity of the mills and the question of securing tonnage to handle the trade. It is said that the business last year amounted to around 5,000,000 shooks. Orders received recently from only two sources exceed that amount. Business is being received from Borneo, Palestine, Spain and England. English business is reported to be especially promising.

The waterfront strike at San Francisco had a serious effect on Tacoma marine trade. The Pacific Steamship Company curtailed all their trade out of Tacoma. Only one cargo of 500 tons was moved outward to California, and this went to southern parts of the state.

Sponsored by Mrs. Paul Savidge, wife of Paul Savidge, assistant to Vice-President and General Manager J. A. Eves of the Todd Drydock & Construction Corporation, the 7500-ton steel steamship Higho was launched the evening of September 27. The Higho is the last vessel placed in the water previous to the present shipyard trouble which has closed the yard down.

At the time the Higho was launched, the yard had the steamers Zarembo and Ophis about completed. These vessels have since been turned over to the Shipping Board and have taken cargo and moved to east coast ports. Both steamers loaded their freight at Tacoma.

After being absent from Tacoma for about six months, Captain O. B. Lindholm, skipper of the Santa Alicia, brought his ship back about October 18. Captain Lindholm has made his home in Tacoma for a good many years and formerly sailed out of here in some of the old-time schooners. Since leaving in the Santa Alicia he made a voyage to France with a cargo of coffee.

Indications point to about ten flour cargoes, ranging from 7500 to 10,000 tons, leaving here within the next six weeks. A number of the vessels will be handled by W. R. Grace & Company.

On the Shores of Grays Harbor

STEEL ship contracts in excess of $30,000,000 are available and will be accepted soon by Northwest shipbuilding interests, according to Captain A. A. W. Shoneis, admiralty lawyer representing large Eastern shipping interests, who was in Grays Harbor recently looking over ships in the harbor with a view to furnishing his clients with information regarding possible purchases. He is a member of the firm of Jacobson & Pollock, New York attorneys. Captain Shoneis acted as agent for Central American interests in purchasing the Belen Quezada from a Paris firm in Vancouver, B. C. He has been on the Pacific Coast five months and has interviewed leading shipping men. Among other things he is investigating shipments from inland points here to inland points overseas. He plans to prepare a technical work on this subject.

"The demand for tonnage," said Captain Shoneis, "is greater than ever and the price offered breaks all records for sustained periods. The price will remain between $85 and $90 at Northwestern ports for many years. Need for shipping is growing throughout the world. The much-heralded slump in shipbuilding will not come suddenly and may never come at all. The movement of lumber is at present actually slackened because of the lack of tonnage. I have reliable information from men at the head of large shipping and shipbuilding concerns on the West Coast that contracts for more than $30,000,000 are offered by diverse foreign interests. The ships sought, however, are not to be of wood, but to some extent of steel."

A total of thirty-five vessels, carrying 28,000,000 feet of lumber, cleared from Grays Harbor in September last, compared to twenty-five vessels carrying 18,000,000 feet in the same month of 1918. Of the September, 1919, shipments twenty-five vessels with 23,000,000 feet were in the coastwise trade.

The construction of a lightship to be stationed off the entrance of Grays Harbor, as recommended by the Secretary of the Department of Commerce, is provided for in a bill prepared by Congressman Albert Johnson. The bill limits the cost to $500,000. There being no funds available for the purpose, a special act of Congress is necessary. In a letter to Congressman Johnson, Secretary Redfield said:

"This subject has been carefully investigated and the department is of the opinion that a full-powered light vessel to mark the entrance of Grays Harbor would be a desirable and important aid to navigation. The records of the collector of customs show that 331 vessels during the fiscal year 1918 entered and cleared from this port, having a total tonnage of 270,397, and exports and imports valued at $6,784,990, this being in addition to vessels constructed for the United States Shipping Board and numerous gasoline launches."

The annual report of the chief engineer, Major-General W. M. Black, will contain a recommendation that sufficient money be appropriated for construction of a deep-sea dredge for Grays Harbor. This subject has been under consideration by the engineering corps for many months, and considerable correspondence has passed between that department and the Hoquiam Commercial Club, as well as between the club and the state delegation in Congress. A letter received recently by the club from the engineer's office states that the subject will come up in due course in connection with the rivers and harbors bill to be introduced in the next session of Congress.

Coming in from the whaling grounds during a storm early in October, the steam whaler Westport, of the American-Pacific fleet, was obliged, because of the heavy weather following seas, to cut the towline attached to three whales. The loss, including harpoon and rigging, amounts to $5000. The total catch of the fleet for the season is 159, distributed as follows: Moran, 64; Westport, 57; Aberdeen, 38.

The Grays Harbor port commission has come out strongly for comprehensive and adequate harbor development, and under the plan of procedure now under consideration the entire inner channel, all the way from Aberdeen to the bar, a distance of about fifteen miles, will be dredged. As a member of the port commission, Frank H. Lamb has taken a decided stand in the matter and made public the following statement: "Grays Harbor in seven years has spent upwards of $100,000 in doing a little patchwork on the harbor which has been about as effective as packing sand into a rat hole. I am opposed to further stop-gap methods of spending public money without a definite plan or adequate supervision. I am strongly in favor of starting work on a comprehensive harbor development, including the entrance, interior channels and docks, a development like that which has been so successfully carried out in other ports, such as Astoria, Oregon, and Vancouver, Washington."

MALLEABLE CAPACITY IDLE

IN connection with the insistent demand for malleable castings, the American Malleable Castings Association reports that this condition has been anticipated and that ample facilities have been provided for both the present and future expansion of the industry.

It is stated, however, that at the present time the shortage of unskilled labor will not permit of these facilities being used. Fully 200,000 tons of malleable capacity is today idle, but would be immediately available if the necessary labor could be secured.

Improvement in this direction is not looked forward to with any great hope until the activities of other industries are curtailed or until there is a flow of immigration sufficient to build up the supply of labor available for foundry work.

This means, therefore, a large percentage of capacity idle continuously in every plant, regardless of heavy unfilled orders.

The Shipping Board announced yesterday that the contract for supplying the government ships with lubricating oils at ports on the Pacific and at Honolulu had been granted to the Standard Oil Company, the contract to go into effect for one year on October 24. The contract for the Gulf and Atlantic ports was turned over to the Vacuum Oil Company.

VANCOUVER

By Special Correspondent

DURING the past few weeks there has been considerable activity in realty transactions in Burrard Inlet. All have connection with drydock propositions. The Coughlan interests have purchased 187 feet of frontage east of the P. Burns abbatoir and have commenced work on a marine railway with a capacity of 8800 deadweight tons. If they get the government subsidy for a drydock they will purchase more land for that purpose.

Mr. A. Wallace, of the Wallace Shipyards of North Vancouver, has bought the 187 feet frontage beside the Coughlan purchase. He has also made application to Ottawa for a drydock subsidy.

The B. C. Marine, Ltd., has recently been picking up properties adjoining its plant and now owns 350 feet frontage on Burrard Inlet, with a depth of 500 feet to the C. P. R. main line tracks.

Vancouver has been anticipating the commencement of government harbor developments for some time, but delays have occurred. It is reported from Ottawa that the government may do nothing further until the results of the present Victory Loan campaign is known.

Captain George E. L. Robertson, superintendent of pilots for the Dominion government, has been in the West this month conferring with shipping interests with a view of establishing some pilotage fee that will suit everybody and yet pay all expenses of the department. He estimates Vancouver pilotage district will cost $80,000 yearly. Captain Robertson left the impression that the wage for pilots would be fixed at $300 a month. The superintendent of the Vancouver pilotage district is to be selected by a committee consisting of Captain Whittaker, president of the Great War Veterans' Association; Mr. E. H. Beazley, of the Union Steamship Company; Captain C. H. Nicholson, of the Grand Trunk Pacific lines, and Captain J. W. Troup, of the Canadian Pacific Railway coast service.

With the arrival of the O. S. K. steamship Borneo Maru, the regular service of this line with Vancouver is resumed. She will load a half million feet of lumber for Japan.

The first apprentices on the Canadian Robert Dollar freighters sailed on the steamship Melville Dollar, Captain Wright, on October 19. The Dollar Company has decided to train boys for the position of officers. At present one lad will be with each ship. He will stand regular watch and learn practical seamanship, and in addition the captain will instruct him in navigation and will supervise his studies in these lines. Captain Morton, port captain for the company, was wroth with the local papers for announcing the decision to take apprentices, as he was flooded with requests from young adventurers who wanted to become seadogs.

The Marconi Company has applied to the Canadian government for permission to erect a high-power wireless station near Vancouver, B. C., that will span the Pacific. Negotiations are also under way between the company and the Japanese government for similar privileges in Japan. The Canadian station will cost about two million dollars, and will deal entirely with commercial matters.

The tugboat Vulcan of the Brunette Sawmill Company sank on the beach at Cracroft Island and was salved by the Vancouver Dredging & Salvage outfit. She is now on the ways at Vancouver undergoing overhaul.

Two steel ships were launched from Vancouver yards since our last issue. The first was the Canadian Aviator, a 5100-ton ship built by the Wallace yards for the Dominion merchant marine fleet. The Aviator was launched more nearly complete than any other big vessel ever launched on the Pacific. She was a completed ship excepting for the installation of boilers.

On October 18 the War Chariot, launched at the Coughlan yards on September 24, was on her trials. She is the last of the 8800-ton ships built by Coughlan's for the Imperial Munitions Board. The War Chariot is the tenth ship launched, but the fourth laid down on this contract. She is the vessel that was ready for launching last year when fire swept the yards and melted the sides of the vessel. She is practically rebuilt.

The Coughlan shipyard is working on four ships of 8100 tons each for the Canadian government; the Wallace yards are busy on one. Other contracts are expected.

Vancouver longshoremen and coastwise shipping interests have closed an agreement. The men receive 80 cents straight time and $1.05 overtime. This rate extends to Prince Rupert and includes that port.

The Canadian National Railway expects to place two freight ships on the Australian run by the beginning of the year. They are the 5100-ton ship Canadian Raider and the 8100-ton ship Canadian Importer, both Vancouver built.

The marine department is asking tenders for two large and powerful motorboats. British Columbia shipbuilding firms are competing. The boats are to be 75 feet long, with a beam of about 20 feet, and will be used as lighthouse tenders. They will be equipped with semi-Diesel engines.

The United States lighthouse tender Cedar is to drydock at Prince Rupert. This is said to be the first record of a United States government vessel using the Canadian government facilities at the northern port.

Lieutenant-Colonel Kirkpatrick, a mining engineer, and Major McKenzie, the engineer who built the Stave Lake power project, have been appointed members of the Vancouver Harbor Commission in place of J. Fullerton and G. Carter-Cotton, resigned. Mr. Sam McClay is the only member of the old board who is still a member. Colonel Kirkpatrick is chairman.

Victoria Marine Notes

By Special Correspondent

THE Foundation Company of British Columbia has finished the construction end of the contract for twenty wooden steamers ordered by the French government, and the two four-way yards are empty and deserted, the last hull, that of the Nouvelle Ecosse, with Mrs. Bayly Hipkins wife of the Pacific Coast manager of the company, as sponsor, having been launched on October 9.

Mr. Hipkins returned recently from a meeting with his directors in New York, and he brought back with him the sanction of his company to go ahead with a community shipbuilding scheme which would keep the big firm in Victoria and aid greatly in solving the employment problem this winter. Mr. Hipkins laid before the Board of Trade at Victoria three proposals: One calls for the building of wooden steamers, another for auxiliary schooners, and the third for schooners without auxiliary power. At the time of writing, the scheme is being investigated. The company has offered to invest in the venture, while the public of British Columbia and the workmen in the yards will be asked to subscribe. The shutting down of the Foundation yards has released approximately 3000 men.

The Cholberg Shipyard has its three ways empty. Two of the wooden schooners built there are now on their maiden voyages, while the third is being completed at the plant. In order to keep the yard busy, the Cholberg Company is endeavoring to form a community concern, in which the company, the yard workmen and the public would hold shares. The scheme calls for the building of wooden barkentines to be used mainly in the lumber trade from British Columbia. The matter has been laid before the business men of the city, but no decision has yet been arrived at.

Five returned officers, two from the army, two from the navy, and one from the air service, have jointly purchased the freighter Cascade and are manning her themselves. As they are not worried with union rules, such as the eight-hour day and overtime, the men are able to operate the vessel more cheaply than would ordinarily be possible.

On her way from Victoria to New York, the former Dunsmuir steam yacht Dolaura, now owned by Arthur Meeker of Chicago, put into Salina Cruz for coal, and, after waiting five days, succeeded in getting twenty tons at the exorbitant price of fifty-five dollars a ton.

The firm of Yarrow's, Victoria, is building a steel shallow-draft ferry which will handle vehicular and pedestrian traffic crossing the Fraser River at Mission, British Columbia. The new vessel will have a length of ninety feet, a beam of thirty feet, and will draw only three feet of water. One man will be able to control the ferry from the pilothouse without the use of an engineer. Four propellers, two at each end, driven by gasoline engines turning at 500 r. p. m., will drive the ferry at from nine to ten knots. The British firm of Messrs. Yarrow, with which the Victoria concern is associated, has been building shallow-draft craft for nearly five years.

The British government has offered to return to her owner, without the payment of costs or damages, the prize schooner Oregon, which was seized in the Gulf of California in August, 1916, by the cruiser Rainbow, with alleged contraband on board, and which has lain ever since in Victoria harbor. The case came before the Admiralty Court in Victoria and was later transferred to London, where it was allowed to lapse. An order was secured some time ago forcing an early trial and this was set for October 30. Early in October the offer was received from the British government, and at the time of writing the owner had neither accepted nor rejected it. The schooner Leonor, seized at the same time as the Oregon, is still in Victoria, and her case is to come before the court in London on October 30.

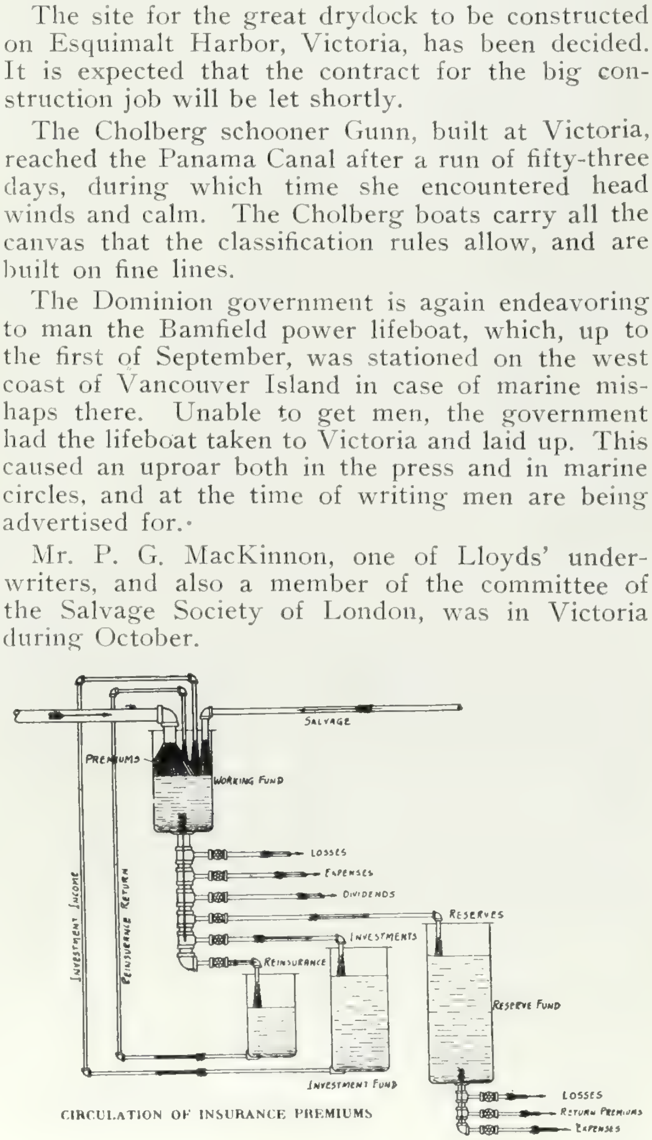
Thousands of Chinese coolies are boarding trans-Pacific steamers at Victoria on their way back to China after serving in labor battalions in France during the war. A huge camp is situated near the quarantine station, Victoria, and there the Chinese wait, after a long train journey across the continent, for the transports that will carry them home. The Blue Funnel liner Tyndareus on October 13 sailed out with nearly four thousand coolies, said to be the largest number of human beings ever transported across the Pacific on one ship.

The site for the great drydock to be constructed on Esquimalt Harbor, Victoria, has been decided. It is expected that the contract for the big construction job will be let shortly.

The Cholberg schooner Gunn, built at Victoria, reached the Panama Canal after a run of fifty-three days, during which time she encountered head winds and calm. The Cholberg boats carry all the canvas that the classification rules allow, and are built on fine lines.

The Dominion government is again endeavoring to man the Bamfield power lifeboat, which, up to the first of September, was stationed on the west coast of Vancouver Island in case of marine mishaps there. Unable to get men, the government had the lifeboat taken to Victoria and laid up. This caused an uproar both in the press and in marine circles, and at the time of writing men are being advertised for.

Mr. P. G. MacKinnon, one of Lloyds' underwriters, and also a member of the committee of the Salvage Society of London, was in Victoria during October.



CIRCULATION OF INSURANCE PREMIUMS

NEWS ITEMS

The Sizer Forge Company of Buffalo have opened a district sales office at 208 South La Salle street, Chicago, Illinois, with Marshall C. Edmunds as district manager. This office will look after the sales of the company for the States of Wisconsin, Minnesota, Illinois, Iowa, Missouri and upper Michigan.

The Admiral Line is now operating the largest American fleet on the Pacific, according to official figures from Washington. The company owns and operates twenty-three of its own ships and manages or operates forty for the United States Shipping Board.

Mr. Conrad B. Rubery has recently been appointed works manager of the Sizer Forge Company, Buffalo, N. Y. Mr. Rubery, who for several years was in charge of production at the Heppenstall Forge and Knife Company, Pittsburgh, resigned from his position there early in 1916 to take charge of shell steel production in this country for the British Munition Commission. In December, 1916, he went to England, where he acted as supervisory forging engineer for the Ministry of Munitions until the end of the war.

The Third San Francisco District Corps of Engineers, United States Army, and the California Debris Commission, having supervision of the War Department control of the Sacramento and San Joaquin Rivers and their tributaries, and adjacent waters to the eastward, announce the removal of their joint office from room 405 Custom House, San Francisco, to the fourth floor of the Fair building, 240 Montgomery street, San Francisco, between Pine and Bush streets.

The Lidgerwood Manufacturing Company of New York, announce the opening of a branch office in the Hammond building, Detroit, Michigan, for the sale of their contractors' hoists, derricks and cableways, mine hoists, ship's winches and steering gear, and logging machinery. Mr. R. S. Hutchinson, formerly of the Lidgerwood office in Philadelphia, will have charge of the Detroit office, under the direction of Mr. F. B. Knight of the Lidgerwood Chicago office, who previously handled this business in Detroit.

Major Charles T. Leeds, United States Army, who during the war has been United States District Engineer, with headquarters at Los Angeles, has been released from active duty and has resumed private engineering practice as an active member of the firm of Leeds & Barnard, 705-6 Central building, Los Angeles, California.

The marine department of the Aetna Insurance Company, Pacific Coast branch, wish to announce the removal of their office to No. 340 California street, San Francisco.

On October 1, the Chicago Pneumatic Tool Company will remove its Birmingham office from 801 Brown Marx building to 1925 Fifth avenue, North, where a service station with a complete stock of pneumatic tools, electric tools, air compressors, oil engines, rock drills and repair parts will be maintained.

AIDS TO NAVIGATION IN ALASKAN WATERS

THE lack of aids to navigation, signalling devices, lights and bouys in American waters on the Alaskan route has long been a sore point with Alaskan shipping men. The matter has now been taken up very urgently by Canadian sailors in Alaskan waters, and the following suggested improvements have been submitted by them to the Federal government at Washington. It is earnestly to be hoped that the necessary machinery will be set in motion to insure the carrying out of these suggestions. Undoubtedly many of the wrecks in these waters and the great loss of life attendant thereon could have been avoided if the dangerous spots had been safeguarded. The Canadian sailors ask only the following very necessary aids on the main track. The Vanderbilt Reef and Cunard Island aid being urgent:

Angle Point: (Bold Island), off east entrance to Tongass Narrows, light and fog horn, to guide vessels bound to the westward, toward entrance of Ketchikan Harbor.

Guard Island: West entrance to Tongass Narrows, fog horn, along with light already there, to guide vessels bound eastward toward Ketchikan Harbor.

Sukoi Id: (Frederick Sound), light and fog horn in position of present light, as guide toward north entrance to Wragell Narrows. This is especially necessary on account of the presence of ice making course and time unreliable.

Grave Point: (Stephens Passage), light and fog horn in position of present light, to guide vessels toward the Gastineau Channel, or safe anchorage in Taku Harbor. The presence of ice makes the courses and time in this vicinity unreliable.

Vanderbilt Reef: (Lynn Canal), a good light and fog horn, to guide vessels clear of this very dangerous shoal, and also as a guide to clear Sentinel Island Reefs.

Sherman Rock: (Lynn Canal), light to be established on the buoy marking the rock, instead of on shore, as the light on the buoy would give a more accurate departure, and could be seen from the vessel when the light on shore could not.

Battery Point: (Chilcot Inlet), light and fog horn to be established to guide vessels towards Skagway or Portage Cove. At present, if a vessel is caught in a snowstorm, after having passed Battery Point, she has no alternative but to keep on her course down the canal, or lay to, in the canal until the weather clears, which are both dangerous, but with a fog horn on Battery Point a vessel bound up the canal, or one having turned back on account of weather, would be able to make safe anchorage in Portage Cove or Skagway Wharf.

EAST COAST FISHERIES EXPANDING ROCKLAND PLANT

The first step in a development which it is believed will require the expenditure of $1,500,000 has been taken by the East Coast Fisheries Products Company of Rockland, Maine, who have awarded a contract to the Aberthaw Construction Company of Boston, Massachusetts, for the erection of fish packing and office buildings and an ice machine building at a cost of $75,000. Present plans, it is understood, call for the undertaking of the remainder of the program, which includes the erection of new canneries and curing plants, in the early spring.

Marine Insurance

Recent Developments in Marine Insurance

By Charles F. Howell

RECOMMENDATIONS designed to place American marine insurance on a sound footing as regards foreign competition have been submitted to the sub-committee of the Congressional Merchant Marine and Fisheries Committee, which is investigating the subject, by the Association of Marine Underwriters of the United States. Benjamin Rush, president of the Insurance Company of North America, offered the statement on behalf of the Association. Among the more important points made by the underwriters were the following:

"The disabilities under which the American marine insurance companies have suffered in the past have been: The absence of any considerable volume of American hull insurance, due to the fact that few vessels registered under the American flag have been engaged in world-wide commerce; they have to compete with the marine insurance markets of the world and their principal competitors are those whose governments impose a minimum of restrictive legislation and taxation; and they, together with the agencies of foreign companies regularly entered in the United States, pay taxes on premium income in the United States, whereas their aforesaid competitors in foreign countries are taxed on net profit.

"As an illustration, a hull insured for $100,000 at 5 per cent in the United States pays a tax on the premium of approximately $200 against about $25 in England. They are required to keep substantial reserves and deposits in more than one State for the security of policyholders. A material volume of marine business is placed abroad with companies either not entered in the United States or through the home offices of foreign companies which are entered in the United States, thus escaping the payment of taxes imposed upon American marine insurance and foreign insurance companies regularly entered in the United States.

"The companies suffer a handicap owing to the fact that they have to operate under the laws of various States and these laws are not uniform and are often conflicting and appear in many cases to be drawn primarily with regard to the regulations of fire insurance rather than marine insurance. This not only hampers the activities of the companies but involves them in expense, necessitated by the segregation and the preparation of separate figures for each State; the figures for one state have to be made up on a different basis from those for another State. Their foreign competitors are under no such disability. It is submitted that this is prejudicial to the interests not only of the American underwriter but to the commerce of the United States, as in its essence commerce is and must be international, the American merchant, American underwriter and shipowner must be prepared to meet the competition of other nations throughout the world, and this fact must be recognized in all legislation, State or national, dealing with insurance upon commerce.

"Considering these matters in order the Association, therefore, makes the following recommendations:

"1. As regards the volume of business. This requires no action by Congress. Hull insurance is one of the foundations of marine insurance, and all that the American market requires is a diversified volume of this business. This result can only be obtained through the growth of the American merchant marine and foreign trade, and by the development in this country of the sentiment of American insurance being placed with American insurance companies.

"2. Taxation. This Association feels that the disabilities created by a premium tax could best be met by an arrangement which would abolish the taxation on premiums of marine insurance business, substituting therefor a tax on net profits, thereby placing it on an equal basis with its foreign competitors. If this proves to be impracticable it is felt that an equalizing tax should be imposed upon any marine insurance placed in a foreign market adequate to place it on an equal cost basis with the business which is done by American companies, and that some more perfect plan of collecting this tax than that provided in the present revenue bill be devised. The question of what is an adequate tax and the proper method of enforcement might with advantage be investigated by the committee, subsequently suggested in paragraph 4. This Association believes that legislation designed to force the placing of marine insurance exclusively with American companies would be unwise and would probably result in foreign buyers making their purchases on the basis of cost and freight, or free on board shipping port, thus permitting foreign buyers to arrange their own marine insurance abroad with the result that American marine insurance underwriters would lose a considerable portion of the export business. Foreign sellers could easily arrange to sell on terms of cost, insurance and freight thus causing loss to American companies of a considerable portion of the marine insurance on import business.

"3. Regulations. As regards the disabilities arising both from the present system of taxation, and from the multiplicity of regulations under the

FIREMAN'S FUND
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JOSEPH HADLEY, European Agent
3 LOTHBURY, E. C.
LONDON
E. A. VALENTINE, Special Agent
714-715 BOARD OF TRADE BUILDING
PORTLAND, ORE.
FRANK G. TAYLOR, GENERAL AGENT FOR WASHINGTON, OREGON, ALASK

various laws of the different States, this Association feels that this can only be overcome by uniform regulations by the States. The limitations imposed by the constitution and the decision of the Supreme Court preclude the taking away of this authority from the States and vesting it in the Federal Government.

"4. The Association feels that by reason of the constitutional control exercised by the various States, the Federal Government is hampered in adopting any action which could be of material assistance in stimulating the development of American marine insurance. However, they do feel that the appointment of a committee by Congress composed of men thoroughly familiar with the principles of marine insurance and its practical operation to draft a model law for the District of Columbia and the enactment of this law by Congress would provide a basis for the standardization of State laws. This would ultimately prove of great value to the American shipowner, American commerce and American marine insurance companies.

"The enactment of such a law after a study by competent experts would undoubtedly have great weight with the insurance departments and legislators of the various States. The Association hopes that with this powerful illustration the principal maritime States would be disposed to enact similar legislation dealing with this important subject thus recognizing its national and international importance.

"The Association also desires to express its approval of the provisions for fixing loadlines and free board as provided H. R. 3621 (the Alexander Bill), and hope that they may be enacted into law."

Caught in a Japanese Loss

Word has been received of the loss of the new Japanese steamer Yoten Maru. She ran ashore outside of Kobe and is now reported to have broken in two and become a total loss. Some of the hull insurance on this vessel found its way into the New York market through the medium of a blanket reinsurance cover on Japanese hulls placed by a prominent brokerage house of this city. The hull was valued at $1,750,000, and close to a half million dollars of it was covered in this market. The steamer carried a valuable cargo of silks and Chinese cotton valued at about $2,500,000. A large portion of this was insured in this market through open covers on commodities coming from the Far East. This was a heavy loss and will wipe out a considerable volume of both hull and cargo premiums.

A Hurricane Souvenir

Recent advices are to the effect that the schooner Copperfield, which was blown ashore in the recent Gulf hurricane, has been towed into port dismasted and that most of her deck cargo and a lot of her under-deck cargo is damaged. Repairs will be effected for approximately $50,000. The hull, which was valued at $100,000, and the cargo, the valuation of which was $150,000, were both insured in the New York market.

Would Force Down the Average

A number of marine insurance brokers are using the low rate of exchange to force down the amount mentioned in the average clause in the American hull policy. The amount was formerly $4850, based on the same clause appearing in the English policies which read £1000. Several fleets have recently been offered in the New York market with the average clause noted as $4180. This reduction in average should not be allowed by the underwriters as it will be very hard for them to get the amount up again to its original figure when exchange comes back to normal.

Lake Marine Difficulties

The strike of the dock laborers at the upper lake ports has seriously affected lake marine insurance. Little coal or ore has been handled for several weeks, and a large number of the bigger vessels have been laid up in consequence. This will be reflected in the usual rebates of premiums at the close of the season, as rebates are provided whenever vessels are laid up for a specified period or longer, because of their freedom from the hazards of navigation during that time. The ore and coal shipments for the year are materially below normal. In August, last year, 1,442,000 tons of bituminous coal were delivered at Duluth and Superior, while only 520,500 tons were delivered in August of this year. Up to September 1 of this year the amount of anthracite received at Duluth and Superior was 121,000 tons short of the previous year's record. Of recent years underwriters have not found the writing of lake hulls to be a very profitable part of their business. When one considers the small premium charged on these vessels in comparison with the amount insured it will be readily seen that one loss will make a startling hole in the premium account. There were a total of no less than five hundred and fifty-one losses reported to underwriters in 1918, of which two hundred and sixteen constituted claims under the policies; and this, when all adjustments had been made, cost the underwriters something over $1,-

INSURANCE COMPANY
Freights and Disbursements
STREETS, SAN FRANCISCO, CALIFORNIA

W. H. WOODRUFF, Special Agent
230 BYRNE BUILDING
LOS ANGELES

F. H. & C. R. OSBORN, Managers
ATLANTIC MARINE DEPARTMENT
72 BEAVER STREET NEW YORK

ND BRITISH COLUMBIA, 309 COLMAN BUILDING, SEATTLE, WASHINGTON

000,000. An analysis of these claims showed that the majority of them resulted from ice damage great enough to apply regardless of the 3 per cent warranty. These were fifty-two in number. Claims resulting from striking bridges, docks, etc., were a close second, their number being forty. There were thirty-nine collisions, twenty-six groundings, and twenty-three strandings. Nineteen-eighteen was an especially bad year in that the number of partial losses exceeded that of other years. At the beginning of the season, however, the captains were confronted with unprecedented ice conditions on all the lakes. This year the losses have been fairly heavy, and at the most the underwriters can only look for an even break. The rate on steel vessels on the lakes is, unlike that on ocean vessels, always the same; that is, 3¾ per cent, which is about 3⅜ per cent net to the assured. For the disbursement cover a gross rate of 1⅜ per cent is charged.

Champions the Old Companies

That the older marine insurance companies are deliberately planning to drive out the newer ones is hotly denied by Hendon Chubb, one of New York's prominent underwriters. He says: "It seems to me to be the hysterical cry of some one hurt by his own folly. That there is any concerted or general attempt on the part of old established marine insurance companies, either American or foreign, to drive out new companies by reducing rates is on the face of it ridiculous. The old established companies know too well what inadequate rates mean, and there is too much to lose and nothing to gain by such proceedings. As far as my observation goes, nearly all the reductions in rates have been brought about by the new and less experienced companies. This is natural. During the war they had a large business on war risks. This is now gone, and in order to secure other business they have to offer inducements and these inducements naturally take the shape of reduced rates. The marine insurance market, not only in America but all over the world, has been expanded and new companies have come in. Some of these naturally are without much underwriting experience or judgment, and during the process of their education all underwriters will have to suffer. The history of marine insurance after all great wars has been the same. There has always been a great expansion during the war, based upon war risks, and when the war risks are taken away there is keen competition for the diminished business. Marine insurance has never been subject to tariff control as fire business is, and therefore rates have been competitive and there have always been periods during which much of the business has been done below cost."

Lloyds for Simon Pure Britishers

Considerable stir has been caused in Great Britain by the announcement that hereafter none but British born subjects will be eligible for membership in Lloyds. It is said, in defense of the measure, that it is one of supererogation and that there have been no members who would be disqualified by the new regulation for some time past. In the early days of the war this was evident when other corporations were faced with a difficult problem in the form of several enemy members, some of them of unimpeachable loyalty to the British crown, but none the less of enemy birth.

National Value of Classification Societies

Friends of the American Bureau of Shipping will feel properly inclined to suggest our taking a leaf out of the British book as revealed in the recent speech of Sir David Beatty, admiral of the Grand Fleet, in his acceptance of election as an honorary member of Lloyds. The value to a nation's welfare in having a dependable classification society and a substantial merchant marine was never better put than in the following words of the admiral: "The navy recognizes Lloyds as being one of its greatest and most influential supporters. We owe a debt of gratitude to Lloyds for its wonderful system of intelligence. During the war that intelligence was of supreme importance to us who had a responsible position on the seas. For information we continually referred to Lloyds' publications. We were continually kept in touch with the heart of the mercantile marine—that service which has made a record of which every Britisher must be proud."

Hurricane and Tornado

Serious inroads into the profit account of marine underwriters resulted from the recent West Indian hurricane, as also on account of the tornado and flood at Galveston. One steamer with a $400,000 cargo of sugar foundered in the hurricane, involving the New York market in a heavy total loss; and another went down with a grain cargo valued at $600,000, fully insured. Six or eight steamers managed to make Key West in a badly damaged condition and still others may yet be heard from. At Galveston, despite the new seawall, some of the main streets were three feet under water—which certainly means an enormous loss on cotton and other wharf merchandise.

SAN FRANCISCO

FREIGHT REPORT

October 20, 1919.

OUR last circular was dated September 20 and since that date no vessels have been chartered for grain from this port to the United Kingdom. At this moment there is more demand for spot tonnage than there has been for some time past, and we believe $32.50 a ton would be paid. This rate has not interested owners so far.

Since our last report, very little tonnage has been bought or sold. Balfour, Guthrie & Company sold schooner Camano on private terms to Seaborn of Seattle. Walter Scammel purchased the motorboat La Merced from the Standard Oil Company at a reported price of $150,000. The steamer George W. Elder was delivered to the Chilean purchaser on September 27, and A. O. Lindvig sold the steamer Governor Forbes to the Caribbean Steamship Company for $450,000.

We have not heard of a single time charter on this coast during the last month, although in New York they are still chartering in a very lively manner large steamers for world-wide trading at $9.25 to $9.50, and for six months as high as $10 has been paid. For small, handy steamers for West Indian trade, charterers have paid as high as $11 a ton on the deadweight.

The Robert Dollar Company chartered their new steamer Grace Dollar, ex War Melody, at $6.40 from Norfolk to Tiburon, followed in about a fortnight by the charter of the steamer Waikawa at $6.32 from Norfolk to Puget Sound, both by the United States government.

Some new business has been done for coals from Australia, the Rolph Navigation Company having engaged cargoes by the steamers Parratah and Chalamba at the reported rate of $6, and the King Coal Company has bought two cargoes by British steamers Culbarra and Benowa on the basis of $9.50 c. i. f., which would leave a freight of about $5.50.

Lumber freights have been quite active. Comyn, Mackall & Company chartered the schooner Edward May on private terms from Eureka to Melbourne. J. J. Moore & Company chartered the new schooners Forest Dream and Forest Pride at $37.50 from Grays Harbor to Sydney. Balfour, Guthrie & Company chartered the schooner Camano at $35 to Sydney, which charter was part of the terms of the sale of said schooner. The American Trading Company chartered the new Coos Bay barkentine at $37.50, Sydney, and $42.50, Melbourne or Adelaide. Hind, Rolph & Company chartered the Makaweli and Lahaina, both $37.50 to Sydney, and Comyn, Mackall & Company are reported to have chartered motorboat Balcatta from J. E. Chilberg on private terms to Melbourne.

Christensen, Hanify & Weatherwax chartered the United States Shipping Board steamer from the North to Cuba at $21 a thousand, and Carpenter & Company, up North, chartered steamer Birriwa for ties to Cuba at $22.

Quite a brisk business has been done in lumber vessels to the West Coast: The barkentine Retriever, $32.50 to Mollendo, by Hind, Rolph & Company; the schooner Muriel at $32.50 to Callao by Grace & Company; the steam schooner Horace X. Baxter at $32.50 to a port in Peru by Balfour, Guthrie & Company; the steam schooner Idaho at the same rate to Callao by Grace & Company, and the steamer Siskiyou at $35 to Valparaiso by Balfour, Guthrie & Company. The last charter reported was the steamer Firwood at $32.50 from the North to Callao by Grace & Company. The schooner Bainbridge was substituted by Comyn, Mackall & Company for one of their own vessels to Antofagasta, and they paid her the best freight yet—namely, $37.50.

In nitrate to Honolulu, we announce charters of the schooner Thistle at $17.50, schooner Alert at $21, motorboat Sierra at $20. These vessels were all chartered in September, and were all taken by the Hawaiian Fertilizer Company.

The last charter made for Africa was schooner Bianca at $55, with the option of Bombay at the same rate, and there are two vessels now negotiating for Africa which will likely result in both being chartered at $55 to a direct port Capetown, Delagoa Bay range.

A fleet of motorboats bought lately from the Australian commonwealth by Mr. J. E. Chilberg has lately come into the market, resulting in the charters, by Comyn, Mackall & Company, of the Culbarra, the Boobyalla and the Coolcha at $55 to the United Kingdom or Continent. The Cethana was chartered by Christensen, Hanify & Weatherwax at $55 to the United Kingdom or Continent, option of Alexandria, at $70, and one of the Chilberg motorboats is reported chartered by Balfour, Guthrie & Company at $55 to the United Kingdom.

Taking all in all, the market closes quite firm, and with good demand at the above rates.

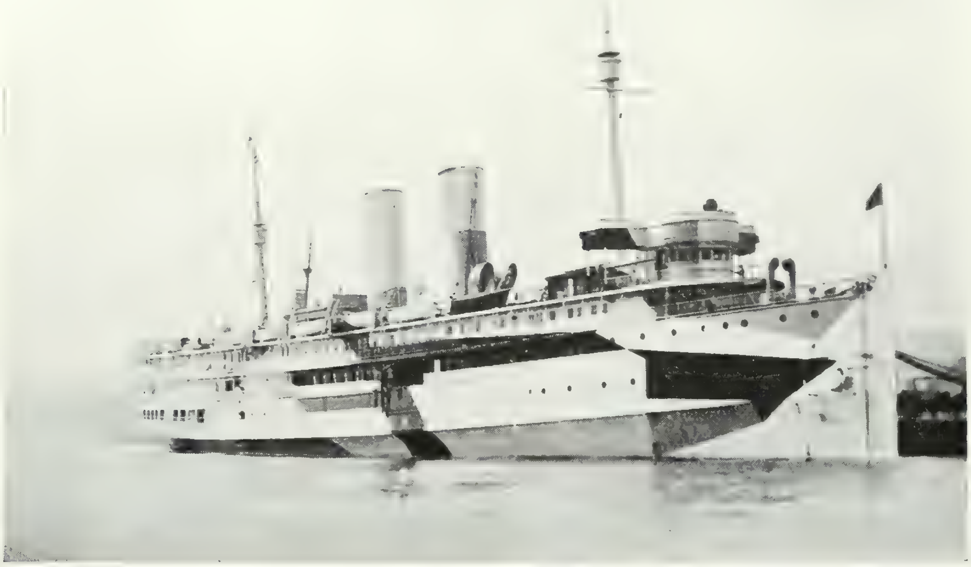
PAGE BROTHERS, Brokers.

AMENDMENT TO INTERSTATE COMMERCE ACT

A DEVELOPMENT of great importance to Pacific Coast shippers in their long-sustained fight on inter-mountain freight rates was disclosed recently in a telegram from Washington received by Attorney Seth Mann, traffic director of the San Francisco Chamber of Commerce. It is indicated in this telegram that the Senate Committee is expected soon to report favorably upon an amendment to the act to regulate interstate commerce.

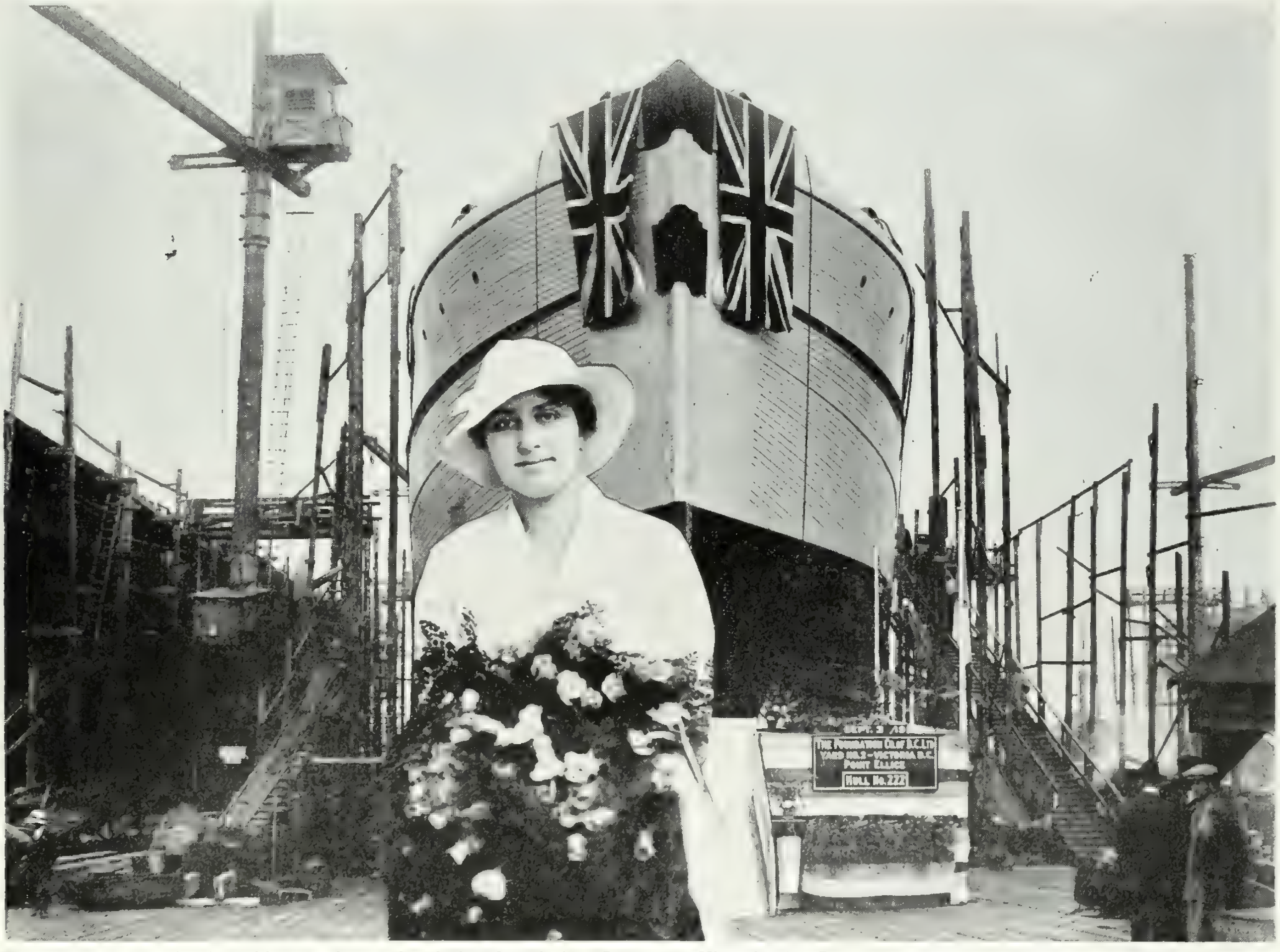
This amendment, which bears directly upon Pacific Coast interests, reads as follows:

"Amend the first provision in Section 4 so that it will read, 'Provided, however, that upon application to the Interstate Commerce Commission, such common carrier may in special cases after investi-



U. S. S. Charles, formerly the Pacific Coast steamship Yale, in war paint in European waters

gation be authorized by the commission to charge less for longer than for shorter distances for the transportation of passengers or property, and the commission may from time to time prescribe the extent to which such designated common carrier may be relieved from the operation of this section, but in exercising the authority conferred upon it in this proviso, the commission shall not permit the establishment of any charge to or from the more distant point that is not fairly compensatory for the service performed, and if circuitous rail line or route is, because of such circuity, granted authority to meet the charges of a more direct line or route to or from competitive points and to maintain high charges of a more direct line or route to or from intermediate points on its line, the authority shall not include intermediate points as to which the haul of the petitioning line or route is not longer than that of the direct line or route between the competitive points and no such authorization shall be granted on account of merely potential water competition not actually in existence."



The Acadie ready for launching at the yards of the Foundation Company, Victoria, B. C., and her sponsor, Mrs. J. J. Haviside, wife of J. J. Haviside, Jr., of the well-known firm of Haviside, Withers & Davis, San Francisco, California

Pacific Coast Shipbuilding Returns

Albatross Metal Furniture Company, Portland, Ore. (Standard Vault & Metal Works)

Purchasing Agent, **K. Kerekes.**

Manufacturing steel cabinets and lockers for ships.

Albina Engine and Machine Works, Inc., Portland Ore.

Hulls Nos. 11 to 17, 300 by 44 by 21.5; engines 22-36-60, 1400-h. p.

Allen Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **G. E. Hunt.**

Two Allen type vessels, 274.6 B. P. by 44.9 by 26.4.

American Concrete Pipe & Shipbuilding Co., Seattle, Wash.

One 7,500-ton concrete steamship.

One 150-foot steam concrete tugboat.

Two concrete scows, 120 feet long.

American Marine Iron Works, Portland, Oregon

Purchasing Agent, **Carl R. Jones.**

Contracts covering cast iron fittings for steel and wood yards of G. M. Standifer Construction Corporation, Vancouver, Wash.

Ames Shipbuilding and Dry Dock Co., Seattle, Wash.

Purchasing Agent, **Mr. C. A. Barron.**

Twenty-seven vessels under contract, mostly 8800- ton freighters.

Anacortes Shipbuilding Co., Anacortes, Wash.

Acting Manager and Purchasing Agent, **Will W. Dunn.**

Two wooden vessels, Ferris type, 281 by 46 by 23.6; engines 19-36-56; 1500-h. p. watertube boilers. Delivery August, 1919.

Anderson Shipbuilding Corporation, 816 Alaska Building, Seattle, Wash.

Purchasing Agent, **W. G. Hall.**

Nos. 8 and 9, full powered motorships, 260 by 46 by 26, 3250 deadweight tons. twin screws, 1000-h. p. engines.

Apex Manufacturing Company, Emeryville, Cal.

Purchasing Agent, **A. Youngholm.**

Several hundred metallic life boats for U. S. Shipping Board and shipyards.

Astoria Marine Iron Works, Astoria, Ore.

Purchasing Agent, **Mr. J. A. Jackson.**

Completely outfitting 27 Hough and Ferris type wooden vessels.

Contractors for United States and French governments.

Overhauling and repair of ships a specialty.

Marine railway under construction capable of handling ships up to 12,000 tons register. Fabricators of steel buildings, bridges, tanks and other structures.

Babare Bros., Old Town, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. Babare.**

Four wooden freighters, Ferris type.

Ballin Water Tube Boiler Co., Portland, Ore.

Sixteen Ballin type water-tube boilers for eight steamers. For the Supple & Ballin Shipbuilding Co.

Twelve Ballin type water-tube boilers for six steamers building at the G. M. Standifer Construction Corporation.

Barnes & Tibbitts Shipbuilding & Dry Dock Company, Alameda, Cal.

President: **W. G. Tibbitts.**

Vice-President: **J. D. Barnes.**

Secretary: **J. J. Barnes.**

General repair and dry-docking business.

Benicia Shipbuilding Corporation, Benicia, Cal.

Purchasing Agent, **L. S. Jones,** Alaska Commercial Bldg., San Francisco, Cal.

Building one Ferris type hull, 3500 d.w. capacity. July delivery.

Converting one Ferris type steam schooner to five-masted barkentine. October delivery.

Bethlehem Shipbuilding Corporation, Ltd. Union Plant, Potrero, Risdon, Hunter's Point, Alameda Works (Alameda Side)

General Manager, **Jos. J. Tynan.**

Assistant General Manager, **A. S. Gunn.**

Secretary and Treasurer, **Arnold Foster.**

Purchasing Agent, **O. W. Street.**

Alameda plant: Thirteen tankers, 10,100 dw.

Potrero works: Three freighters, 12,500 dw.

Fitting out two tankers, hulls Nos. 5259 and 5260.

Ralph J. Chandler Shipbuilding Co., Wilmington, Cal.

Six wooden vessels, Ferris type, 281 ft. 6 ins. by 46 ft. by 26; engines 19 by 32 by 56 by 3; 1400 h. p. Two tubular boilers. For U. S. Shipping Board.

Chilman's Shipyard, Hoquiam, Wash.

Purchasing Agent, **Mr. Iver Chilman.**

Two 3-mast auxiliary schooners 130 by 33 by 14. One 300-h. p. engine, for Belgian interests.

Columbia Engineering Works (Linnton), Portland, Ore.

Purchasing Agent, **Mr. C. W. Steele.**

Capacity of yard: 5 vessels at one time.

Prepared to build any type of wooden ship. Specialize in schooners of 1000 to 3000 tons deadweight.

Columbia River Shipbuilding Corp., Portland, Ore.

Purchasing Agent, **J. C. Bowles.**

Eight steel merchant ships, 8800 tons dw., General Electric and De Laval turbines, Scotch marine boilers. Deliveries 1919. Four of above now on ways.

Commercial Boiler Works, Seattle, Wash.

Purchasing Agent, **Mr. J. H. Fox.**

Contracts for:

Fifty Scotch marine boilers, 14.9 inside dia. by 11 ft. long, H. S. 2695.5 sq. ft., W. P. 210 lbs., for vessels building on Pacific Coast. Delivery, twelve completed boilers per month.

Coos Bay Shipbuilding Company, Marshfield, Ore.

Manager, **Mr. J. H. Polhemus.**

Contracts for one Ferris type vessel. Length over all 281.6, 3500 dw. tons.

J. Coughlan & Sons, Vancouver, B. C.

Purchasing Agent, **F. Brammall.**

Four 8100-ton dw. freighters, 400 by 52 by 31, 3000-h. p., three Scotch marine boilers. For Dominion Government.

Two 8800-ton dw. freighters, 427 feet by 54 feet by 29 feet, 9 inches.

Crowley Launch & Tugboat Co., San Francisco, Cal.

Purchasing Agent, **John L. Crowley.**

Two 28-foot launches with 10-h. p. engines.

Two 38-foot launches with 30-h. p. engines.

Four 45-foot launches with 50-h. p. engines.

Eight covered barges, 125 by 40 by 12.

Derrick barge, 75-ton lifts, 125 by 50 by 12.

J. F. Duthie & Co., Shipbuilders & Engineers, Seattle, Wash.

Purchasing Agent, **E. C. Gaumnitz.**

Twelve 8800-ton cargo vessels, 2800-h. p., 425 feet by 54 feet by 29.9; Scotch boilers.

S. S. Deuel launched September 27.

Elliott Bay Dry Dock Company, Seattle, Wash.

Local repair work, cleaning, painting and overhauling.

Elliott Bay Shipbuilding Co., Seattle, Wash.

Purchasing Dept., **C. A. Morrow.**

Six vessels, 260 by 46 by 26.

Contracts for five 3500-ton carriers.

Elliott Bay Yacht & Engine Co., Seattle, Wash.

Large amount of repair work.

Feeney-Bremer Company, Tillamook, Ore.

Contracts for three wooden ships, Ferris type, 281.6 by 46 by 26.

Foundation Company of British Columbia, Ltd., Victoria, B. C.

Purchasing Agent, **Mr. D. D. Long.**

Twenty 3000-ton dw. twin screw wooden steamers, 293.2 by 47.6 by 23.6, two Scotch marine boilers.

Alberta launched September 22.

Montreal launched September 30.

Foundation Co., Portland, Ore.

Local Purchasing Agent, **G. M. Raymond.**

Foundation Co., Tacoma, Wash.

Purchasing Agent, **Mr. Whiteside.**

Seattle Office: Smith Building.

Fulton Shipbuilding Company, Wilmington, Cal.

Purchasing Agent, **A. H. MacFarland.**

Four Hough design wooden steamers.

Nine Ferris design wooden steamers, 3500-ton, engines 19 by 32 by 56, 1400-h. p., two tubular boilers.

Grant Smith-Porter Ship Company, Aberdeen Yard, Aberdeen, Wash.

Manager: **Charles Albertson.**

Superintendent: **J. C. Langille.**

The Grant-Smith-Porter Ship Co., Portland, Ore.

Purchasing Agent, **Mr. P. S. Sinnock.**

Contract for twenty-two Ferris type ships; length 286 feet, beam 46 feet, depth 28 feet; two standard E. F. C. boilers.

Grays Harbor Motorship Corporation, Aberdeen, Wash.

Purchasing Agent, **Mr. H. L. Rich.**

Twelve 4000-ton ships of Ward type. For Emergency Fleet Corporation. Deliveries about two a month.

Eight building slips, maximum length 350 feet.

Complete machine shop for installing machinery.

Great Northern Concrete Shipbuilding Company, Vancouver, Wash.

Purchasing Agent, **Mr. Pacquet.**

Three concrete hulls, Nos. 4, 5 and 6, 100 by 25 by 12.6.

Hammond Lumber Co., Eureka, Cal.

Purchasing Agent, **W. R. McMillan.**

Two steamers, Ferris type.

Hanlon Dry Dock & Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **C. J. Foard.**

Twelve cargo vessels, 320.9 by 46 by 26.9; three water-tube boilers. For Emergency Fleet Corporation.

Harrison & Lamond, South Vancouver, B. C.

One auxiliary schooner.

Helser Machine Works, Inc., Portland, Ore.

20 large size hawser reels for Pacific Coast Shipbuilding Co.

12 same as above for Pensacola Shipbuilding Co.

30 same as above for J. F. Duthie & Co.

44 same as above for The Columbia River Shipbuilding Co.

56 8¼ by 8 single geared winches, single gypsey.

28 8¼ by 8 single geared winches, double gypsey.

56 9 by 9 single geared winches, single gypsey.

All of above winches for Southwestern Shipbuilding Co.

180 cargo winches for Schaw-Batcher Shipbuilding Co.

200 9 by 9 cargo winches.

300 8¼ by 8 cargo winches.

80 9 by 9 cargo winches for Southwestern Shipbuilding Company.

Hesse-Martin Iron Works, Portland, Ore.

Purchasing Agent, **Mr. R. M. Hoffman.**

All auxiliary machinery for ten wooden steamers building by the G. M. Standifer Construction Co.

All auxiliary machinery for twenty-four wooden steamers building by the Grant-Smith-Porter Ship Co., at Aberdeen.

Anchor windlasses, cargo winches, steam capstans and steam steering gears for eight wooden steamers building by Supple & Ballin at Portland.

Forty steam cargo winches for ten steel steamers building by the Northwest Steel Company.

One hundred and thirty anchor windlasses, forty steam steering gears and fifty hand steering gears.

Herzog Electric & Engineering Company, San Francisco

Purchasing Agent, **H. C. Toumey.**

G. W. Kneass, San Francisco, Cal.

Purchasing Agent, **G. W. Kneass.**

Two tow boats, 60x15, 125-h. p. engine. For Peterson Tow Boat & Lighterage Company.

Three hundred metal life boats for Bethlehem Shipbuilding Corporation, Union Plant.

Kiernan & Kern Shipbuilding Co., Portland, Ore.

Four composite steamers of Ballin design.

Kruse & Banks, North Bend, Ore.

Purchasing Agent, **Robert Banks.**

Two steam schooners, 240 feet over all, 43 feet beam, 17 feet depth of hold, double end type. For J. R. Hanify Company.

One five-masted sailing schooner, with a carrying capacity of 1,750,000 feet of lumber. For private interests.

Three building ways.

Llewellyn Iron Works, Los Angeles, Calif.

Builders of Marine Engines, Boilers, Tanks, etc., for Emergency Fleet Corporation.

Present contracts include 1400-h. p. and 2800-h. p. marine engines with marine boilers for same, for most of the ships being built on the Pacific Coast.

Also reinforced concrete bars for concrete ships being built for the Emergency Fleet Corporation at the San Francisco Shipbuilding Company's yard in Oakland and at the Pacific Marine & Construction Company's yards in San Diego.

Long Beach Shipbuilding Company, Long Beach, Calif.

Purchasing Agent, **Frank W. Philpot.**

Eight steel steamers, 8800 tons dw., 2700 h. p., triple-Scotch boilers. For U. S. Shipping Board.

One steel motorship for California & Mexican Steamship Company.

One steel vessel for sugar and coal trade, for Cuban interests.

Los Angeles Shipbuilding & Dry Dock Co., Los Angeles, Cal.

Thirty 8800-ton dw. vessels, 410 by 54 by 29.9, 3500 I. H. P. three Foster water-tube boilers. For Emergency Fleet Corporation. Delivery 1919-1920.

Five 11,000-ton dw. vessels, 430 ft. 3 in. by 54 by 29.9 to second deck, and 38.3 to upper deck. For Emergency Fleet Corporation. Deliveries 1919-1920.

Equipment ample to build passenger, freight and naval vessels of any size and type, including machinery and equipment.

West Himrod launched August 6.

West Calumb delivered September 20.

The Wm. Lyall Shipbuilding Co., Ltd., North Vancouver, B. C.

Three auxiliary schooners, 235 W. L. by 44.6 by 20.6 moulded.

Two 200-h. p. Fairbanks Morse Semi-Diesel engines for these boats.

Eight full-powered steamers, 1500 tons deadweight. For Republic of France.

Main Iron Works, San Francisco, Cal.

Four ocean-going tugs; engines 17 by 25 by 42 by 30; complete for Emergency Fleet Corporation.

Machinery for two tugs for Rolph Shipbuilding Company.

Shafting for concrete ships for Emergency Fleet Corporation.

Installation of machinery for Emergency Fleet Corporation.

Repairs to vessels for Emergency Fleet Corporation.

Marine Pipe and Machine Works, Inc., Seattle, Wash.

Purchasing Agent, **Mr. E. A. Lamb.**

One 6-cylinder Sumner type heavy oil engine, 650-h. p. For Chilean Government.

Two 1200-h. p. triple exp. steam engines.

Special marine repair department.

Martinolich Shipbuilding Co., 306 California Bldg., Tacoma Wash.; Yard at Dockton, Wash.

Purchasing Agent, **Mr. Martinolich.**

Three wooden 4-masted auxiliary schooners, 250 by 43 by 21; twin 240-h. p. Skandia engines. For Norwegian interests.

Matthews Shipbuilding Company, Hoquiam, Wash.

Purchasing Agent, **G. F. Matthews.**

Five-masted sailing schooner, 262 feet by 44 feet by 21 feet 6 inches. Lumber capacity, 1,750,000 feet. For owner's account.

McAteer Shipbuilding Company, Seattle, Wash.

Purchasing Agent. **Mr. Ramm.**

One steel vessel, 160 by 30 by 16.

Two four-masted schooners, 250 by 44 by 21; Skandia engines.

McEachern Ship Co., Astoria, Ore.

Purchasing Agent, **Mr. O. E. Draper.**

Three steamers, 286 by 46 by 28; Hough design.

Meacham & Babcock Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **Mr. W. N. Voegtly, Jr.**

Ten hulls, Ferris type.

Moore Shipbuilding Company, Oakland, Cal.

Purchasing Agent, **M. G. Waites.**

Contract for eleven 9400 dw. steel freighters, 402 feet 6 inches by 53 feet by 34 feet 6 inches; 2800 h.p. For United States Shipping Board.

Five of the above vessels on the ways, five in outfitting basin, one keel yet to be laid.

Contract for nine 10,000-ton dw. steel tankers, 425 feet 6 inches by 57 feet by 33 feet; 2800 h.p. For United States Shipping Board.

Five of the above vessels on the ways, three in outfitting basin, one keel yet to be laid.

Motorship Construction Co., Vancouver, Wash.

President, **Merrill A. Reed.**

Purchasing Agent, **J. W. Dougherty.**

Builders of cannery tenders, tugs, barges, river steamers, power boats and concrete barges.

National Engineering Corporation, Wilmington, Calif.

Outfitting ships for Emergency Fleet Corporation.

New Westminster Construction & Engineering Co., New Westminster, B. C.

Purchasing Agent, **Mr. H. M. Fullerton.**

Four 2800 dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

Five 1500-ton dw. wooden freighters, 204 by 40.6 by 17, 550-h. p. twin engines, watertube boilers.

Nilson & Kelez, Seattle, Wash.

Purchasing Agent, **Mr. Kelez.**

Eight wooden hulls, Ferris type.

Northwest Steel Company, Portland, Ore.

Purchasing Agent, **Mr. W. C. Smith.**

Four freighters, 2800 I. H. P., 423 feet 9 inches by 54 feet by 29 feet 9 inches, 8800 tons dw., geared turbine drive.

Three freighters, 2800 I. H. P., dimensions same as above; three Scotch marine boilers, oil burners, reciprocating engines.

Pacific American Fisheries, South Bellingham, Wash.

Purchasing Agent, **Mr. B. U. Slyster.**

Pacific Boat & Iron Works, Portland, Ore.

Metal lifeboats and life rafts for steel yard in this district.

Contract for Corser's one-man simultaneous releasing hooks on all lifeboats.

Capacity: Three boats a day.

Pacific Coast Shipbuilding Co., 319 First National Bank Bldg., San Francisco, Cal.; Plant, Bay Point, Cal.

Purchasing Agent, **Mr. J. A. Smiley.**

Ten 9400 dw. steamers. Six launched.

Pacific Construction Co., Ltd., Coquitlam, B. C.

Purchasing Agent, **Mr. R. W. Holland.**

Two 2800-ton dw. wooden freighters, 250 by 43.6 by 25, 950-h. p.

No. 3, Wooden steamer, 250 by 43.6 by 25, 1000-h. p. water-tube boilers.

No. 4, Same as No. 3.

Nos. 5 and 6, 1500-ton full-power barges, 204.8 by 39.8 by 17, 275 I. H. P. engines, 5 water-tube boilers.

Pacific Marine and Construction Company (Scofield Engineering Company) San Diego, Cal.

Contracts for two concrete ships of 7500 tons, 420 by 54, draft loaded 27 feet, light 17 feet, carrying capacity 58,000 barrels.

Thirty-four-acre yard. Two building ways for sidewise launching. Two other ways.

Pacific Marine Iron Works, Portland, Ore.

Purchasing Agent, **Mr. V. L. Hamlin.**

Contracts for four 1600-h. p. triple expansion engines.

Contracts for six 1400-h. p. triple expansion engines.

Patterson-MacDonald Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **W. J. Thomas.**

Ten wooden steamers, 281.6 by 46.10 by 27, twin screw, triple expansion engines, 1550-h. p. 30-15½-25½-42. Two Heine boilers.

Pacific Shipbuilding Corpn., Seattle, Wash.

Purchasing Agent, **C. H. Jones.**

Yard designed with six building ways.

Peninsula Shipbuilding Co., Portland, Ore.

Purchasing Agent, **Mr. H. H. Fisher.**

One steamer, 287 by 49.8 by 27.6. To be equipped with Westinghouse turbines.

Capacity of yard: Four ways, wood construction, installation wharf.

Puget Sound Boiler Works, Seattle, Wash.

One Scott Patent Water Tube Boiler, 200-h. p. pressure, for Anderson Shipbuilding Co.

Contracts for condensers, water feed tanks, boiler casings and smoke stacks.

Large amount of local marine repair work.

Rolph Shipbuilding Company, Eureka, Cal.

Purchasing Agent, **John D. Stelling.**

One steamer and one barge. For U. S. Shipping Board.

Two barkentines, two steam schooners and one tug boat. For Rolph Navigation & Coal Company.

Three barkentines, 3500 tons, converted Ferris type steamers for United States Shipping Board.

Sanderson & Porter, Raymond, Wash.

Five-way yard. No plant equipment for outfitting of hulls.

San Diego Marine Construction Co., San Diego, Cal.

Purchasing Agent, **C. W. Stose.**

No. 136, Tow-boat "Pullet," 55 by 12 by 7.6; 100 h. p. oil engines.

No. 137, Tow-boat, 56 feet by 12 feet by 7 feet 6 inches; 100 h. p. Fairbanks-Morse type C. O. engine. Immediate delivery. For stock.

No. 138, V-bottom pleasure boat, 40 feet by 9 feet by 2 feet 6 inches; 6-cylinder, 3½ by 5¼ Continental motor. C. W. Stose, owner. Delivery November 1, 1919.

San Francisco Shipbuilding Co., 310 California St., San Francisco, Cal.

Purchasing Agent, **Mr. J. M. Cummins.**

Two 7500-ton dw. bulk oil steamers and one 7500-ton dw. freighter, reinforced concrete, at Government Island Plant, Oakland, Cal.

Schaw-Batcher Company Ship Works, South San Francisco

Purchasing Agent, **K. I. Dazey.**

Ten single-screw freighters, 8800-ton dw., 427 by 54 by 29.9; 2800-i. h. p. reciprocating engines, 24½ by 41½ by 72 by 48; three Scotch boilers. Deliveries 1919.

Seaborn Shipyards Company, Tacoma, Wash.

Four-way yard prepared for any kind of wood construction.

Seattle Machine Works, Inc., Seattle, Wash.

Purchasing Agents, **Frank H. Wheelon** and **D. Crause.**

Three 2700-h. p. triple-expansion engines for Skinner & Eddy Corporation.

One 500-h. p. triple expansion engine for McAteer Shipbuilding Co.

One 2800 h. p. triple-expansion engine for Ames Shipbuilding & Dry Dock Company.

Seattle-North Pacific Shipbuilding Co., Seattle, Wash.

Purchasing Agent, **F. H. Magune.**

Ten freighters, 402.5 by 53 by 34.5. Parson turbine, three Foster boilers. Deliveries 1919.

Chepadoa launched September 12.

Skandia Pacific Oil Engine Co., Oakland, Cal.

Purchasing Agent, **Mr. E. B. Brown.**

Twenty 825 B. H. P. Werkspoor Diesel engines for installation in 5600 tons steel fabricated motorships.

Four 240-h. p. and six 120-h. p. Skandia engines.

Additional engines of smaller capacity.

Skinner & Eddy Corporation, Seattle, Wash

Purchasing Agent, **Ray Anderson.**

Contracts for twenty 9600-ton dw. freighters for U. S. Shipping Board.

Brave Coeur launched September 6.

Elkton launched September 10.

Sloan Shipyards Corporation, Olympia, Wash.

Purchasing Agent, **Mr. L. P. Byrne.**

Sixteen freighters, 281.6 by 46 by 26, 19-32-56 by 36; 1400-h. p.

Smith & Watson Iron Works, Portland, Ore.

Purchasing Agent, **Mr. H. W. Bates.**

Contracts to furnish all castings, fittings, condensers and auxiliary machinery for thirty ships building by Columbia River Shipbuilding Corporation.

Somarstrom Shipbuilding Co., Columbia City, Ore.

Four wooden steamers, Hough design, 288 feet long.

Four wooden steamers, Ferris type.

Southwestern Shipbuilding Co., Los Angeles, Cal.

Twenty-three single screw freighters, 8800 tons dw., 427 by 54 by 29.9; 2800 i. h. p. reciprocating engines; three Scotch boilers. For U. S. Shipping Board.

G. M. Standifer Construction Corp., North Portland, Ore., and Vancouver, Wash.

Purchasing Agent, **Mr. H. Luckett,** Vancouver, Wash.

Four wooden freighters, 281 by 46 by 26; 1700-h. p., Ferris type.

Five composite steamers, Ballin design, 4500 tons.

Fifteen steel steamers, 9500 tons.

Three shipyards, fifteen building berths.

Stephens Bros., Stockton, Cal.

Two wooden towboats, 50 by 13 by 8, for Island Transportation Co.

One 65 ft. by 14 ft. butcher boat, equipped with 6-cylinder Wisconsin motor. For Pollard Brothers.

One 40 ft. by 7½ ft. raised deck runabout cruiser, equipped with 6-cylinder Wisconsin motor. For Mr. W. Q. Wright, of the Bay & River Dredging Company.

St. Helens Shipbuilding Co., St. Helens, Ore.

Purchasing Agent, **Mr. A. F. Barnett.**

No. 49, steam schooner, 250 over all by 46 by 22, to the order of Charles R. McCormick & Co., San Francisco, Cal.

W. F. Stone Shipbuilding Co., Oakland, Cal.

Purchasing Agent, **Mr. Lester F. Stone....**

Four 150-foot wooden hulls for seagoing tugs, 30-foot molded beam by 17 ft. depth.

Miscellaneous repair work.

Supple-Ballin Shipbuilding Corporation, Portland, Ore.

Three 4500-ton steamers, Ballin design, 309 feet o. a. by 44 by 26, diagonal planked, steel reinforcing on top sides, single screw; 1600 h. p.

Nos. 2194-5-6.

Tacoma Shipbuilding Company, Tacoma, Wash.

Purchasing Agent, **Mr. D. D. McKay.**

Contracts for six Ferris type vessels. For U. S. Shipping Board.

Motorship Ambassador, 120 by 22 by 12 feet for W. H. Rust.

T. R. Trahey, Ballard, Wash.

One oil barge, 110 feet long and 32 feet wide, capacity 150,000 gallons. For General Petroleum Company

Tregoning Boat Co., Seattle, Wash.

Purchasing Agent, **Mr. C .Tregoning.**

A large number of lifeboats and ship power launches.

Todd Dry Dock & Shipbuilding Co., Tacoma, Wash.

Purchasing Agent, **Mr. C. L. Bankson.**

Eight cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 watertube boilers.

Twenty-four cargo vessels, 380 by 53 by 23.9, 2500 h. p. 3 S. E. S. boilers.

All of above for Emergency Fleet Corporation. Deliveries by January, 1920.

Todd DryDocks, Inc., Harbor Island, Seattle, Wash.

Purchasing Agent, **Mr. C. R. English.**

General drydock and repair work.

Union Construction Company, Oakland, Cal.

President: **W. W. Johnson.**

Vice-President and General Manager: **H. G. Peake.**

Purchasing Agent, **Mr. Chas. L. Froding.**

Contracts for 10 steel ships of 9400 tons, Isherwood type, 402.5 by 53 by 34.5; three watertube boilers, 2800-h. p. turbines. For the U. S. Shipping Board.

One 2800-ton Diesel-engined oil tanker for the Standard Oil Company of California.

S. S. Haxtum launched September 27.

Vancouver Shipyards & Engine Works, Ltd., Vancouver, B. C.

Contracts in hand for two wooden vessels.

Wallace Shipyards, Ltd., North Vancouver, B. C.

Purchasing Agent, **Mr. C. Wallace.**

Contracts for four 8,100 dw. steel vessels.

One steamer, 320 by 44 by 25, single screw, triple-expansion, reciprocating engines, 1800 h. p., 4300-ton dw. capacity.

Two steamers, 331 by 46 by 25, single screw, triple expansion, reciprocating engines, 2500 i. h.p., 5100-ton dw. capacity.

Western Canada Shipyards, Ltd., Vancouver, B. C.

Five 195 by 39.8 by 17 watertube boilers.

Willamette Iron & Steel Works, Portland, Ore.

Purchasing Agent, **S. F. Woodbury.**

Three 13 feet 9 inches diameter by 11 feet 9 inches long Scotch marine boilers for Todd Dry Dock & Construction Company, Tacoma, Washington.

Three 78 inches diameter by 18 feet long dry back marine boilers for ferry boat. Hunt, Mark & Company, engineers.

Eight 13-ft. 9-in. by 11-ft. 3½-in. Scotch marine boilers for Foundation Company, Victoria, B. C.

Twenty-six 3-furnace Scotch marine boilers for vessels building in Pacific Coast yards for Emergency Fleet Corporation.

Twelve 15-ft. 3-in. by 11-ft. 4-in. 3-furnace Scotch marine boilers, for Kiangnan Dry Dock & Engine Company, Shanghai, China.

Wilson Shipbuilding Company, Astoria, Ore.

Purchasing Agent, **W. G. Wray.**

Four wooden vessels, 281.6 by 46 by 26; Ferris type. For Emergency Fleet Corporation.

Wright Shipyards, Tacoma, Wash.

Purchasing Agent, **Mr. Geo. P. Wright.**

Two wooden steamers, "Elissa" and "Endymion," 3500 tons each, length 282 feet, beam 46, depth 26. For U. S. Shipping Board.

Yarrows, Ltd., Victoria, B. C.

Two slipways suitable for building vessels up to 350 feet in length.

Marine railway, 315 feet long, 3000 tons dw. capacity.

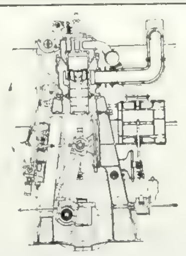
Graving dock, 480 feet long, 65-foot beam.

Makers of manganese bronze propellers and large marine engine castings.

OTHER SHIPBUILDING COMPANIES

American Shipbuilding Company, Warrenton, Ore.
Ballard Marine Railway Company, Seattle, Wash.
Chico Shipbuilding Co., 4185 Arcade Building, Seattle, Wash.
Clapp & Reed Shipbuilding Company, Seattle, Wash.
Columbia River Shipbuilding Co., Vancouver, Wash.
Craig-Wilde Ship Company, Los Angeles, Cal.
Wm. Cryer & Son, Oakland, Cal. W. E. Cryer, Purchasing Agent.
Fellows & Stewart, Inc. V. B. Stewart, Purchasing Agent, Wilmington, Cal.
French-American Shipbuilding Corp., 418-420 Marsh-Strong Bldg., Los Angeles.
Halstrom Shipbuilding Co., Inc., Seattle, Wash.
International Shipbuilding Company, Columbia City, Ore.
King & Winge Shipbuilding Co., C. B. Winge, Purchasing Agent, Seattle, Wash.
Marine Iron Works, Seattle, Wash.
Mare Island Navy Yard, Mare Island, Cal.
Muller Shipbuilding Company, 410 I. N. Van Nuys Building, Los Angeles, Cal.
Oceanic Shipbuilding Co., Milwaukee, Ore.
John E. Price & Company, Hoge Building, Seattle, Wash.
Port Blakeley Shipyard, Port Blakeley, Wash.
Puget Sound Navy Yard, Bremerton, Wash.
T. B. Puck & Co., Honolulu, T. H.
Raymond Shipbuilding Co., Raymond, Wash.
Sehrs Shipyard, Port Townsend, Wash.
South Bend Shipbuilding Co., South Bend., Wash.
Southern California Shipbuilding Corporation, 405 Trust & Savings Bldg., Los Angeles, Cal.
H. D. Stewart Shipbuilding Company, American Bank Building, Seattle, Wash.
Union Timber & Products Co., O. L. Craven, Pres., Port Towsend, Wash.
United Shipbuilding Corporation, Hoge Bldg., Seattle, Wash.
U. S. Steel Shipbuilding Corp., Ltd., Los Angeles, Cal.
Varney Shipbuilding Corporation, Seattle, Wash.
Washington Shipbuilding Corp., C. E. McMasters, Pres., Burke Bldg., Seattle, Wash.
West Coast Shipbuilding Co., H. W. Hellman Bldg., Los Angeles, Cal.

Oil Engines and Motorships



Oil Engine Testing Methods

By G. N. Somerville

PRIME movers of all kinds are usually tested by the manufacturers before shipment in order to satisfy the terms of sale. These tests are insisted upon usually by the purchaser to ascertain measurement of power and fuel economy, and are of importance also to the manufacturer as showing the results of improvements and developments. The purchaser is naturally interested in knowing the power that can be developed and the economy that can be expected; he also wishes to know that parts have been properly fitted mechanically and to satisfy himself that adjustments will not be required upon installation. The testing of small power units of which large numbers have been previously made is simplified because indications which are usually evident during manufacture plainly show the builders many things which need adjustment before the testing stand is reached, and hence on small units the test in many cases resolves itself into a very simple brake and fuel test.

Brake Forms

For determining the power output of medium and small sized engines, an absorption dynamometer commonly called a prony brake is used. The prony brake has been designed in many forms, but the plan of operation does not vary. It consists of a rotating drum or pulley fixed to the engine shaft and usually provided with flanges to retain a cooling medium, usually water, to carry away the heat generated in dissipating the power. Around the brake drum or pulley a friction band is provided and means arranged so that the pressure between the band and drum can be varied, which in turn varies the torque transmitted to the brake arm. An arm extending out a known distance from the center of the trum transmits the torque to a platform or other type of scale. By knowing the distance from the center of the drum to the point of application of this torque to the scale, together with the speed of revolutions and the value of this torque, it is a simple matter to calculate the horse power being generated.

Calculating the Power

The formula for this is derived from the basic formula:

$$\text{H. P.} = \frac{\text{Ft. lbs. pr. min.}}{33{,}000}$$

By substitution this is reduced to:

$$\text{H. P.} = \frac{\text{F} \times \text{r. p. m.} \times 2\text{L} \times 3.1416}{33{,}000}$$

Where H. P. = Brake Horse Power
F = Weight on scale (in pounds)
R. P. M. = Revolutions per minute of drum

L = Distance from center of drum shaft to point on drum arm where scale is applied (in feet).

The value "F" together with the r. p. m. is read direct. The value 2L × 3.1416 is a little unwieldy as it involves considerable multiplication, whereas if the value "L" is made equal to 5¼ feet, the formula finally reduces to:

$$\text{H. P.} = \frac{\text{F} \times \text{r. p. m.}}{1000}$$

We find many manufacturers adopting this standard, as 5¼ feet is a convenient length for the arm, and for moderate powers the pressure applied on the scale with this length of arm is convenient to handle.

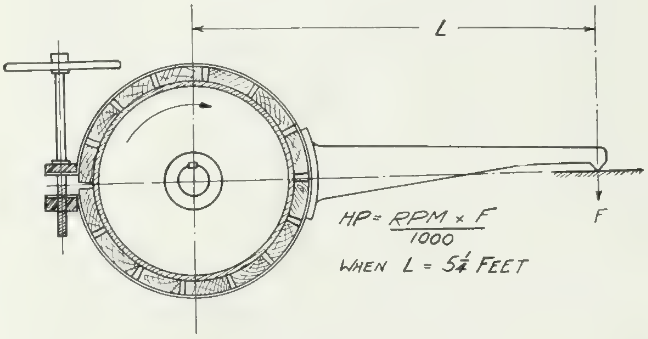


Figure 1. Rigid arm Prony Brake

It must be remembered, however, that the force read on the scale must be the net force due to the torque and derived from the friction between the drum and friction band; for this reason it is necessary to subtract an amount from the scale reading which represents the pressure due to the unbalanced weight of the extending arm. To determine this weight, it is necessary to balance the brake drum on a knife edge over or under the exact center of the brake shaft while supporting the arm on a scale at a point equal to the chosen length of arm "L." Satisfactory results cannot be obtained when the band is in position on the drum, as it is practically impossible under these conditions to get two readings that will agree.

The speed of revolutions (r. p. m.) is best determined by means of a revolution counter or tachometer. For accurate work a tachometer should be chosen as the speed variations over a minute are liable to throw the results out in using a speed counter.

As will be seen from the above formulas, the diameter of the drum or the width of the face has no effect on the calculations of the horse power as many believe. This opinion no doubt is due to the old time use of rope brakes. A rope brake, which is another form of the one just described, consists of wrapping a number of ropes in parallel around a drum. The power or force "F" in this case is measured as the difference between the weights on the two ends of the rope, as will be seen by referring to the cut herewith. The distance L in this case is equal to the radius of the drum plus one-half the diameter of the rope. The small weight "f" is simply used to put an initial tension on the loose end of the rope, the force "f" becoming smaller as large "F" increases. With this type of brake, it becomes necessary to increase the diameter of the drum quite quickly with the power to be absorbed if it is desired to stay within reasonable values of "F." We are limited, however, in the diameter of the drum by the safe peripheral speed of the metal from which the drum is made.

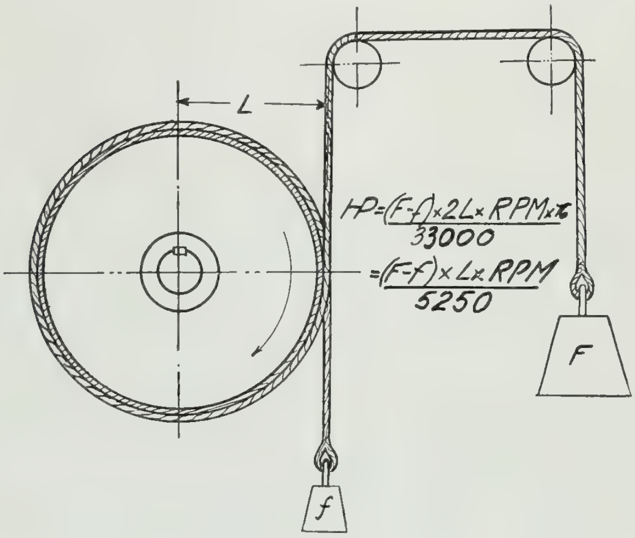


Figure 2. Rope band Prony Brake

The diameter and face of the drum, however, enter as another factor in the design of prony brakes, that is, relative to the safe unit pressure and rubbing speed between the drum and band. Small drums at a given speed and power will naturally require a greater unit pressure between the drum and band than would be required were a larger drum used. This necessarily introduces the element of temperature, which is to be considered seriously. While the safe limit of drum temperature is easily maintained, we have to contend with a much lower temperature desirable for proper lubrication of the drum surface and band, if we are to obtain smooth operation of the brake. As a lining for the band, maple blocks are usually used and lubrication is by means of skid grease or tallow. A cheap grease can be utilized where the design of the drum is such that high temperatures are not produced, while tallow, an expensive lubricant, is often required under severe conditions.

Hydraulic Brakes

Hydraulic brakes are now resorted to for the measurement of high powers. Hydraulic brakes are designed to occupy much less space for a given power than the friction brake, and, while much more expensive, they give for the larger powers more accurate results. Water brakes, of which the Froude is a representative make, are used by many of the large engine builders. The Froude brake consists of a rotating element fitted with numerous small buckets or vanes designed to throw the water against shock-producing stationary vanes. In reality the water brake can be compared to a centrifugal pump in which the efficiency is very low. The Froude brake consists of a cast iron shell, fitted with a brake arm and a counter balancing weight to balance the power-measuring arm. It is claimed also that the power absorbed can be measured from the temperature and volume of the water discharged, as it will be remembered that the entire power dissipation is through the heat imparted to the cooling water. These brakes are very accurate, smooth running and form a valuable instrument for the test laboratory.

Electric Dynamometers

The electric dynamometer has been quite extensively used for the measurement of power in the past. For small high speed engines such as the automobile and airplane it possesses many advantages, and there are designed and on the market machines of immense value. For larger powers there has been nothing of a commercial nature offered and the engine builder has resorted in some instances to the use of generators with wire or water rheostats. Such a combination, however, has many disadvantages. There are many factors entering into the calculation of horse power in this method to produce unreliable results, especially where there exists a wide variation in the speed or the power unit, or in the value of the power measured. In order to have a large generator flexible over a wide range in speed, it becomes necessary to transmit the power either through a reduction gear or by belting, and either method introduces power losses that are hard to calculate. Where it is possible to directly connect and operate the generator at engine speed these losses are eliminated. The next point encountered is due to the variable efficiency of the generator at different load values. This requires that an occasional efficiency test be made on the generator, and a curve plotted therefrom, if accurate results are to be obtained.

If a direct current generator is used, and this is usually the case, there will be required volt and ammeters requiring an occasional calibration.

Rheostats

Rheostats may be made of soft coiled wire, which is by far the cleanest and most easily manipulated type of rheostat. By this method of electric braking when the rheostat is divided into a large number of units with cutout switches it is possible to get very close power readings. There is not much to recommend in water rheostats except in very small sizes where cost is an item and where great accuracy is not necessary. For the dissipation of large powers through the water rheostat considerable oxidization takes place in the rheostat plates or terminals and there is also danger of electric leakage because of the damp surroundings.

The Motorship Katherine

MUCH interest attaches to the trials of the motorship Katherine, the latest addition to the fleet of motor tankers owned by the Philippine Vegetable Oil Company, which has just completed her trials over the measured mile course in San Francisco harbor.

This vessel, which was formerly a four-masted, square-rigged, British-built, iron-sailing ship, is of the following dimensions:

Length overall, 286 feet 9 inches.
Length between perpendiculars, 275 feet.
Breadth molded, 43 feet 5 inches.
Depth molded, 24 feet 1 inch.
Gross register, 2196 tons.
Net register, 2087 tons.
Under deck, 2056 tons.

She has been converted into a six-masted, baldheaded schooner for the purpose of taking advantage of favorable winds which might occur, although it is intended that the engines shall be the main source of power and run continuously. She is equipped with Bolinder fuel oil engines as motive power.

In fitting the vessel for the trade in which she is to be engaged for the future—namely, the carrying of vegetable oils in bulk, the hull has been divided into ten tanks, having a total cargo capacity of 3000 tons on 22-foot draft.

Every facility has been provided for the rapid handling of this type of cargo. An elaborate and most efficient system has been devised for heating the oil to facilitate the rapid discharge of the cargo, which is done by means of powerful pumps, it being possible to discharge the total cargo in less than ten hours. The machinery installed for the purpose of taking care of the handling of the cargo consists of two Scotch marine boilers of approximately 900 square feet of heating surface, having a working pressure of 150 pounds and equipped to burn fuel oil.

Besides the main pumping system, there is a secondary drainage or pumping system for taking care of the oil below the suctions of the main pumping plant. The pumping room is situated in the forward part of the ship between frames 110 and 126.

The cargo pumping machinery consists of two duplex steam pumps, 16 by 19½ by 12; one auxiliary cargo pump, 6 by 4 by 4; one fire pump, 10 by 6 by 10, and one feed pump, 6 by 4 by 6, for boiler service, etc.

The propelling machinery in the above vessel consists of two 320 B. H. P. Bolinder fuel oil engines of the latest "M-11" type, fitted with air injection, a feature of these engines being the latest improved Bolinder oiling system, which has resulted in a considerable reduction in the consumption of lubricating oil, and in connection with this there is an efficient arrangement for the saving and filtering of all waste lubricating oil.

The machinery is located aft the cargo space, between frames 18 and 33, the space aft the engine room between 8 and 18 being used for fuel oil tanks. The engine room has a splendid appearance and ample room has been provided not only for the reception of the main engines, but also the auxiliaries, with which this vessel is well equipped. The engines are firmly secured on well designed and substantial foundations, which has added considerably to the success of the plant.

The auxiliary machinery consists of one 25 b. h. p. stationary model "B-111" Bolinder fuel oil engine, running at 375 revolutions per minute, direct coupled to one 15-kilowatt generator, and also connected by clutch coupling on the opposite side of shaft to one two-stage air compressor, a duplicate of the one on the main engine for providing air for starting purposes or for the main engine in case of an accident to the main air compressor; one 15 b. h. p. model "B-111" Bolinder fuel oil engine, turning 450 revolutions per minute, direct connected to 10-kilowatt generator, and one 8 b. h. p. model "B-111" Bolinder fuel oil engine, running at 550 revolutions per minute, direct connected to 5-kilowatt generator, all 110 to 125 volts.

The main bilge and circulating pumps are driven from the forward end of the crankshaft of each engine. The auxiliary pumping machinery consists of one 4 by 6 triplex electrically-driven fire pump with connection to sea and bilge; one electrically-driven 6½ by 8-foot triplex pump for fire and bilge and emptying and filling coffer dams direct connected to 20-horsepower motor; one 3 by 4 electrically-driven sanitary pump direct connected to 3-horsepower motor.

The fuel oil supply is carried in double-bottom tanks under pump room and in the fuel oil tank aft the engine room, having a total capacity of 2200 barrels, sufficient for 100 days' running.

Two circular day tanks, having a capacity of 26 barrels, are placed in the forward part of the engine room. Storage for 3000 gallons of lubricating oil is provided for in two circular tanks with connections to filters and lubricating oil day tanks.

Besides the machinery already mentioned, the Katherine is equipped with a most complete refrigerating plant, consisting of one motor-driven Jarvis ice machine with a capacity of 1¼ tons a day and nearly 1000 feet of refrigerating space for the ship's stores.

The steering is accomplished by means of a well-known electric steering gear, fitted by the Herzog Electric Company of San Francisco.

In addition to the oil cargo space provided for in the tanks, the vessel has 20,000 cubic feet of dry cargo space and four winches of the most up-to-date type have been provided, with all accessories for handling this class of cargo.

The vessel is also fitted with a wireless equipment, having a range of over 3000 miles.

Accommodations are provided for the captain and officers in the aft end of the ship, and are equipped in the most comfortable and modern fashion, besides state rooms and offices for the owners and their guests.

The motorship Katherine left the Hanlon Dry Dock & Shipbuilding Company's plant in Oakland on August 29 at 11 a. m., and proceeded up San Francisco Bay to the measured mile course, where several runs were made, observations being taken by the officers of the Philippine Vegetable Oil Company, Lloyds' representative, the naval architect, Mr. D. W. Dickie, and the officials of the Hanlon Dry Dock & Shipbuilding Company, and the agreed results showed a speed of 9.02 knots with the tide and 7.06 knots against the tide, or an average of slightly over 8 knots. During the trial the ship was fully loaded, the cargo tank having been filled, the draft forward being 20 feet 2 inches and 20 feet aft.

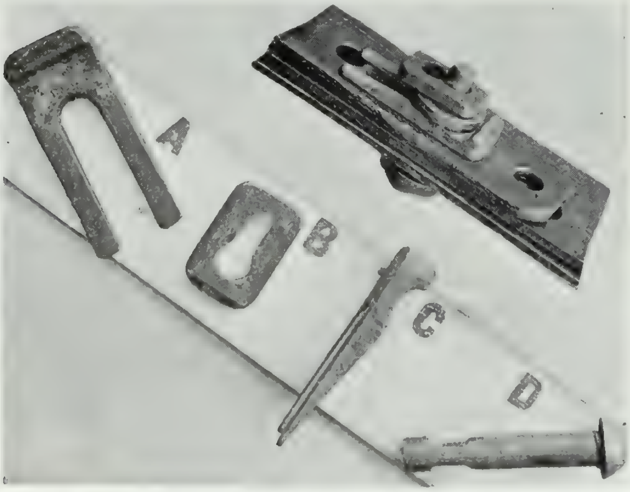
The satisfactory results that were obtained on the trial demonstrate the wisdom of the policy of the owners in making a careful selection of a good hull and in carefully designing and carrying out the work in a most efficient and substantial manner. Everything has been done to make this vessel the very finest of its type.

The engines run with the utmost steadiness and without the slightest vibration. The officers of the company, and the officials and visitors who were on board, expressed their satisfaction at the fine showing made. Upon the completion of the trials, the ship proceeded to Martinez to take on a cargo of case oil for Manila, where she will engage in her regular trade of carrying vegetable oils. The engines were supplied by Messrs. Henry Lund & Company of San Francisco, the Pacific Coast agents of Messrs. J. & C. G. Bolinders Company of Stockholm, Sweden. The work of converting the ship was carried out by the Hanlon Dry Dock & Shipbuilding Company of Oakland, and the naval architects were Messrs. D. W. & R. Z. Dickie of San Francisco, the work being done under the direction and supervision of the Philippine Vegetable Oil Company's San Francisco office.

It may be added that on account of the fine showing made by the Katherine on her trial trip, and the substantial way in which the work has been carried out, the vessel has received the highest classification from Lloyds.

"THE SHIP WITHOUT A NUT"

Up in Portland, Oregon, they were doing some strange things during the war, and from all we can gather, they are still doing them. It seems a pity, however, that it was left until these latter days to give the steel industry the "nutless bolt," or whatever name its inventors will finally give to it. Patent wrenches, bolting-up machines, etc., have played their part, and now comes the "wedge bolt," as simple a device as the homely hairpin, or the omnipresent safety-pin.



Nutless Bolt manufactured by the Northwest Bridge & Iron Company

Here is an article that will be welcomed not only by the leaders of our industries but by the workmen as well. Gone is the drudgery of the bolter's task, the strained back, and the falls on account of defective wrenches. The fitter no longer will be burdened with the awkward wrench, and the riveter need wait no more for the crew to take out bolts so that he can complete his berth.

The device eats into the cost of steel construction as no other invention of recent years. No more threading of nuts and bolts, for nuts are no longer necessary and the bolts require no threads. Not only so, but a much smaller quantity of the new bolts or pins is required than was needed with the threaded bolt. Ship plates can be bolted in practically half the time taken at present, and the subsequent operations speeded proportionately, as will readily be seen if we follow the performance of the bolt.

It consists, first, of a patented wedge, slotted through its length to accommodate the thickness of the bolt; secondly, of a washer which resembles nothing so closely as it does an ordinary keyhole; and thirdly, of the bolt or pin, which is a plain unthreaded bolt, if you will have it so, with two shoulders, or rather slots, punched on opposite sides near its point.

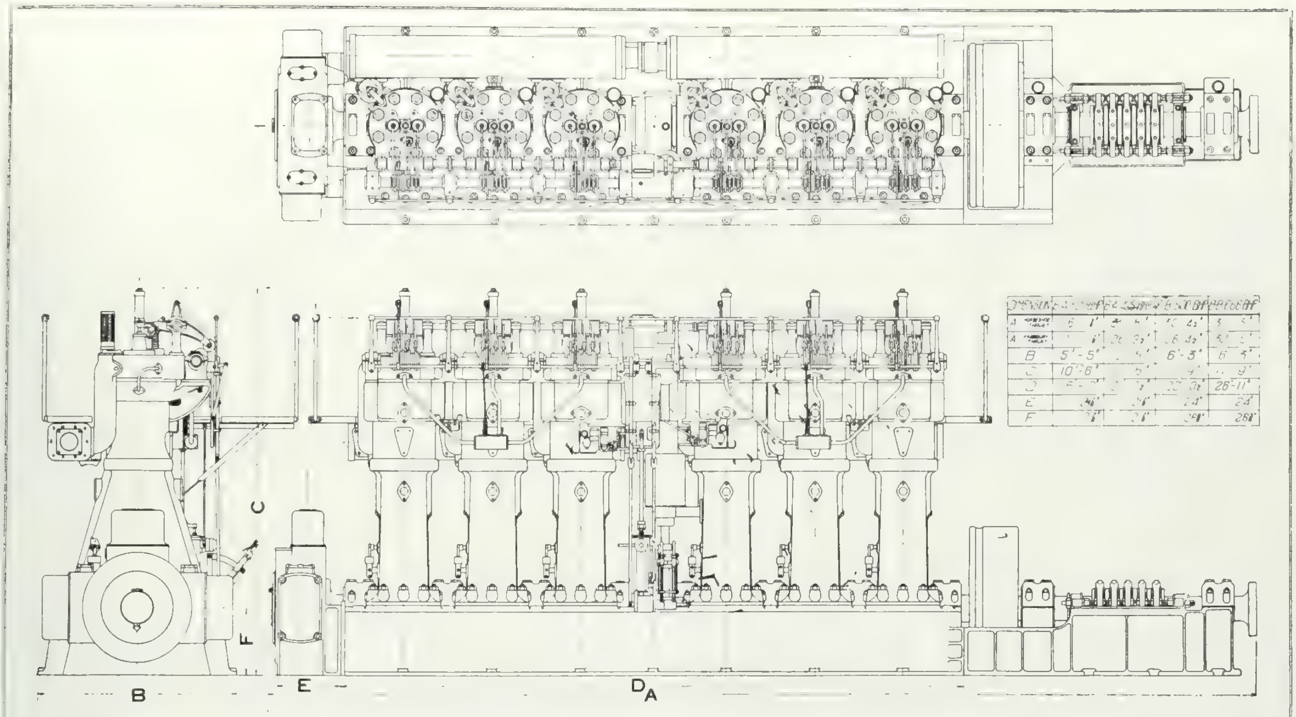
The procedure on the job is exceedingly simple. While one workman passes the pin or bolt through the hole desired, another slips the key-hole washer over the pin; it is engaged in the slot, bears on the shoulder, and then the wedge is placed between the washer and the plate; the workman gives it a few raps with his hand hammer, and is then ready for the next.

The plates are then reamed, if necessary, and the riveter follows to perform his particular task. No more will it be the rule to drive the empty holes and pass on to the next plate, leaving the bolts to be taken out by another crew and the remaining rivets to be driven by pick-up gangs. As each wedge bolt is passed, the riveter taps the wedge with his hammer, and, as the contrivance is released, the holder-on at the other side of the plate, or below the deck, or wherever he may be, takes out the pin and sticks another "hot one" through in its place.

Here is a device which should do its own advertising, and in a few short days there will be a story to tell. At one of the plants in Portland which has been renowned for its war-time performance, at least one hull is being constructed without the use of a single threaded nut, and in another plant, close by, there is a strong demand for the contrivance.

Any invention that lightens the labor of the workman, and at the same time increases his productivity, must be utilized in this age, and the wedge bolt certainly performs along these lines.

The device is the result of the enterprise of William Hackett, formerly riveter-boat-foreman at the Northwest Steel Company, and of John McPhee, veteran riveter boss from the Atlantic to the Pacific. It is patented in this country and abroad, and is being manufactured in all diameters for the patentees by the Northwest Bridge & Iron Company of Portland.



View Showing Overall Dimensions of Dow Full Diesel Type Direct Reversible Marine Oil Engine

SEATTLE AGENCY FOR DOW DIESEL ENGINES

THE Pacific Net & Twine Company and the builders of the Dow engines are both to be congratulated upon completion of arrangements for handling the Dow marine engine in the Northwest. The Pacific Net & Twine Company of Seattle is the largest institution of its kind in the West and with its other sales organizations located in Portland, Oregon, Prince Rupert, British Columbia, and Ballard, Washington, the Dow full Diesel type marine oil engine will be very capably represented throughout the Northwest.

Mr. Edward Cunningham, who is well known in the Northwest, heads the Pacific Net & Twine Company and before entering into sales arrangements with the engine builders, Mr. Cunningham made an exhaustive study as to the general efficiency and performance of this engine.

Regarding the Dow engine, Mr. Cunningham has this to say:

"Before taking the agency for the Dow full Diesel type engine we thoroughly investigated this engine both from the standpoint of design and workmanship. The design of this engine is not new. It has been built in England for many years and hundreds of the engines are running steadily today —both marine and stationary.

The engine is of the four-stroke cycle type, and will successfully burn fuel oil varying in gravity from 14° to 36° Baume. It is of massive and rugged construction throughout. Bearings are of ample size and the crank shafts of large diameter. Cylinder heads and pistons, the most vital parts of a Diesel engine, are well designed to give even expansion and contraction of the metal without undue strains to cause cracking.

"Simplicity and accessibility have been kept constantly in mind so that all bearings and reciprocating parts may be inspected or felt by the engineer while the engine is running.

"We have had an opportunity to observe the performance of these engines in the full-power motorship Libby Main, which is equipped with twin 320-brake horsepower Dow engines. This 300-ton wooden motorship has been in constant service for almost two years with remarkable success and entire freedom from break-downs of any description, showing what may be expected from a motorship powered with Diesel engines as carefully designed and carefully built as the Dow."

MOTOR WORKS FOR SEATTLE

AMONG recent announcements is the news that Seattle is shortly to have a $400,000 corporation to be organized for the production of motor cars and trucks. The company, known as the H. R. L. Motor Company, is already engaged in building shops and equipping them with machinery necessary for the production of motors, bodies and other parts on a large scale. Headed by Mr. J. J. Hendricks, the new truck company will have as its other officers H. M. Rothweiler, vice-president; H. B. Perine, secretary, and A. L. Lagoe, treasurer. Both Mr. Hendricks and Mr. Lagoe are well known in the Seattle machinery fraternity, having been engaged in this business in that city for the past seventeen years. Both are practical mechanics and upon their shoulders will fall the responsibility for production. For many months the company has been perfecting plans for the present organization.

Plan Light Cars

Arrangements have been made to use Timken axles and Continental motors in the first cars, which are scheduled for delivery about the first of February. The company plans to develop light trucks from 1000 pounds to one ton capacity, believing that a large demand exists for light delivery cars. The officials of the company are to be congratulated upon their foresight in this respect and are also to be welcomed into the manufacturing fraternity of the Pacific Coast.

GREAT CLYDESIDE SHIPBUILDING FUSION

HARLAND & WOLFF have acquired the shipbuilding yards and businesses of D. and W. Henderson and A. and J. Inglis, Ltd., situate at Meadowside and Pointhouse respectively, on the River Clyde at Glasgow.

The Meadowside and Pointhouse concerns are the seventh and eighth respectively which Harland & Wolff have acquired or possess controlling influences in on the Clyde, the list reading: John Brown & Company, Ltd., Clydebank; London & Glasgow Engineering and Shipbuilding Company, Ltd., Govan; Mackie & Thomson, Ltd., Govan; Caird & Company, Ltd., Greenock; A. Macmillan & Son, Ltd., Dumbarton; D. & W. Henderson, Ltd., Meadowside; A. & J. Inglis, Ltd., Pointhouse; and Burmeister & Wain, Ltd. (Diesel engine manufacturers). The five yards in the upper reaches which are now part of the great Queen's Island combine, viz., Brown's, Macmillan's, Henderson's, Inglis', and the Govan yard, form a group launching practically into the same water and capable of turning out all classes of ships. The change of ownership or control, as it may be in some cases, as at Cairns, involves or will involve great alterations and extensions for which power was granted last month.

INDEPENDENT WIRELESS TELEGRAPH COMPANY

THE Independent Wireless Telegraph Company, Incorporated, has established division headquarters in San Francisco, with service stations at Seattle, Portland, Los Angeles and Honolulu. This company has service stations at all principal American ports where inspections and repairs are made to the radio equipment on four hundred Shipping Board vessels, in addition to the large number of vessels owned by various steamship companies.

T. M. Stevens is Pacific Coast superintendent of the Independent Company. Up to the outbreak of the war he was associated with the Marconi Company and during the war was assistant to the Pacific Coast communication superintendent, Naval Communication Service, at Goat Island. While in the naval service Mr. Stevens had charge of radio personnel and detailed navy radio operators to merchant vessels.

The Independent Wireless Telegraph Company plans to maintain and operate shipboard radio stations which are privately owned. Ships subscribing to this service are given the benefits of a large radio organization which have heretofore been only possible under the rental plan.

Mr. P. R. Mallory, a well-known steamship man of New York, is the president of the Independent Company.

AMERICAN BUREAU OF SHIPPING APPROVES THERMIT WELDING FOR MARINE REPAIRS

AN important development of thermit welding in American shipyards is anticipated by the recent approval by the American Bureau of Shipping of the thermit process for welding stern frames, rudder frames, and other heavy sections on ships registered under their classification. The only qualification is that this bureau be notified sufficiently in advance to have a surveyor in attendance during the welding operation as well as to inspect and test the weld when completed.

While the thermit process has been used since 1903 for making marine repairs and has a great many successful welds of this nature to its credit, the process was never officially approved by the American Bureau of Shipping and most of the repairs were made on vessels not classed by them. It is due entirely to the unbroken record of successful marine welds that the bureau now accords its official sanction to the process. According to a statement by the Metal & Thermit Corporation, there has never been a single failure of a thermit marine weld, so far as it has been able to ascertain, in all the years that the process has been used under this company's jurisdiction.

NEW EDITOR FOR "NATIONAL MARINE"

CAPTAIN FELIX RIESENBERG, former commander of the New York Nautical School training ship Newport, will succeed Edward Frank Allen as editor of the National Marine, the monthly publication of the National Marine League of the United States of America, on October 1, when Mr. Allen leaves his present post to become publicity director of the J. B. Pond Lyceum Bureau.

Captain Riesenberg is a sailor, civil engineer and author. He was born in Milwaukee in 1879 and at the age of eighteen was graduated from the New York Nautical School ship St. Mary's. A number of years at sea as sailor and officer followed, including service with the United States Coast and Geodetic Survey and the United States Revenue Cutter Service. In 1906 he joined the Wellman Polar Expedition, and later became navigator of the airship America in the first attempt to reach the north pole in a dirigible balloon. In 1907 Captain Riesenberg entered Columbia and there received the degree of civil engineer in 1911. Subsequently be became commander of the Newport.

One of Captain Riesenberg's books, "The Men on Deck," is the standard textbook of young men who intend to become watch officers on our ships and has been supplied by the United States Shipping Board to all vessels under its control. His other book, "Under Sail," is a popular modern narrative of a voyage around Cape Horn.

ANNOUNCEMENT

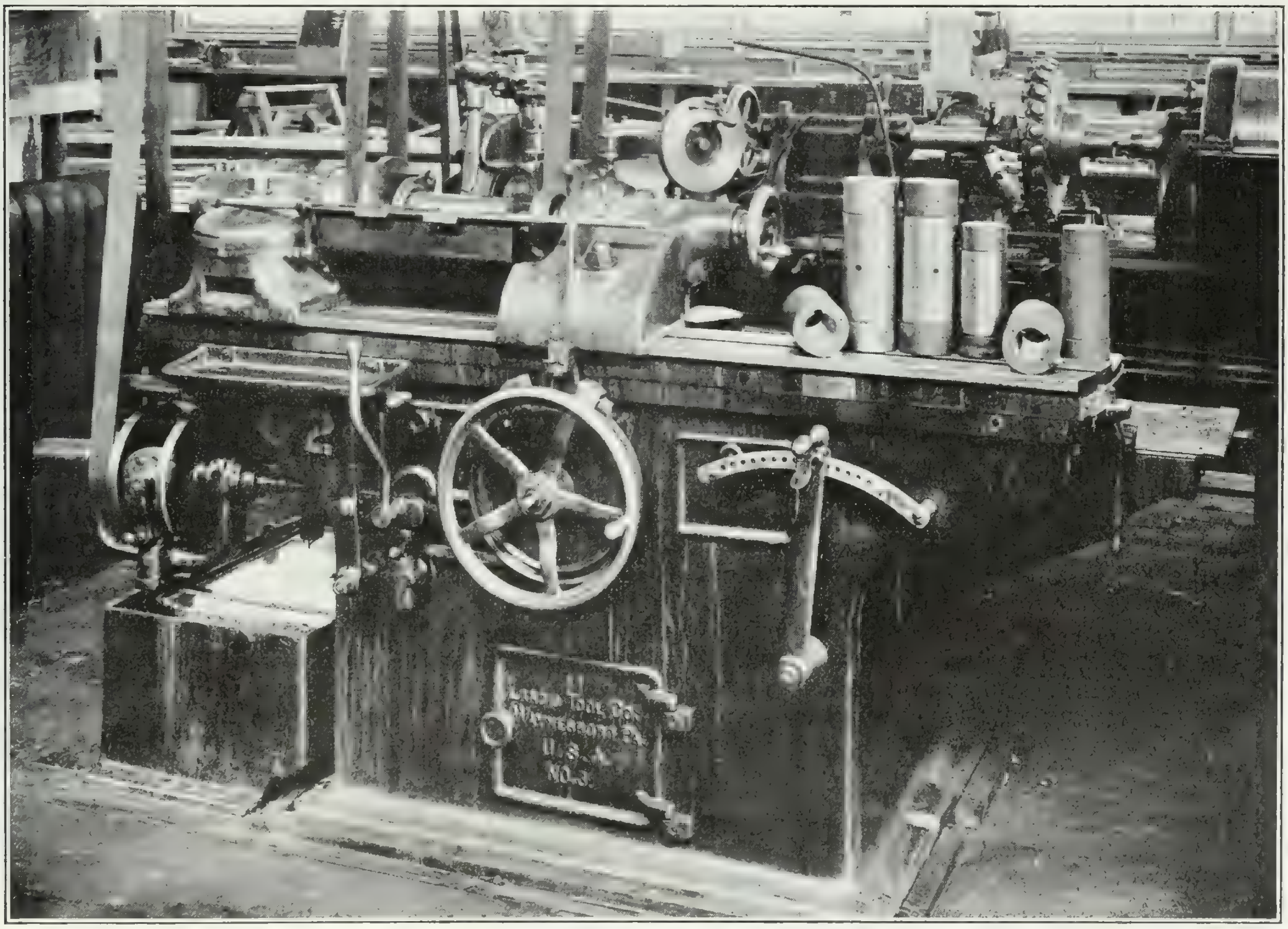
Charles Cory & Son, Incorporated, of New York, have announced the opening of a new branch at 207 Market street, Philadelphia, Pennsylvania, in order that their ships' electrical installation and repair and mechanical communicating work may be more expeditiously handled in the Philadelphia district. The Cory Company announces that it will carry in its Philadelphia branch a complete stock of marine electrical appliances and mechanical communication apparatus which will be available for immediate deliveries.

PACIFIC MACHINERY

Grinding Machines in the Modern Manufacturing Plant

By C. M. Talhelm

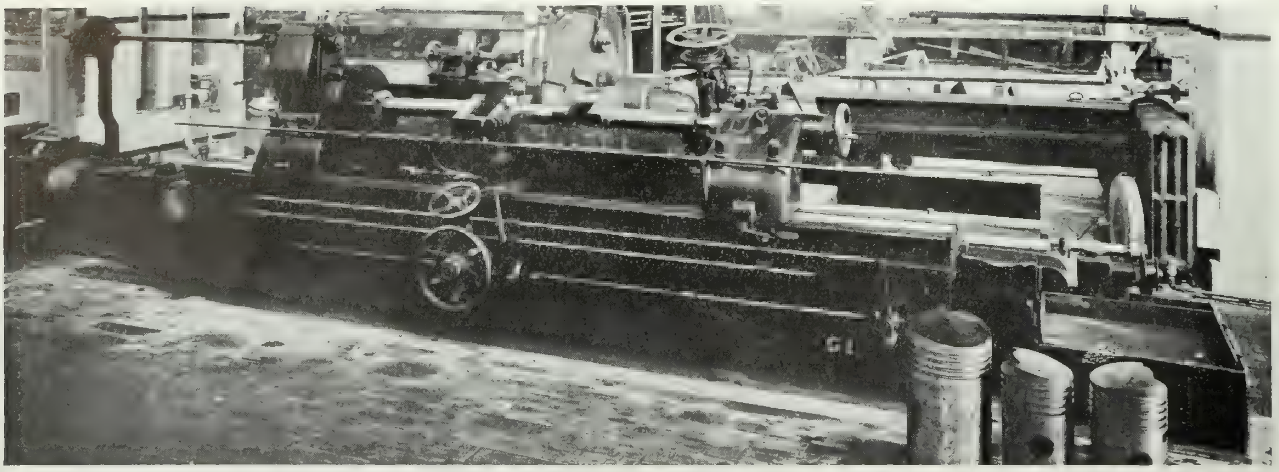
THAT the manufacturer on the Pacific Coast is fast realizing the importance of using grinding machines to increase production and at the same time meet the high standard of accuracy required, is evidenced by the many recent installations of modern grinding machines.



Internal and external grinding of oil engine piston pins

There are a number of very good grinding machines which have been developed in this country. Practically all designers have used the moving work table, with the exception of the Landis Tool Company, who use the traveling grinding wheel with a stationary work table. Both designs have shown more or less merit in grinding small work, but the traveling-wheel design of grinding machine has been very highly successful on long and extra heavy work.

To get production with high degree of accuracy it has been necessary to design a very heavy and rigid machine. The Landis machine embodies very heavy construction throughout. The massive carriage on which the grinding wheel is mounted operates on the bed of machine in V-shape and flat



Grinding line bearing journals on Gas Engine Crank Shaft

ways which have a large bearing surface, eliminating vibration, which is a very important factor in grinding machine operation. Correct lubrication of the ways is obtained by rollers, which are forced upward by springs against the carriage bearings and operate in oil pockets. The wheel head is of massive construction, operating on large V-shape and flat ways mounted on the wheel carriage. The tapered wheel spindle is large in diameter and made from high-grade crucible steel, accurately ground, operating in bronze bearings, which are lubricated by sight-feed oilers. The tapered spindle with micrometer adjustment is a Landis feature, permitting quick adjustment by the ordinary mechanic and also insuring alignment of bearings at all times. The wheel head feed into work is accomplished by a wheel graduated to a thousandth part of an inch which may be operated by hand or automatic power.

The swivel plate or work table on which the head and foot stock slide is chilled, thus insuring long wear and alignment. A graduated scale is located on foot stock end of swivel plate. This plate can be adjusted for tapered work.

The Landis grinding machine is entirely self-contained and may be driven by direct connected motor or over-head counter shaft.

Various types of these machines are manufactured by the Landis Tool Company, including universal, plain, internal and special crank, cam and ball-race machines. The universal machine may be used for internal, external and face grinding. This type of machine has been designed for tool-room work, but is often used very handily for manufacturing purposes. The plain grinding machines are very heavy and rigid, designed for straight and tapered work on production. The internal machines are used for internal grinding, hardened gears and various types of bushings, etc., while the special crankshaft and cam grinding machines have been designed for grinding cranks and cam shafts and the ball-race machines for grinding the radius in ball-race cones, male and female.

Production

Modern grinding equipment should not be considered only for polishing operations. Many manufacturers have found that by the use of grinding machines, a high degree of accuracy is obtained with greatly increased production in roughing cylindrical work compared with the old methods of roughing on lathes by turning, then filing to size and hand polishing to finish.

A notable instance of the part that grinding machines have taken in increasing production over lathes may be seen in the automobile industry. Landis grinding machines are used very successfully in rough grinding automobile crank and cam shafts from the forging, removing as much as one-half inch of stock.

Crank and Cam-Shaft Grinding

When grinding crankshafts, the grinding wheel is first dressed on both sides by the use of a diamond to obtain the required width of wheel. The grinding wheel is then moved straight into the work, without any traverse movement, to within .015 inch of the required finish size, the face of grinding wheel is then re-dressed for removing the remaining .015 inch of stock, producing an extremely accurate and highly finished crankshaft. In large Eastern plants using many grinding machines on crankshafts, one or more machines are used exclusively for the roughing work and others for finishing. This eliminates the necessity of redressing the same wheel for both operations and saves considerable time.

Roughing four-pin crankshafts from forgings, removing three-eighth-inch stock can be handled on special Landis crank-grinding machines at the production rate of sixty complete shafts a day. Finishing by removing .015-inch to .025-inch stock, shafts can be completed at the rate of eighty a day.

Special camshaft-grinding machines have been designed for grinding integral camshafts for automobile engines and loose cams for stationary gas engines. Camshafts and loose cams are rough ground from forgings, removing up to one-quarter-inch stock to within .025 inch of finished size. After roughing, the cams are hardened and then returned to the grinding machine for finishing. The grinding produces very accurate cams, which are necessary in automobile and stationary engines.

The foregoing is a very brief outline of the work which may be accomplished on modern grinding machines and is written in the hope that more Pacific Coast manufacturers will appreciate the necessity of using more modern equipment for lowering manufacturing costs and increasing production.

The Manufacture of Crank Shaft Coupling Bolts

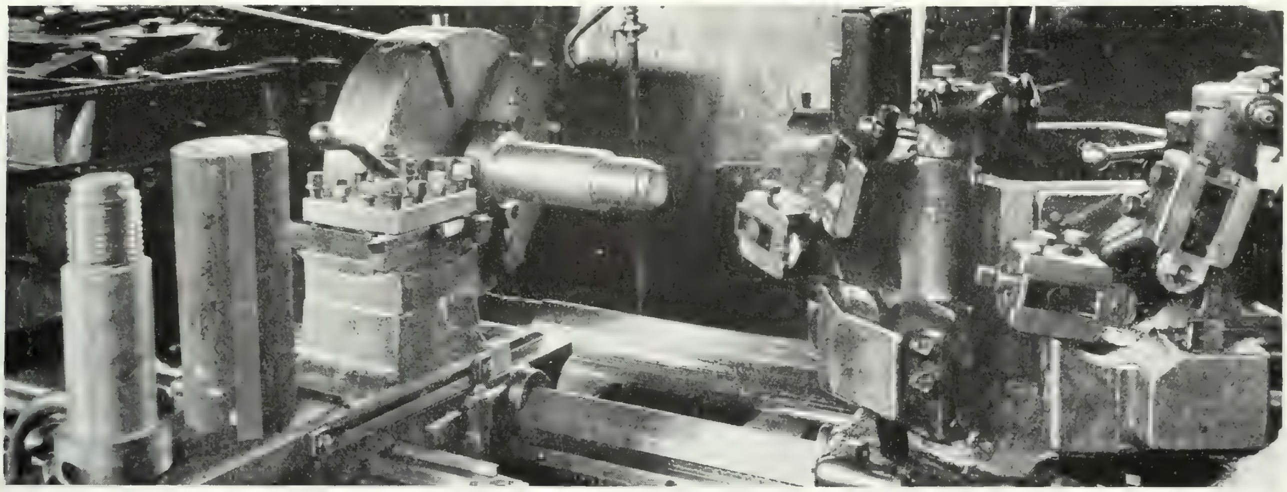


Figure 2. Turning and threading Coupling Bolt Bodies

DURING the stress of the past few years much new and modern machinery has been installed for high speed production. Of foremost importance in the saving of time and labor in machine shops is the turret lathe, many of which are now installed in Pacific Coast shipbuilding plants. An interesting operation on a turret lathe at the shop of Hesse-Martin Iron Works of Portland, Oregon, is described herewith, the work being a coupling bolt for the crank shaft for large marine installations. Figure 1 is a sketch showing the general dimensions. and the stock removed in the manufacture of these bolts. As the largest machine in these shops was a 4½-inch Warner-Swasey, the work could not be fed through the spindle, so the stock was previously cut to the proper length, about 12⅛ inches, leaving 1/16 of an inch on each end for finishing. The rough stock was cut from 4¾-inch round hot rolled bars .25-.35 carbon steel.

Figure 2 shows the work in the position occupied when finishing and threading the body of the bolt. In this operation the bars are chucked in the rough in a three jaw universal chuck. The first operation consists of turning the body for a length of 10 inches, removing ⅝ of an inch on a side, the finishing size having a tolerance of .001 inch plus or minus. A surface speed of 65 feet a minute is used and a feed of .025 inch, the time consumed being six minutes. The tool used in this operation is the standard Warner-Swasey universal turner, with roller back rests. The cutting tool is adjusted with a lead of about 1/16 inch ahead of the rolls. In this manner tool vibration is eliminated the moment the rollers are seated behind the tool. As these bolts are fitted in line reamed holes, a smooth finish on the body of the bolt is desirable and a tool releasing device which forms part of the turning tool moves the cutting tool away from the work at the end of the cut, eliminating the tool mark which would otherwise be formed when backing off the tool for indexing the turret. The second operation consists of turning the blank thread diameter for a length of 3½ inches on the outer end, removing a ¼ inch of stock on a side. A Universal turner mounted on another face of the turret is used for this operation. In this case, however, the guide rollers are given a lead over the cutting tool and are adjusted so as to roll on the 3½ inch body previously turned. This assures the thread being concentric with the body diameter. For this operation a surface speed of 79 feet a minute is used, together with a feed of .025 inch, the operation consuming 1⅓ minutes. The third operation consists of forming the extreme end of the bolt with a pointing tool. This tool faces the end and forms the diameter. This operation consumes about two minutes. Coincident with this operation a forming tool situated in the cross slide tool post undercuts the bolt at the end of the thread for the over-run of the die in the next operation. The fourth operation is that of cutting the U. S. F. threads. These threads are cut by means of a geometric die held on another face of the turret. The time consumed in cutting and indexing is two-thirds of a minute. For finishing the heads, the Universal three-jaw chuck is removed and the standard automatic collet chuck is substituted. The work in this position is shown in Figure 3, the diameter of the head being finished to 4½ inches in diameter by means of a Universal turner. The time of this operation requires about two minutes. For facing the head and chamfering the corners a pointing tool is used, this operation requiring three minutes. Thus the actual turning time on each bolt amounts to but fifteen minutes.

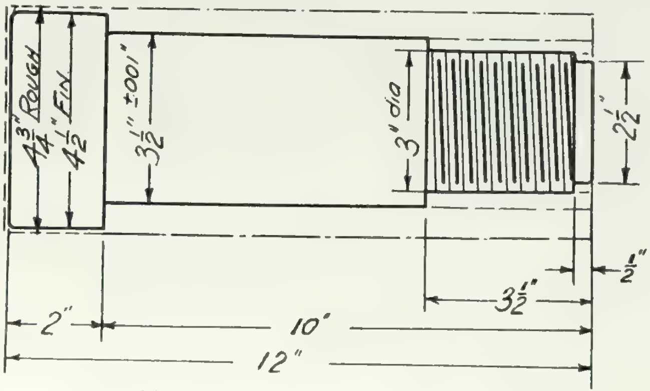
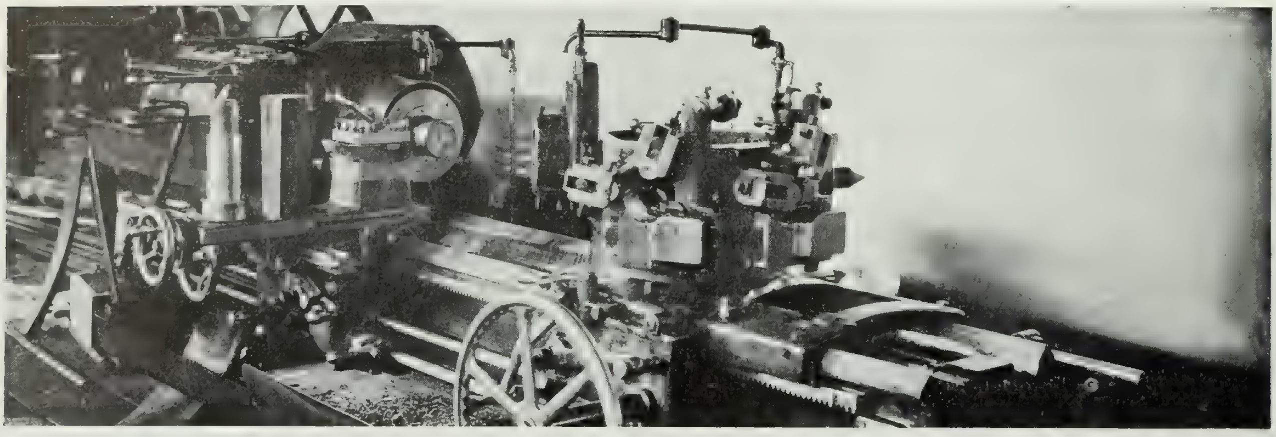


Figure 1. Dimensions of Coupling Bolt

Fig. 1, page 123, is representative of many similar operations to be found in the shipyards which illustrate the advantage of proper tool equipment. Turret lathes fitted both with bar and chucking equipment are proving more and more every day their value to Pacific Coast manufacturers.


Turning and forming Head of Coupling Bolts

Electric Steel

By G. N. Somerville

THE many advantages of electric steel over earlier and more widely used processes was brought out quite plainly during the recent world war. Among other things tending to help this industry was the impossibility of getting German clays, from which many of the crucibles used in this country were made, and the suddenly increased demand for high-grade alloy and special carbon steels, much of which had previously been imported from Germany. In 1915 there were about twenty-five electric furnaces in operation and building in the United States, while at the present time (1919) there are in operation and building approximately 300 electric furnaces with a combined daily output of about 300 tons. Of the present installations probably not more than 25 per cent are installed in steel foundries where the output is utilized in steel castings, the remaining 75 per cent producing ingots of high-grade carbon, alloy and tool steels.

We in this country are familiar with the crucible furnace as the earliest method of steel making, and this is still used where small quantities are desired and where the output is not of sufficient magnitude to warrant the operation of any of the other methods of steel making. Some industries where a particularly high grade of steel is required in small quantities, such as in the manufacture of surgical instruments, still favor the crucible process. Where larger quantities of steel are required, either the open-hearth or converted process has been resorted to. While the Bessemer converter was proposed many years ago, its commercial development lagged behind the open-hearth process, so that many of our big steel producing furnaces operate on the latter process. Probably one of the greatest disadvantages against the open-hearth method is the inability to produce a sufficiently hot metal for running in thin section castings and for this class of work we find the Bessemer converter in many steel foundries.

In the converter method, pig iron and scrap steel are melted in a cupola, after which the melted charge is transferred to the converter and blown to reduce the carbon. This method is open to the objection that it is not possible to reduce the sulphur or phosphorous entering the mixture from the pig iron and coke. Another great disadvantage is the oxidizing effect produced in the blowing process within the converter. To reduce the phosphorous and sulphur content and to de-oxidize the metal, agents such as ferro silicon, ferro manganese and aluminum are mixed in the ladle before pouring into the molds. While this method has given satisfactory results for certain classes of work, it has long been known in the steel industry that a clean steel is not produced. Small non-metallic globules are formed within the steel which under this method do not have sufficient time to rise to the surface as a slag, and while of exceedingly small dimensions, probably one-thousandth of an inch in diameter, they have the effect of reducing the cross-sectional area, but, which is more dangerous still, cause internal strains within the metal upon cooling. Converter steel and electric steel, having a carbon content of about .20 to .25, will probably show about the same tensile strength while the elastic limit, elongation and reduction of area are usually higher in electric steel because of the more nearly perfect chemical refining by this method. The following table illustrates a fair comparison of steels produced by the two methods:

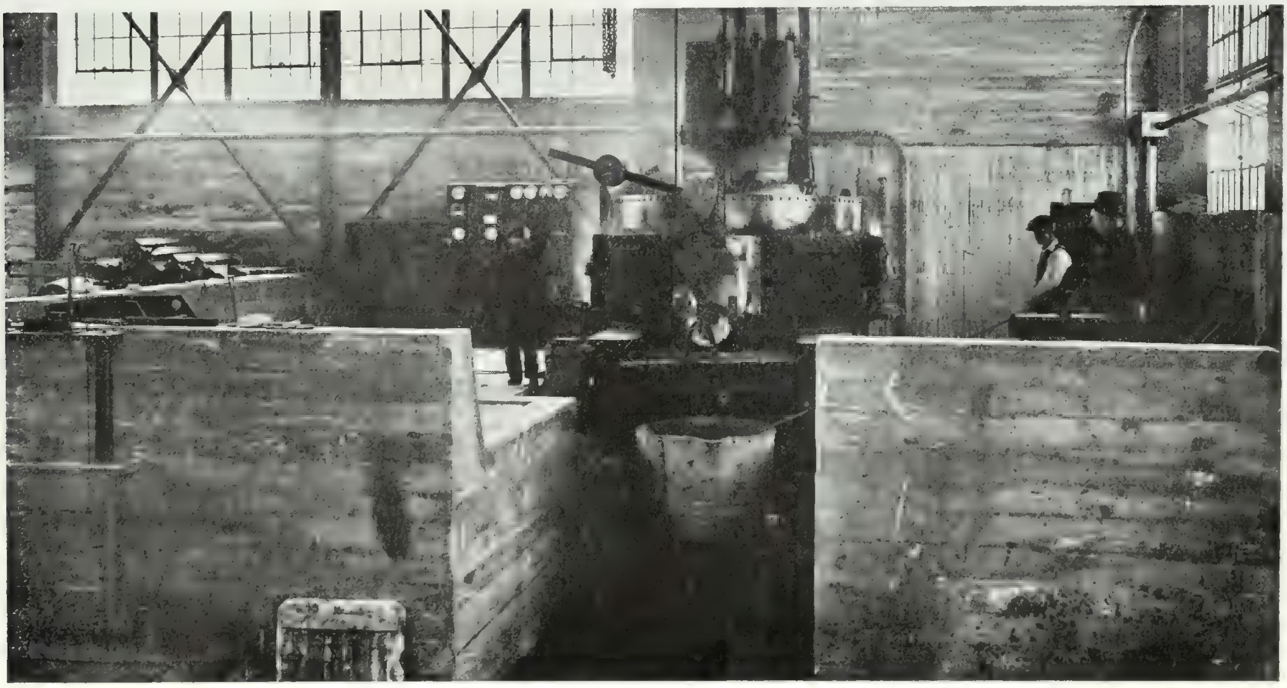
	Converter Steel	Electric Steel
Tensile strength	71,400 lbs.	71,400 lbs.
Elastic limit	32,000 lbs.	43,400 lbs.
Elongation	25%	31.6%
Reduction of area	40%	51%

These physical properties are typical of a straight carbon steel with a carbon content of .20 to .25.

Electric Furnace

In the Heroult electric furnace the advantages of all other methods are retained and most of their disadvantages eliminated. Steel scrap may be used alone, resulting in considerable saving in cost of material. The steel furnace itself consists of a boiler plate shell about three-quarters of an inch thick with a bowl-shaped hearth. Two or more charging doors are provided according to the size of the furnace and one spout door for pouring. The furnace is designed to be lined with a suitable lining about 16 inches thick. The roof through which the three electrodes enter the furnace is removable for relining. The electrodes are supported by water-cooled rings. These rings are supported in such a manner from the back of the furnace that the raising and lowering device tilts with the furnace. The raising and lowering of the electrodes is accomplished automatically. Counterweights balance the weights of the electrodes and a small electric motor is provided to automatically raise and lower the electrodes to keep them the proper distance from the mass of molten metal within the furnace. Large copper busses and flexible cables transmit the power from the transformers to the electrodes. The tilting of the furnace for pouring is accomplished electrically through gears, the trunnion upon which the furnace tilts being directly below the door spout. Oil switches for primary control of the transformers and secondary control of the electrode motors are provided. A single three-phase transformer is used. Up to the present time voltage reductions of from 20,000 to 100 volts are accomplished in one step, while the furnaces that have come under the writer's notice reduce from 11,000 to 100 volts in a single step. The largest furnaces installed so far in this country are about twenty tons' capacity, the six-ton size being the most popular.

I have shown above some of the disadvantages of the other types of steel furnaces and will now endeavor to point out the progress made by the electric furnace in overcoming these disadvantages. This can probably best be shown by describing the processes involved in making electric steel. In the electric furnace steel scrap such as punchings, turnings, etc., are charged and the electrodes dropped until they come in contact with the charge. The current is then turned on and the electrodes automatically raised, causing an arc. Because of the heat generated, the metal immediately below the electrodes is fused, causing a small puddle of molten metal directly underneath each electrode, allowing the electrodes to descend slowly until the bottom of the charge is completely melted. At this stage of the process the melting of the entire mass starts from the bottom upward. In the six-ton furnace the time required for the electrodes to go down through the charge is about ten minutes, after which it requires from two to three hours to melt the charge. As gases are formed during the melting, they naturally rise and escape through the openings around the doors. This creates a very slight pressure within the furnace, which, while not enough to register on a gauge, is sufficient to prevent air from entering the furnace. This causes the charge to be melted under a reducing condition, preventing the oxidation of the charge. After the charge is thoroughly melted, the refining process starts. Slags are formed for the removal of sulphur and phosphorous and for de-oxidizing the charge. This is done by the addition of ferro manganese, ferro silicon and aluminum. The refining process occupies approximately two hours. While the ferro silicon is not always required for refining, it is by the addition of this material that the silicon content of the charge is raised. Because of the time required in refining, we have by this method the only known metallurgical process of removing sulphur and phosphorous. For the raising of the carbon content, pig iron carbon electrodes are used. We find in the Eastern manufacturing centers a preference for pig iron for this use because of the closer control of the chemical analysis. On the Pacific Coast, however, where the freight rates and cost of pig iron are rather high, much use is made of carbon electrodes for this purpose. Electric steel, because of the thorough refining it receives in the electric furnace, does not contain non-metallic globules and is a higher grade of steel than open-hearth or converter steels. In the electric furnace it is impossible to produce steel quite as hot as that produced in the converter. This is a



A six-ton Electric Furnace installed at the plant of American Manganese Steel Company decided advantage in foundries where thin section castings are made, as the period of red shortness is entirely eliminated. Electric steel can be run in any class of molds and produces castings true to the pattern.

Linings

Furnaces are lined with a basic lining up to the slag line, consisting of magnesite brick and powdered magnesite rammed on top. The hearth and walls are lined with chrome brick up to the slag line; above the slag line silica brick is used in many cases. Silica brick, however, is not so satisfactory as the magnesite, and many furnaces are lined throughout up to the roof with magnesite brick. The electrodes now in use are both carbon and graphite made in sections and screwed together, permitting them to be continuously fed into the furnace through the holder. In this manner the electrodes are entirely consumed without loss. The graphite electrode enjoys an advantage on account of its conductivity and freedom from breakage, and, being only about one-half the size of a carbon electrode of the same conductivity, it is much easier to handle.

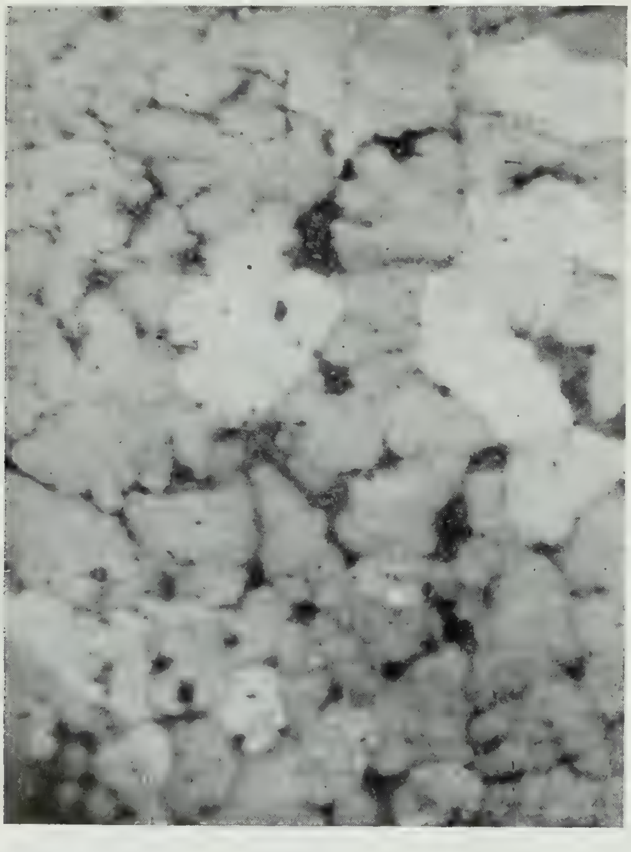


Figure 1. Untreated or raw Manganese Steel as viewed through the Microscope

Uses of Electric Steel

Some of the largest steel users are to be found among the consumers of electric steel. The Timken Roller Bearing Company, makers of roller bearings and automobile parts, use electric steel exclusively. Scrap is used entirely from their manufacturing departments, which, after being cleaned of oil, is pressed into bundles, charged into the electric furnace, melted, cast into ingots and finally rolled into commercial shapes. This method results in the elimination of practically all waste. Other uses to which electric steel is now put are found in the manufacture of tool, alloy and special steels, springs, saws, files and hand tools, ammunition, steel sheets, plates and bands. Probably 75 per cent of the steel used in automobile manufacture in this country is electric steel.

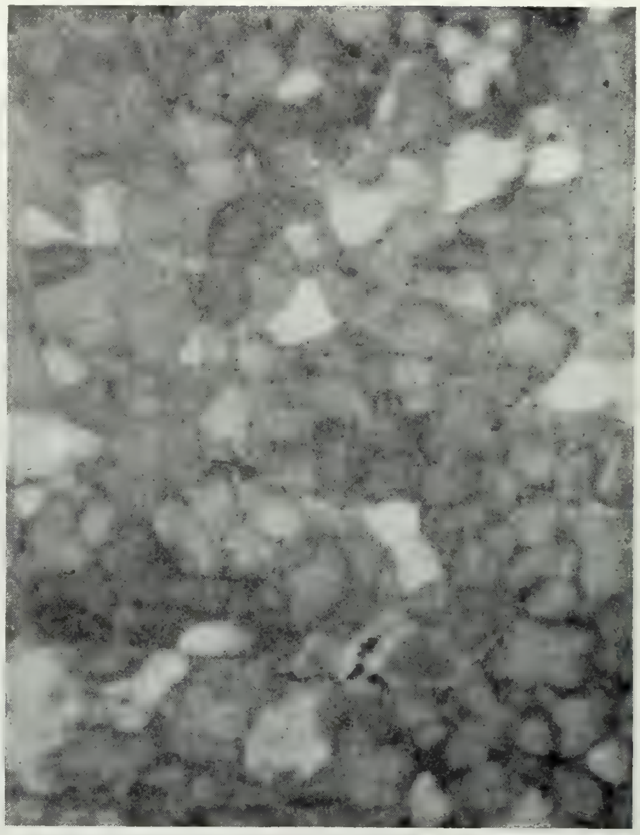


Figure 2. Same Steel as in Figure 1 after Heat Treatment

Manganese Steel

Manganese steel castings are now being produced on the Pacific Coast by the American Manganese Steel Company, using Heroult electric furnaces. The method of melting and refining manganese steel is much the same as that described for carbon steel; but an added amount of manganese is used in the mixture. Manganese steel castings require special treatment after melting. This treatment consists of heating the castings to the lower critical point (1800 to 1850 degrees Fahrenheit), after which they are quenched in water. Raw manganese steel is hard and brittle, the steel is made tough by this treatment. Figure 1 shows a microscopic photograph of a sample of raw manganese steel before treatment. Figure 2 is a photograph of the same steel after treatment. The chemical properties of this steel are shown in Table 2.

Table No. 2

Carbon	1.07
Manganese	11.75
Silicon	.40
Phosphorous	.044
Sulphur	trace

We may confidently expect to see the steel industry take root on the Pacific Coast through the electric furnace, because by this method none of the high-priced material common to other methods is required, such as coke and pig iron, while scrap on the Pacific Coast is comparatively cheap, and we are favored with an abundance of cheap electric power.

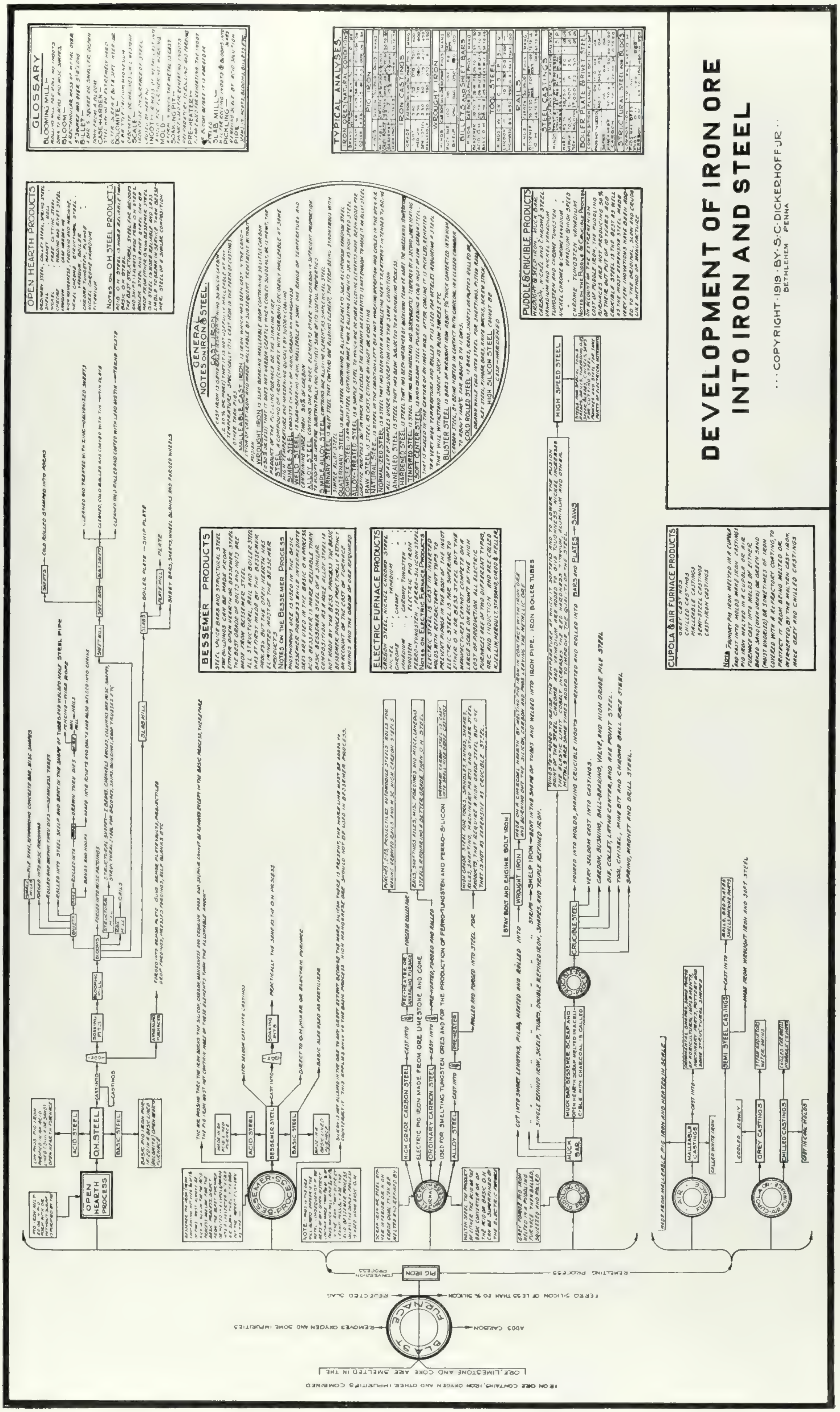
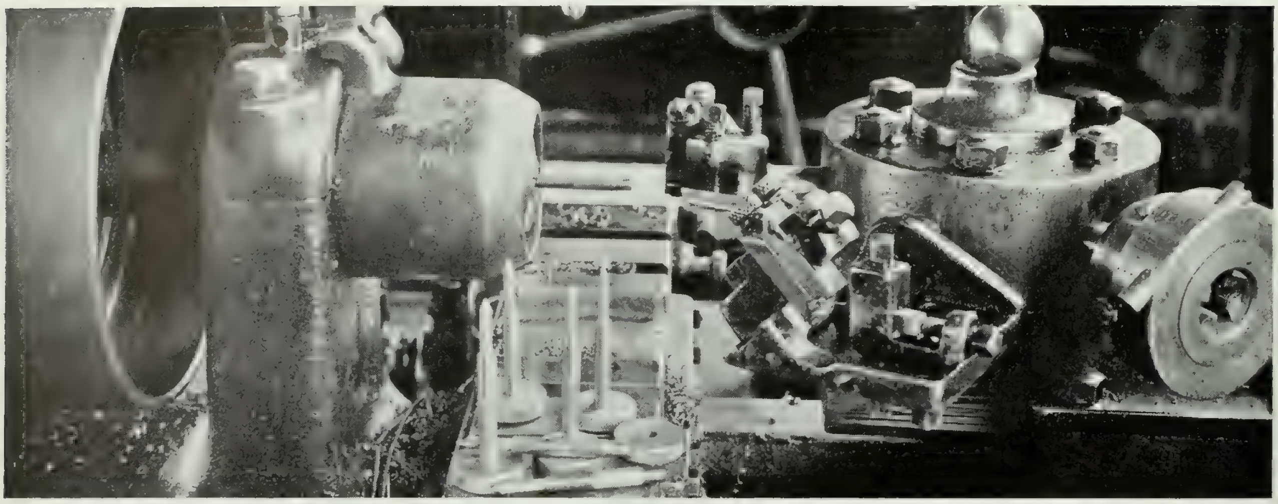


Chart showing processes involved in the various methods of manufacture of Steel and Iron products. Reproductions of this chart in various sizes can be obtained by communicating with Mr. S. C. Dickerhoff, Jr., Bethlehem, Pennsylvania

Machine Air Regulating Valves



Making Air Regulating Valve Stems on a Hand Screw Machine

MACHINING operations developed for facilitating the rapid production of air regulating needle valves has been highly perfected by the Coin Machine Manufacturing Company of Portland. Figure 1 is a photograph of the assembled valve and it will be noted by referring to the details shown in Figure 2 that the entire valve is made from bar stock. The work is done on a Warner & Swasey hand-screw machine. It will also be noted that the body proper is made from ⅞-inch round cold-rolled steel, the bar being fed through an automatic chuck. The first operation consists of drilling a 7/32-inch hole 1-3/16 inches deep, the second operation being the tapping of this hole with a ¼-inch 28 thread tap, the projecting end having been previously formed. The outer diameter is threaded 7/16 S. A. E. The next operation consists in forming the other end, namely, the ⅛-inch pipe thread end, simultaneously with the first end of the next succeeding piece to be made. The forming tool is held in the cross slide turret. After this operation the work is cut off. The work of drilling and threading of the 3/32 hole is performed in the second set-up. Finally the side outlet is drilled and tapped for ⅛-inch pipe, the work being held in V centers. The needle valve, it will be noted, is turned from ¼-inch round cold rolled. The work, as in the previous case, is fed through in a bar. The needle body is first turned down by means of a hollow mill to 5/32 diameter and the needle formed with a pointing tool to a thirty degree angle. Next a ¼-inch 28 thread is cut with an expanding die. After the cut-off the short thread for the knurled nut is cut in a subsequent operation. The knurled nut is one inch in diameter, made from cold rolled, the operation consisting simply of forming the groove, drilling, tapping and knurling, and, with the exception of the knurl, the tools are held in the main turret. The knurling tool is held in the cross slide. It is to be noted that instructions call for assembling the needle and knurled head, after which the stem is riveted over to prevent its becoming loose.

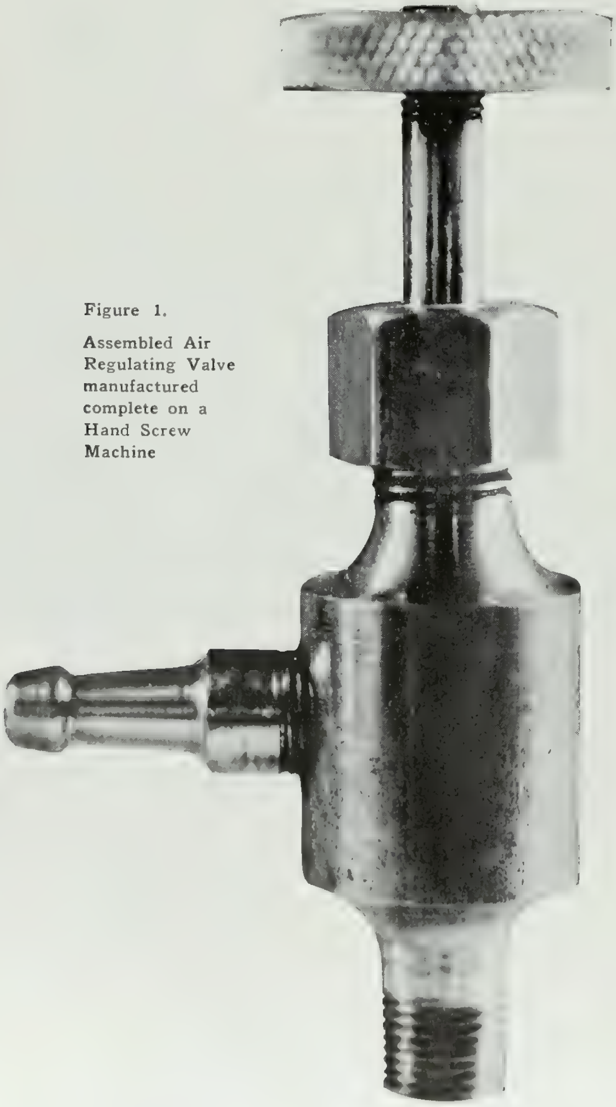


Figure 1.
Assembled Air Regulating Valve manufactured complete on a Hand Screw Machine

While the labor involved in making the needle and head in two pieces might seem unnecessary, it is found that the cost is considerably lower than if turned down from a solid one-inch bar embodying the stem and head in one piece.

Packing nut, as will be noted, involves the drilling, counterboring, tapping and chamfering of a ⅝ hexagon cold rolled bar. A 7/16 S. A. E. tap is used to correspond with a similar thread on the valve body, while the ¼-inch drilled hole naturally comes a sufficient amount over size to give clearance around the ¼-inch stem. A special drill here is not required, especially so as the cold rolled stock for the stem is usually a few thousandths of an inch under size. The air hose connecting stem is 13/32 O. D. and cold rolled screw stock of 7/16 diameter is used. The first operation consists of forming the taper for the ⅛-inch pipe thread, after which the 5/32-inch hole is drilled, followed by the threading operation. Simultaneously with the threading, the forming of the enlarged head and taper stem is accomplished by means of a forming tool in a cross slide. The cut-off tool for the final operation is held in the back tool rest.

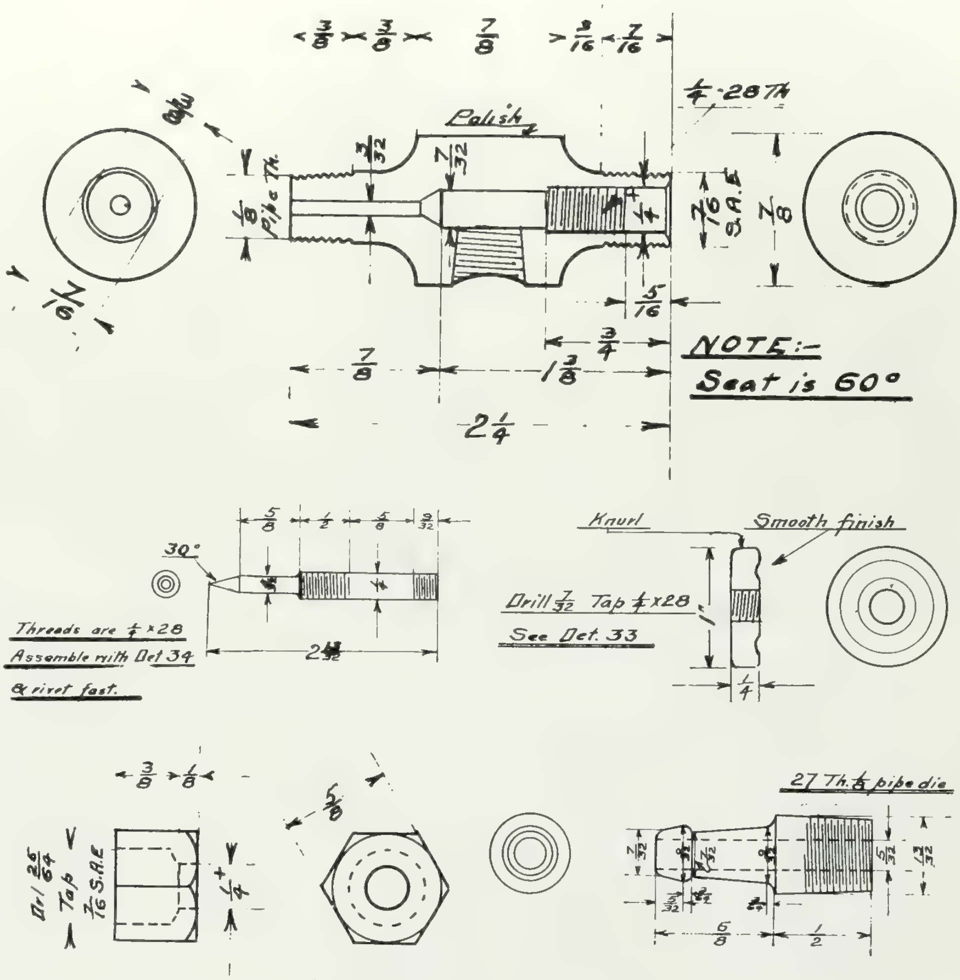
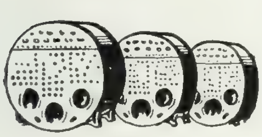
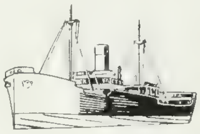
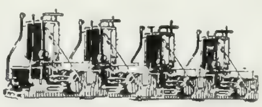


Figure 2. Details of Air Regulating Valve

The design of this air valve is the result of many experiments, during which many commercial valves were tried and discarded, the desire being continually in the manufacturer's mind to produce a valve at a low cost, at the same time embodying close regulation as the paramount feature. Both of these requirements have been met in the final design. The total operating time, not considering assembling, is less than twenty minutes and the work is easily performed either by a specialist or an apprentice operator.





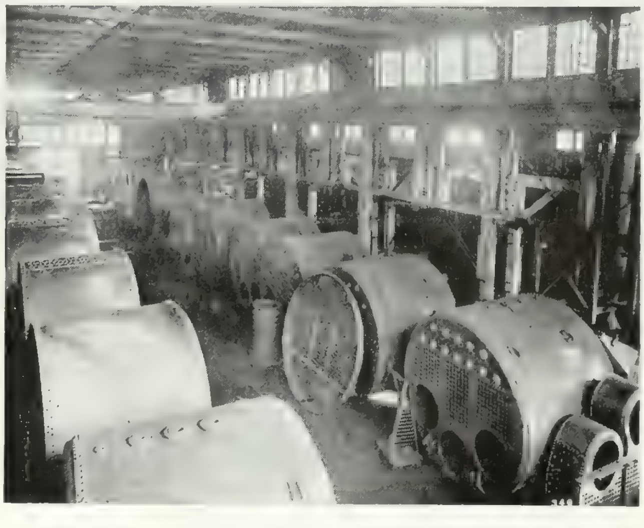


World's Record in Boiler Production

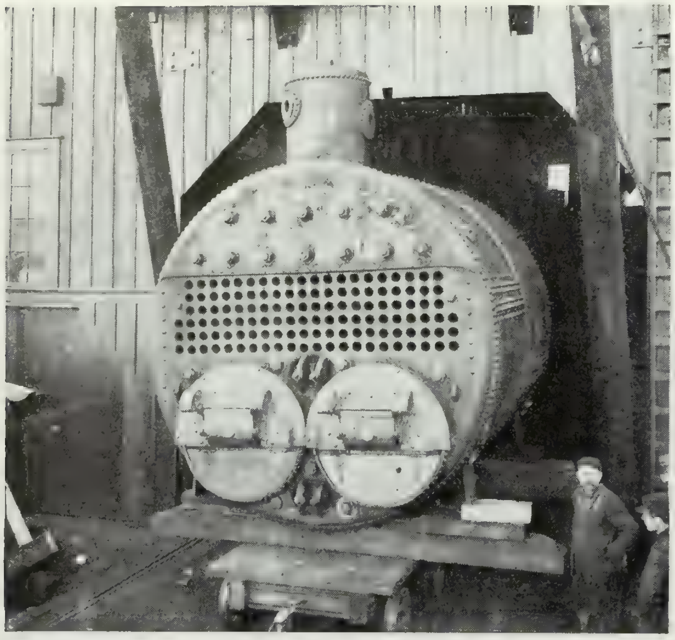
MANY interesting and remarkable records have been made in the United States during the crisis just passed, in the field of marine activities.

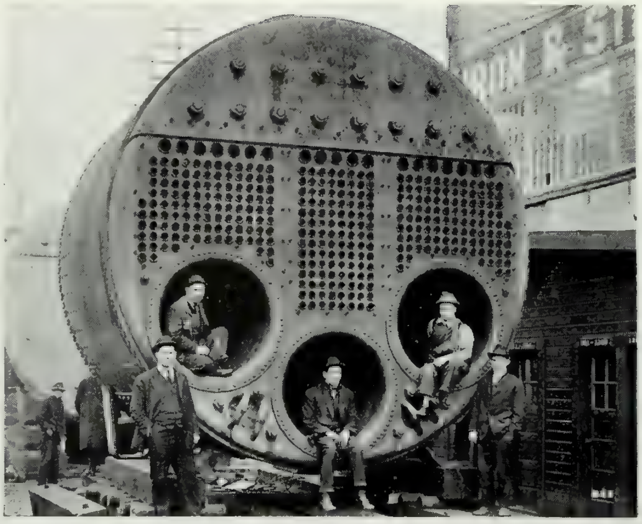
This is particularly true in the case of new construction. Not the least brilliant of these records is that of the Willamette Iron & Steel Works of Portland, Oregon, in the matter of Scotch marine boiler construction.

The foundation of this plant was laid in the early sixties, doing business at that time as the Willamette Iron Works. In 1900 the company was reorganized under the present name of the Willamette Iron & Steel Works. Modern shops were erected on its present five-acre tract on the river front in the lower harbor. During the early life of the concern many of the engines and boilers of inland water boats of the Northwest were constructed by the company. Not so many years ago it took this company nearly a year to build by hand a boiler fourteen feet in diameter, and need-



A partial view of the Boiler Erecting Shop, Willamette Iron & Steel Works, Portland, Oregon





At the left: Scotch Marine Boiler manufactured fifteen years ago at the rate of one boiler a year. Above: Scotch Marine Boiler now manufactured at the rate of one every working day. These two illustrations show very graphically the remarkable progress of the Willamette Iron & Steel Works in boiler production.

less to say it is a long jump from one boiler a year to practically one a day. In looking back over the Willamette record of construction for the year 1918 we find a total of 138 Scotch marine boilers; sixteen 8800-ton steel ships and 151 logging engines completed—truly a remarkable performance and one to be justly proud of.

Coming down to the present year we find still a further increase in boiler production, the plant having discontinued its shipbuilding activities upon completion of its government contracts, giving more time to the important branch of the business until today we find a boiler being turned out nearly every day, each being practically of the same dimensions, viz.: 14 feet 9 inches in diameter, and 11 feet long, built for a working pressure of 210 pounds, and weighing approximately 60 tons.

Taking each month separately the record shows: January, 21 complete boilers; February, 22; March, 24; April, 22; a total of 89, and this against the actual working days during this period.

It might not be amiss at this time to take up the matter of shop facilities which make this record production possible. The boiler shop includes two crane bays 50 feet wide by 300 feet long. One bay is used exclusively for assembling purposes and is equipped with a 20-ton Pawling & Harnischfeger crane. This provides room for assembling eighteen 14 foot 9 inch boilers at one time. In the other bay are located the various tools, all of sufficient capacity to handle plate up to 1⅝ inches thick. The tools in this bay are served by a 10-ton traveling crane. The equipment consists of two hydraulic bull rivets, a battery of high speed electrically driven drill presses, two plate planers, annealing furnace, two large 150-ton flange presses, bending rolls, oil furnaces and similar equipment.

Another achievement which attests to the high state of efficiency and organization perfected in the workings of this plant is clearly shown in a carefully kept boiler shop record, with but eighty-four errors in the handling of 21,000 operations.

A ready market is found for the products of this plant, not only in the United States but in the Southern Hemisphere, the Orient and in fact a world-wide distribution is enjoyed owing to the enviable reputation attained by this company wherever its products are in use. Nor does the production of boilers cover its present field of activities, the plant being well equipped to do ship repair work of any class or magnitude, the rebuilding of engines and the making of all classes of marine machinery and auxiliaries. The following news item, taken from the Portland Oregonian of October 10, this year, gives one some idea of the shipments being made daily by this company, and their destination:

"TO SHIP TWENTY BOILERS

"Willamette Iron & Steel Works to Make Big Delivery

"Twenty Scotch marine boilers, the total value of which is close to $500,000, will be shipped out from the plant of the Willamette Iron & Steel Works next week.

"Twelve of these will go on the steamer Grace Dollar to Shanghai, China. They are valued at $300,000. These boilers were to have been shipped last August, but no tonnage for their shipment was available. They will be installed in vessels being built by the Emergency Fleet Corporation in Shanghai.

"The coasting steamer Johan Poulsen of the Loop Lumber Company will be in Wednesday to load six boilers for J. F. Duthie & Company, Seattle, and the Columbia contract barge No. 39 is expected about Tuesday to take two more boilers for the Foundation Company, at Victoria. This barge left early in the week with two boilers for the Victoria shipbuilding concern."

Through the very capable and efficient management of Mr. Bert C. Ball, who fills the double function of chief engineer as well as president, assisted by the excellent judgment and capacity for organizing displayed by Mr. A. G. Labbe, general manager, it has been possible to bring this plant to its present state of high efficiency and world record production in the matter of construction of Scotch marine boilers.

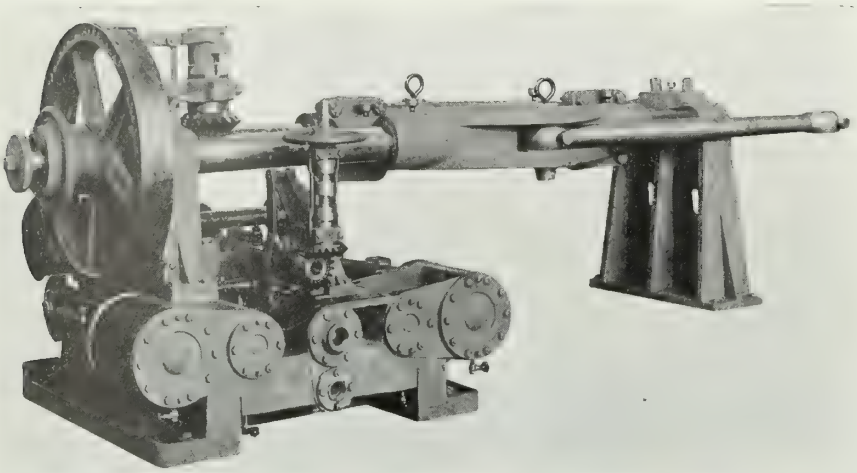
A Popular Shipping Man of Portland

A. C. Stubbe, General Manager of the Columbia-Pacific Shipping Company of Portland, Oregon

The Columbia Pacific Shipping Company of Portland, although a very young concern, is fast making strides in marine operation. This is due, in a very large degree, to the efficiency and popularity of its genial general manager, Mr. A. C. Stubbe. Mr. Stubbe, although a comparatively young man, has had a very large experience in the commercial and shipping world, as the following list of positions held by him will show.

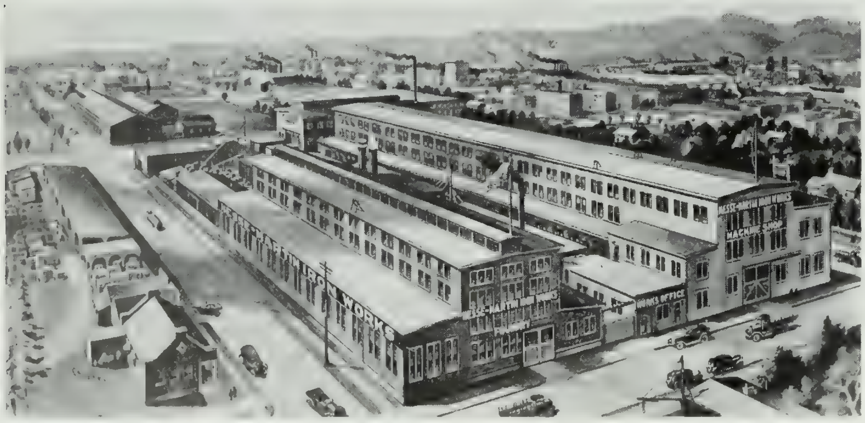
Freight clerk for the California & Oregon Coast Steamship Company; freight clerk and purser on steamers operating between Portland and Astoria by the O. R. & N. Co.; rate and tariff clerk in the office of the traffic department of the O. R. & N. Co.; rate and tariff clerk in the traffic department of the Great Northern Railroad Co., Seattle; assistant to the traffic manager of the Pacific Hardware & Steel Co., of San Francisco; rate clerk for the Pacific Steamship Company at San Francisco, and agent for the company at Eureka, California; traffic manager for the Pacific Hardware & Steel Co.; freight claim agent for the California-Atlantic Steamship Co. of San Francisco; agent for the Oahu Railway, Leilehau, Oahu; head of the steamship and chartering department of the E. I. Du Pont de Nemours & Co., Wilmington, Delaware, and manager of the Portland office of Sudden & Christenson.

Heese-Martin Iron Works, Portland, Oregon



Steam screw Steering Engine built by the Hesse-Martin Iron Works

View in the machine shop, Hesse-Martin Iron Works



Birdseye view of the plant, Hesse-Martin Iron Works

THE past two years show for the Hesse-Martin Iron Works, of Portland, Oregon, a most commendable period of advancement. During that time they have established on the Pacific Coast a permanent industry for the manufacture of deck and auxiliary ship machinery.

At the time when the war made its unprecedented demands upon manufacturers of this class of equipment, the Hesse-Martin Iron Works were well prepared to do their share in turning out this machinery. Plans were already under way for the erection of the new shop which is shown in the birdseye view on this page. In this shop new and modern tools particularly adapted to the building of ship machinery were immediately installed.

Some idea of the volume of work turned out by this plant can be obtained from the following list:

For the United States Shipping Board Emergency Fleet Corporation, this company built 135 anchor windlasses. These windlasses had double horizontal engines 8 inches by 10 inches and the wildcats were made for 1⅞-inch stud link chain. A cut of the windlass on this page will give an idea of the compact design used by this company. These hoists were installed on the wooden ships of the Hough and Ferris types.

In addition to these, this company built for the Shipping Board fifty steam steering engines of the quadrant type for wooden ships, and also fifty hand steering gears which were installed on both Hough and Ferris type boats.

For the Grant Smith-Porter Ship Company of Portland and Aberdeen, the Hesse-Martin Iron Works furnished the complete deck equipment for thirty-eight wooden vessels. The equipment required for each ship and furnished to them consisted of:

One anchor windlass 8 inches by 10 inches.
Eight cargo winches 8¼ inches by 8 inches.
One steam capstan 6 inches by 8 inches.
One steam steering engine 7 inches by 7 inches.
One hand screw steering gear.

In addition to the above, large contracts were taken from both Supple & Ballin and the G. M. Standifer Construction Corporation.

At the same time this company also built for the Northwest Steel Company and the Columbia River Shipbuilding Corporation thirty-two screw type steam steering engines 8 inches by 7 inches. A cut of the engine is shown on this page.

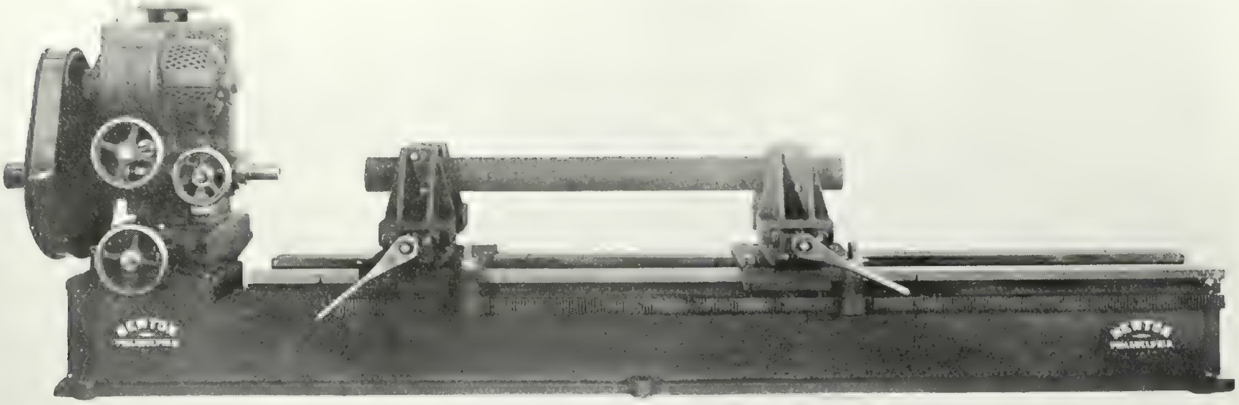
When the wooden ship program was curtailed by the Shipping Board, the Hesse-Martin Iron Works were fortunate in obtaining from the Northwest Steel Company of Portland a contract for supplying all the special machine work in connection with the 8800-ton steel vessels building at that plant. This work included all of the shafting and bearings; rudder arms and rudder stocks; sea chests, manifolds, and practically all pipe fittings.

It is the intention of the Hesse-Martin Iron Works to pursue this class of work on the Pacific Coast, and they hope in time to establish an export trade in this line.

ENTERPRISE GAS ENGINES

Mr. J. H. Hause, the well-known San Francisco pattern maker, who has been engaged in making patterns for a number of the gas engine companies, has ordered a 16 H. P. Double Cylinder Enterprise Marine Engine, equipped with two carburetors, for use in a 35-foot trolling boat.

The Enterprise Gas Engine Works, which he is interested in, are now located at Eighteenth and Alabama streets, and with new equipment will be in better position to make quick deliveries on all size engines.



Newton Centering Machine

NEWTON CENTERING MACHINE

THE newly designed centering machine, illustrated and described herewith, is a recent development of the Newton Machine Tool Works, Philadelphia, U. S. A., for centering rough and irregular forgings.

Two universal centering vises of the interlocking type are supplied with the machine. The jaws are adjustable by means of a screw, giving a capacity for rounds from 2 inches to 12 inches in diameter and of any desired length.

Vises are adjustable on the bed by means of rack and pinion.

The spindle is of forged steel 3 inches in diameter, running in bronze bushed bearings, has 4-inch cross and 4-inch vertical adjustment with 8 inches of hand feed.

The cross and vertical adjustments are equally divided from center line of work.

The drive is by direct connected motor through a bronze driving gear.

Alignment of all movable parts is maintained by adjustable taper shoes.

Table of Dimensions

Diameter of spindle	3 "
In-and-out adjustment to spindle	8 "
Vertical adjustment to spindle	4 "
Cross adjustment to spindle	4 "
Length of base	16 '
Width of base	22 "
Distance center of vise to top of base	15½"
Maximum distance center of spindle to top of base	17½"
Minimum distance center of spindle to top of base	13½"

THE DAVIS EXPANSION REAMER

FOR a long time the old style of solid shell reamers were used, but with the constant improvement of other machine shop equipment, the necessity of a reamer whose blades could be expanded, in a practical manner, to compensate for wear, was keenly felt. Numerous types of adjustable reamers were placed on the market from time to time, the majority of which were controlled and locked with individual blade screws or pins. But none of these fully met all the requirements of the trade. The great percentage of these went into the discard, but there are still several types of adjustable reamers which have survived.

Some time in the year 1909, Mr. E. E. Davis, general manager of the Davis Boring Tool Company of St. Louis, Missouri, also realized the necessity for a thoroughly practical expansion reamer. With the aid of his thorough knowledge of boring equipment and metal boring requirements, as well as an exceptional mechanical experience, he set to work solving the problem. The result was the Davis expansion reamer, one of the greatest improvements on record in the history of machine tools.

The entire principle and design of this tool were originated by Mr. Davis and in December, 1912, a patent was taken out, as a protection against infringement.

The distinguishing features of the Davis expansion reamer are simplicity and practical construction, with fewer parts than any other tool of similar type. All wearing parts are hardened. All threaded parts are protected from dust, chips or possible injury which might result from careless usage or accident.

The blades are positively controlled by an accurate micrometer adjusting dial, graduated in quarter thousandths, which acts for both expanding and receding of blades. The blades are slotted and fit over the ring on an adjustable dial which prevents their movement either way without turning the dial. When the reamer is set to size required, the blades are individually and doubly locked to reamer body by a locking principle which positively locks the blades without the use of screws, virtually making a solid reamer in its entire principle.

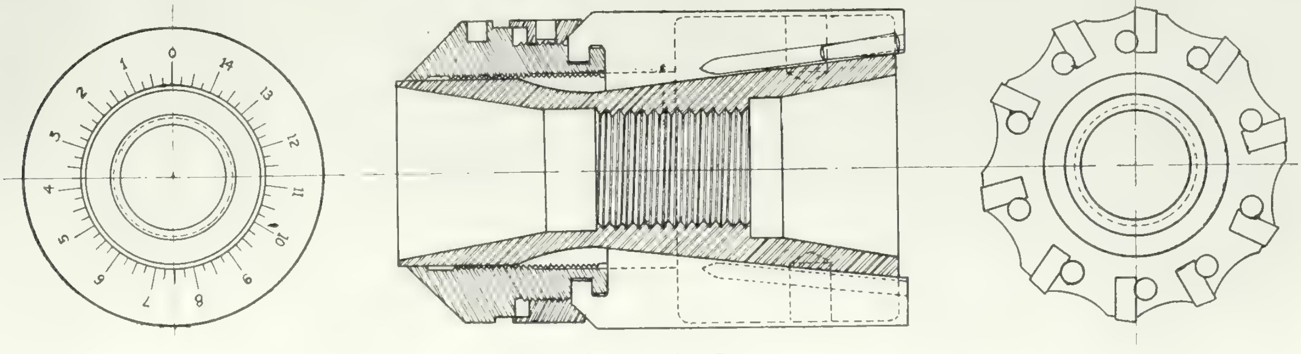
Blade Efficiency

Davis expansion reamers require but three groups of blades to cover range of sizes from 1⅝ inches to 6 inches, inclusive. The large range of sizes covered, together with the greatest possible range of expansion, will show a decided increase in the number of holes reamed per set of blades.

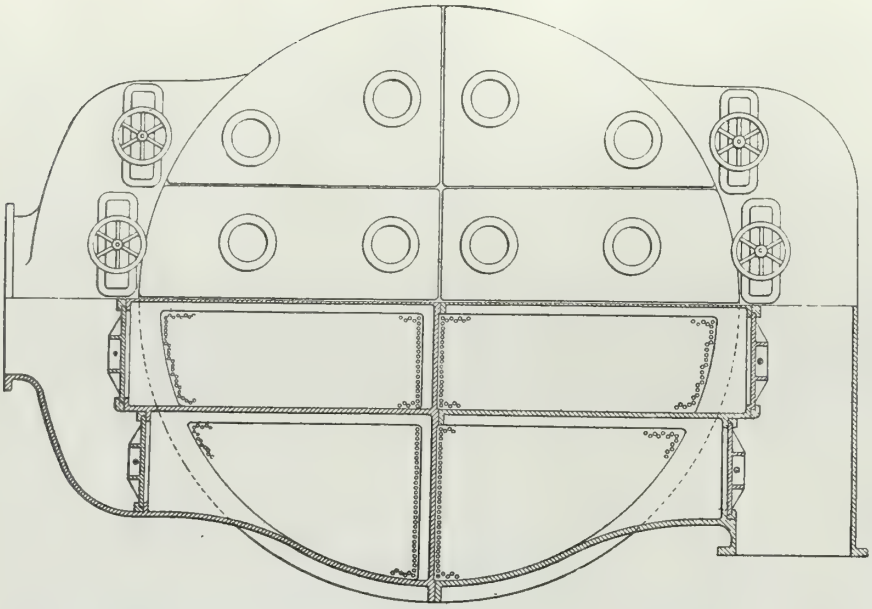
When the blades for the 6-inch reamer are worn under size, they can be used in a number of smaller sizes down to and including 4-1/16 inches. Blades for the 4-inch reamer can be used in smaller sizes down to 2½ inches. Blades in the 2-7/16-inch reamer can be used in smaller sizes down to 1⅝ inches.

This is reamer blade efficiency at lowest possible blade expense, and means 100 per cent to 300 per cent more holes reamed per set of blades than with any other similar type of reamer.

The Davis Boring Tool Company, Incorporated, are the originators of the forward movement of blades for the purpose of expansion in a tool of this type. This feature always keeps the blades cutting in advance of the tool body, consequently the blades never lose their bottoming feature.



The Davis Expansion Reamer



The new Compartment Condenser of the Wheeler Condenser and Engineering Company

SOMETHING NEW AND GOOD IN CONDENSERS

A NEW and valuable development in steam surface condensers is announced by the Wheeler Condenser & Engineering Company, Carteret, New Jersey. It is a patented "compartment condenser" that can be cleaned while in service without shutting down the turbine. Any tube or tubes may be temporarily plugged and other repairs made without taking the condenser out of service.

This is a timely development in view of the persistent claims made by well-known fuel authorities that the price of fuel is not likely to go down for some time, if at all. This condenser will enable the chief engineer to constantly maintain clean condensers; hence a constantly high vacuum. All engineers of experience know that in addition to increasing output, a high vacuum means low fuel consumption and a considerable saving in money, year in, year out.

Also upon installation of this condenser there need be no interference with the operation of the turbine. At the present time, in many important power stations, even where water conditions are regarded as good, it is necessary occasionally to shut down the turbine for a period sufficiently long to give the condenser a thorough cleaning. In such cases, and in fact in all cases where continuous and highly efficient operation is desirable, this new type will fill a long-felt want.

To clean the average condenser is not a difficult task, but it is time-consuming, and for that reason the chief engineer is naturally tempted to put cleaning off until "tomorrow," or "next week," or "next month." During his wait for the opportune time, the vacuum gradually drops, and with the drop coal wastage increases. Sometimes the loss of vacuum amounts to several inches of mercury. Hence the compartment condenser, which can be kept constantly clean regardless of load conditions, will in the long run prove to be a paying investment from the standpoints of both uninterrupted service and coal saving.

The illustration shows clearly how the compartments are arranged. The condenser shown is divided into four compartments, each compartment being equipped with a set of valves to control the circulating water. To clean the condenser while the turbine is delivering full power, the operator simply shuts off the water from one compartment, removes the cover, cleans the tubes, replaces the cover, turns on the water again, and then passes on to the next compartment, repeating the operation until the four compartments or the entire condenser is clean. Thus, while one compartment is being cleaned, the other compartments are in full operation, temporarily taking over the entire turbine load.

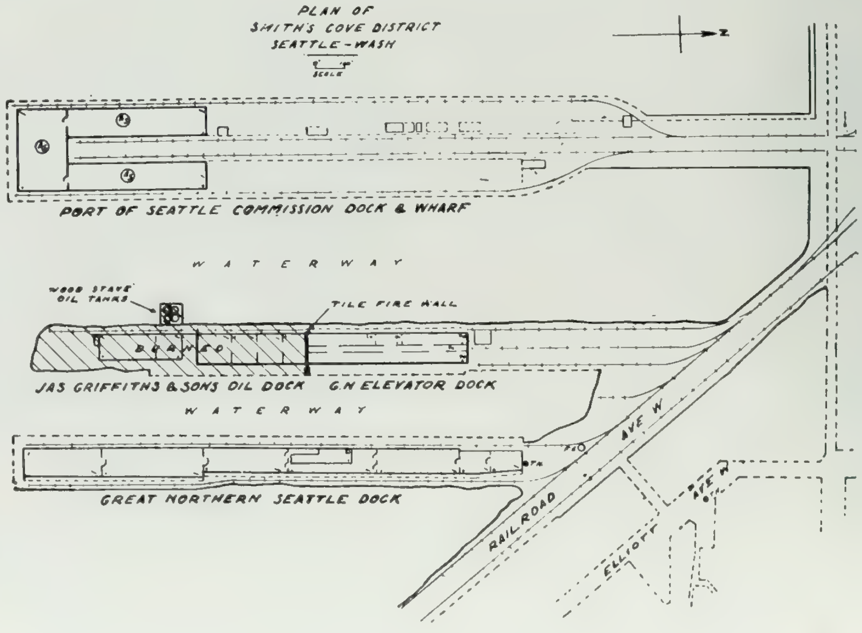
An advantage that will not be overlooked by engineers in localities where water is bad is that no matter how severe the water conditions may be, the compartment condenser will take care of the cleaning problem. Shut downs for frequent cleaning will become a thing of the past. This condenser can be cleaned as many times a week or month as desired. Further information if desired may be obtained directly from the manufacturer.

THE DENISON INTERLOCKING TILE

A rather remarkable demonstration of the fire-proof qualities of interlocking tile was seen at the fire at the Great Northern Dock of Smith Cove terminal, Seattle. This fire, starting near the end of the Great Northern dock, destroyed part of the dock and about 2,000,000 gallons of vegetable oil, causing a loss of $1,775,000. But for the interlocking tile fire wall, located as shown in the accompanying illustration, this fire would have swept the entire dock and probably spread to the Port Commission and Great Northern docks on either side and might have wiped out the entire Smith Cove dock system, with a loss running into hundreds of millions. The tile wall stood up in the face of the intensely hot flames from the vegetable oils and its strength and efficiency are hardly impaired.

So effective was the protection afforded by this wall that, although the fire absolutely destroyed the entire pier up to the wall, the portion of the pier between the wall and the land end of the pier was practically unscathed. This should be a matter of great interest to engineers, architects and contractors, and should demonstrate the necessity for the installation of such fire protection in work along the waterfront in warehouses and on docks.

The interlocking tile used in the fire wall at Smith Cove is manufactured by the Denison Interlocking Tile Corporation of Cleveland, Ohio, and Seattle, Washington.



Plan of Smith Cove, Seattle, showing how the tile fire wall prevented fire from spreading on the dock

NEW LIFE-SAVING GUN RECEIVES ENDORSEMENT OF UNITED STATES STEAMBOAT INSPECTION BOARD

IN a series of recent tests made for the United States Steamboat Inspection Board, the new G-O life line gun for throwing life lines met every one of the requirements established by the board and greatly exceeded the majority of them.

Unlike most of the guns now in use at life-saving stations and on shipboard, the G-O gun requires no separate powder charge, wad or primer. The charge and projectile are one piece, thus eliminating the danger of moisture getting to the powder.

In one of the tests recently made the cartridge case was immersed in water and then put into the gun and fired. In another, the barrel of the gun was filled with water, the cartridge inserted and successfully fired through the water, proving that any amount of moisture could not damage the cartridge or mechanism in any way.

In none of the tests to which the gun was put was there a misfire or short shot. In every case the projectile went well beyond the mark, without the breaking of a single line.

The recoil was found to be perceptibly less than any other gun of like character. The teeth on the bottom of the gun carriage held the gun firmly in place during all of the tests.

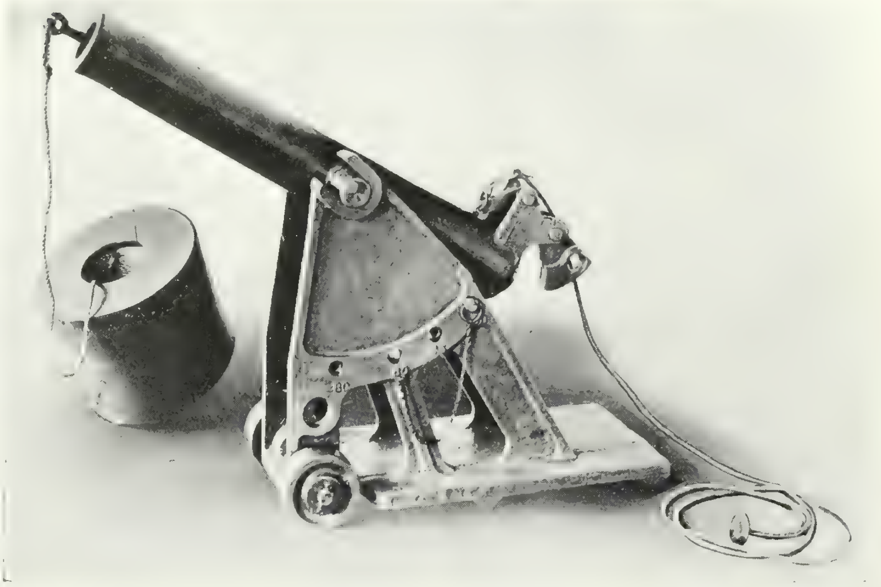
The gun is made in two parts, the carriage and the barrel are so constructed that it can be easily and quickly moved from one part of the boat to another and the barrel can easily be carried by one man. The wheels in front of the carriage allow it to be moved easily to any position required. Tests were carried out at each of the gun's four elevations—30, 45, 60 and 80 degrees.

The board's officials commented particularly on the simplicity of the gun and the ease with which anyone, even though unfamiliar with its operation, could handle it. Another point which came in for commendation was the length of the life line, which permits of accurate shooting at objects 1700 feet distant.

When a cartridge is inserted in the barrel, the life line is attached to the projectile. A slight pull on the lanyard fires the cartridge and the line uncoils from its container without possibility of snarls or breakage.

The gun is manufactured by the General Ordnance Company, which designed and built the famous "Y" depth bomb guns used during the war on the United States army transports and on the navy's torpedo boats, destroyers and submarine chasers. It also designed and manufactured the non-recoil airplane gun for attacking submarines—the only heavy artillery ever mounted on an airplane.

In addition to its ordnance work, it is at present engaged in manufacturing the G-O farm tractor, its plants at Derby, Connecticut, and Cedar Rapids, Iowa, being two of the best equipped plants for this purpose in America.



The new G-O Lifeline Gun

THE LUNKENHEIMER CO. TO BUILD MAMMOTH PLANT

THE Lunkenheimer Company, Cincinnati, manufacturers of valves and engineering appliances, has announced its intention to greatly increase and improve its manufacturing facilities by building a complete new plant. The site selected for the undertaking, comprises about seventy acres of land in Carthage, a suburb of the city of Cincinnati, directly on the Toledo Division of the Baltimore & Ohio Southwestern Railroad. The location selected is not far distant from the center of the city, is in the heart of one of the manufacturing sections of the city, where labor is plentiful and facilities for the handling of incoming and outgoing freight are excellent.

Plans for the erection of the new buildings are being prepared by capable engineers, and it is expected that work on the new structures will be started within the next few months.

Buildings will be of the one, two and three story types, of steel and concrete construction, and there will be provided all modern devices for the manufacture, handling and transportation of raw materials, part finished and finished products. The undertaking will represent an outlay of approximately $2,000,000.

The welfare of the employees has been given special consideration. A piece of land of about eight acres, lying directly opposite the land upon which the main plant is to be located, has been reserved as a recreation center, upon which will be erected an assembly hall, club rooms, base ball grounds, tennis courts, swimming pool, etc. Upon this site will also be erected a dining room capable of accommodating one thousand employees at one time.

The Lunkenheimer Company moved to its present location in North Fairmount, Cincinnati, about the year 1900; the plant then comprised two manufacturing buildings, since which time many additional buildings have been erected. Having outgrown its present plant, being sorely in need of additional manufacturing facilities, and there being no more property available in the North Fairmount section, the company determined that the best plan was to acquire acreage property, with a view to providing for the future, as well as present, necessary expansion. The new plant, when completed, will contain about three times as much floor space as now used by the company.

Arrangements are being made so that there will be no interruption to the business of the company while the building operations are in progress, nor while the task of moving into the new plant is under way.

G-R DUPLEX STRAINER

THE Griscom-Russell Company, 90 West Street, New York, has placed on the market the G-R Duplex Strainer, designed for installation in the suction or discharge lines of lubricating or fuel oil systems for the removal of solid foreign material in suspension. Such foreign material, if not removed, makes the lubrication inefficient and may seriously damage bearing surfaces. Similarly, sediment in fuel oil tends to clog the burners, reducing their capacity and necessitating frequent cleaning.

This strainer is also suitable for straining the water supply from such sources as rivers and lakes to prevent weeds, sticks, marine plants and small fish from entering the pipe lines.

The G-R Duplex Strainer consists of a cast iron body containing two perforated steel or brass baskets. The valve arrangement permits of the complete removal and cleaning of either basket while the other remains in service.

In operation, the oil or other liquid enters the inlet connection of the strainer and passes into whichever basket is in service. The solid matter remains in the basket, the clean liquid passing through the perforations and thence out of the strainer.

All cast iron sections are cylindrical, resulting in maximum strength. The valve mechanism is very simple and the valves are easily re-ground.

This apparatus is described in Bulletin No. 1150 published by the manufacturer.

Shipment of turned Spars from the Western Spar Company

THE WESTERN SPAR COMPANY

THE Western Spar Company has for the past two and one-half years been supplying shipbuilders and ship repair men all over this country and various other parts of the world with timbers to be used for cargo booms, spars, masts and dredger spuds, turned by machinery to the required size.

Their plant is located in a region adjacent to the finest spar timber in the world. In fact, in no place but the Pacific Northwest could such spars as are shown on the accompanying illustrations be obtained. The great strength of Oregon pine (Douglas fir) makes it an ideal timber for use as spars and spuds.

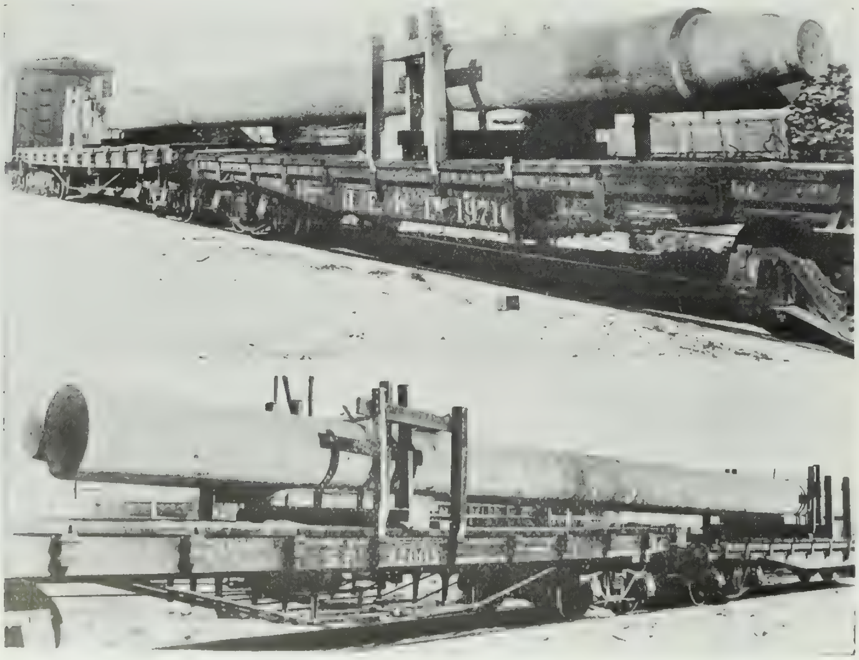
At one time there was some doubt in the minds of Eastern shipbuilders as to whether this material could be delivered successfully from the Pacific Coast without being damaged in transit. The fact that this material can be delivered any place in the country when properly packed has been demonstrated so thoroughly during the last two years that practically all shipyards are realizing the great advantage of purchasing their material in this condition.

A matter which will be of particular interest to ship owners and operators as well as those engaged in ship repairing is the stock of turned spars which may be drawn on for immediate use at many of the principal ports of the world. The spars carried in stock for repair work are in such condition that a day's labor for two men in cutting the shoulders and squares to fit the particular requirements of the boat will complete the mast ready for installation. A broken mast with such stock available need therefore cause no delay. When specifications can be sent before delivery is required, there is of course no labor necessary except to attach the irons.

Dredge operators will be interested to note that dredger spuds may now be obtained in any diameter, turned neatly to the required size, and ready for installation as soon as they arrive. Here the great strength of Oregon pine is particularly needed.

Anyone who is not familiar with Oregon pine or Douglas fir will undoubtedly be surprised at the beautiful appearance and grain of this timber. In fact, one is almost tempted to use some of the spars for columns for the interior of buildings. The linseed oil applied on these timbers before shipment helps to bring out the beautiful grain of the wood and also to prevent checking. Any piece of timber containing the heart will check to some extent when exposed to the sun and weather. This matter is taken care of very nicely through oiling and seasoning in the immense loading sheds of the Western Spar Company.

Masts squared and turned, ready for stepping



Two Western Spar Shipments

It may be of interest to know that this plant probably has turned the largest timbers ever made by machine.

TRADE LITERATURE

The Wood Turret Machine Company of Brazil, Indiana, has just published a handsome catalog describing a full line of the tilted turret screw machines, turret lathes, brass working machines and extra capacity automatic chucking turret lathes. Illustrations and specifications of various types of screw machines and turret lathes are shown as well as cuts detailing the construction.

Several pages are devoted to new improvements and special construction. Considerable space is given to tooling equipment and various special fixtures that can be furnished with or applied to the tilted turret.

SHIPBUILDERS' PNEUMATIC TOOL COMPANY

THE history of the Shipbuilders' Pneumatic Tool Company, its formation and advancement, is almost as unique as the airplaner, that wonderfully successful little tool which is the company's principal product.

This company was organized and is owned by the Kraber Brothers, George L. and Frank J. Kraber of Portland, Oregon, and Harry A. Kraber of Spokane, Washington.

Previous to the organization of the Shipbuilders' Pneumatic Tool Company by these three men, the Kraber Brothers were well known in the State of Washington as hog breeders and raisers, although their experience has not been confined to that business alone, they having been interested in mining and other manufacturing enterprises on the Pacific Coast for a number of years.

Shortly before the United States started its shipbuilding program, Thomas A. Paxton had designed a pneumatic turbine. As capital was required to build his first model, Mr. Paxton approached Messrs. George and Frank Kraber and was fortunate enough to secure their assistance in financing the building of the first airplaner. This machine worked fairly successfully, but lacked the refinements necessary for a practical tool. Paxton having original ideas as to a new type of gasoline engine, wished to leave for other parts to perfect this machine, and disposed of his airplaner interests to the Kraber Brothers.

Further development of the airplaner to fit it for use for the many new wooden shipbuilding yards was taken up by the Krabers and the present type of airplaners which are sold all over the world is the result.

The machines are highly efficient, doing the work of from ten to twelve men, and the company were able to sell as many machines as they could manufacture, being of course handicapped by lack of material.

Foreign orders came, but were refused to meet the demand of the United States yards.

At the conclusion of the war, foreign fields were supplied, and during business amounting to about $7000, mostly shipments to foreign countries.

The airplaner stands out as one of the most successful of the war products and inventions that were born of the necessity of speed in shipbuilding, and it was responsible to a great degree for the speed made by the Pacific Coast builders, and the records made in launching wooden vessels.

The success of this machine was due to the great power and light weight of the little turbine which operates it. The amount of manufacturing done has enabled the company's designers to get data for further applications of this machine in other lines of work.

At the present time a complete line of turbine-driven drills and wood-boring machines are designed, all of which have a marked superiority over the reciprocal drilling machines now being manufactured, being of simpler construction, lighter of weight, with no vibration to tire out the operator, and, in fact, a desirable tool in every way. This line as now designed will supply a demand in wooden and steel shipyards, and in all construction work and shops where a light, powerful drilling machine is necessary. One tool is a portable planing machine with width of cut sufficient to surface 24-inch by 24-inch timbers. This can be moved anywhere within the radius of the reach of the air hose, and is much easier to move than to move the heavy timber to a stationary surfacing machine. Complete air compressor outfits at a very small cost will go with these machines, and at a very low figure a full surfacing outfit can be supplied, that can be easily carried anywhere, thus enabling small sawmills that can not afford heavy and expensive machinery to surface any sized timbers they may saw. This device is a boon to the small operator, putting him on an equal competitive basis with large concerns.

Another device that is attracting considerable attention among the lumbermen is a tree-felling device. This machine weighs about 25 pounds and can cut a tree down with ease in a fraction of the time now required by hand. This device can be bought at a very low figure and will save many dollars and many hours' time, increase our lumber output, and decrease the cost of same.

The above-mentioned applications of this wonderful little turbine are the only ones so far worked out, but as other fields are investigated and their requirements known, many other designs will be thought out, and many other appliances manufactured.

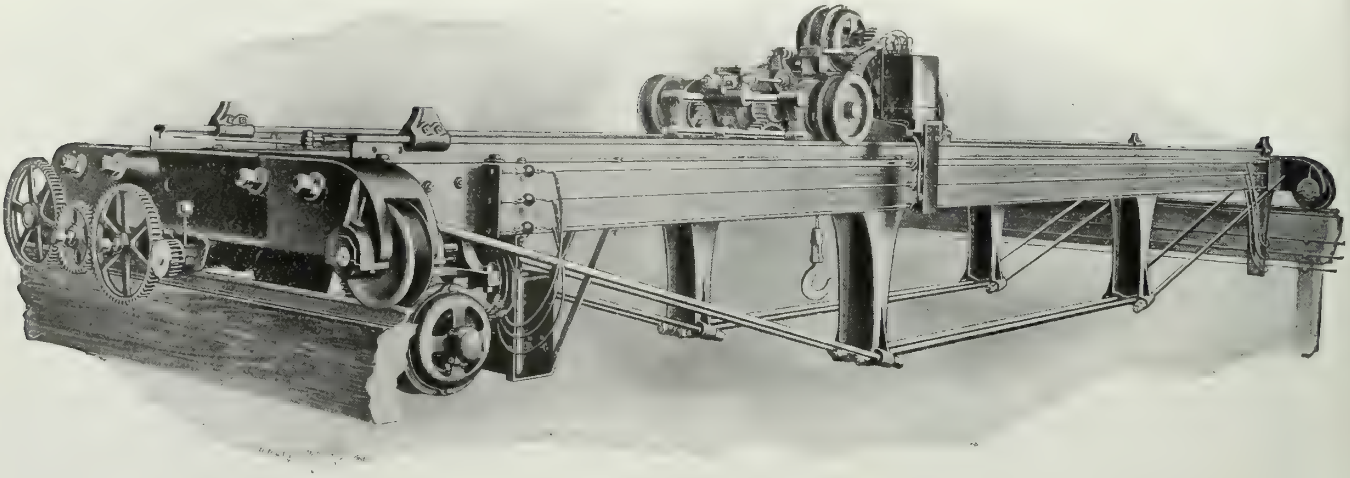
The company, while handling their business along the established lines, are developing their ingenious contrivances along other lines and in new fields. Doing these things requires energy, some capital, and a lot of nerve and ingenuity.

NEW SALES MANAGER FOR DIAMOND POWER SPECIALTIES

MR. F. W. LEAHY, who has just assumed the position of marine sales manager for the Diamond Power Specialty Company, with offices at 32 Broadway, Room 1611, New York City, was born in San Francisco, May 30, 1886. He was educated in the public schools and Santa Clara College. Upon leaving college he served as machinist's apprentice for three years with the Boston Engineering Company. He then started to sea as a cadet engineer of the steamship Admiral Farragut of Boston. After serving seven years as operating engineer on both coasts, during three of which he was chief engineer, he became manager and part owner of the Marine Repair Works, Los Angeles, California. Later he became manager of the boiler feed water treatment department of the Moore Oil Company, Cincinnati, developing and marketing his own system of analytical boiler feed water treatment.

At the outbreak of the war, Mr. Leahy resigned from the Moore Oil Company and reported for government naval service, being assigned for duty with the Emergency Fleet Corporation. In this connection he served eight months as the inspector in charge of reciprocating engine building in the Ohio district; four months as chief inspector of machinery in the Fifth district (New Orleans); nine months as senior performance engineer, New York City, in charge of trial trips, surveys, etc.; three months as instructor in charge of engineering schools of the United States Navy, Eighth naval district. He is a member of the American Society of Marine Engineers, Society of Naval Engineers, and the Marine Engineers' Beneficial Association.

Motorship Katherine, equipped with Mast from the Western Spar Company



Lane Electric Overhead Traveling Crane

A "NEW" FORTY-YEAR-OLD CRANE

THE Lane Manufacturing Company, Montpelier, Vermont, established for seventy years, built their first rope-driven overhead traveling crane about forty years ago. Many of these cranes installed in the early eighties are still rendering full service.

Until this year all efforts of the Lane Manufacturing Company have been confined principally to the stone working field. About 1898, with the increased development of electric power, the Lane crane was adapted to electric drive, and during the past twenty years a large number of these electrically driven cranes have been installed in their original field—the stone-working field—throughout the country. Although most of the installations have been in the New England States, Lane cranes are now in service in many states from the Atlantic to the Pacific.

Hence, although so long established, it is easy to understand why the Lane crane has not been better known in fields outside of the stone-working trade. The company has now appointed as its sole crane agents, N. B. Payne & Company, 25 Church street, New York, who will make it their business to give the Lane crane a broad distribution throughout the United States—wherever cranes are needed.

Two Motors Give Three Movements

A notable characteristic of the Lane electric crane is the employment of two motors for the three movements. Both motors are the constant speed, non-reversing type, which eliminates the use of controllers and complex wiring. Control of all movements, including that of direction, is mechanical, by means of a series of friction cones.

This design effects a saving in electric power which is ordinarily lost in frequent and quick stops and reversals, and speeding up or slowing down of variable speed reversing motors.

Originally Lane cranes were furnished with timber bridge girders, stayed with steel truss rods fastened to cast iron bridge trucks and having a safety factor of about 7. This construction has the advantage of being exceptionally light for a given capacity. Bridges are now supplied in three styles:

No. 1—For short spans; rolled steel I beams, reinforced with inverted channels riveted to the top flanges when necessary.

No. 2—Steel girders of the lattice box section type for long spans.

No. 3—Heavy timbers of long leaf yellow pine reinforced by large steel truss rods as shown in Figure 1.

In all cases these bridges are designed with a large factor of safety—at least 5—and with ample strength to sustain the load without undue deflection, horizontally or vertically.

The bridge girders of this crane are supported by cast iron end trucks, provided with cast iron double flange chilled wheels, which have steel axles running in renewable bearings. The trolley is made of cast iron; is designed for rigidity, compactness, accessibility of all parts, and is suitably reinforced with steel tension rods. The sides are joined together by several large steel shafts. Power for hoist and trolley movements is transmitted by friction cones through steel worms, engaging bronze gears running in oil. These friction cones are plainly visible in Figure 2.

The worm-gear drive is a simple and effective load brake, being controlled by a convenient hand wheel. Two speeds of the hook are furnished with one part of rope. A luff block is provided with a hook and hinged housed sheave, so that by running the line through this sheave and attaching the single rope hook to a girt on the underside of the trolley a two-part reaving of the rope is effected, thereby dividing the first two speeds by two and doubling the power, supplying four hoist speeds.

The bridge motor drives a friction disc by transmission through a pair of opposed cones, alternately contacting therewith. Control of the bridge travel movement in either direction is effected by shifting the cones by means of a lever connected to a rod running the full length of the bridge convenient to the operator's left hand.

In summing up it is claimed by the manufacturers that this crane has five special points of superior merit, as follows:

First—Maximum longevity of service—a record of thirty years.

Second—Minimum power and repair cost.

Third—Great overload capacity.

Fourth—high return value on capital invested; and

Fifth—The crane can be operated by inexperienced labor.

ENTERPRISE GAS ENGINES

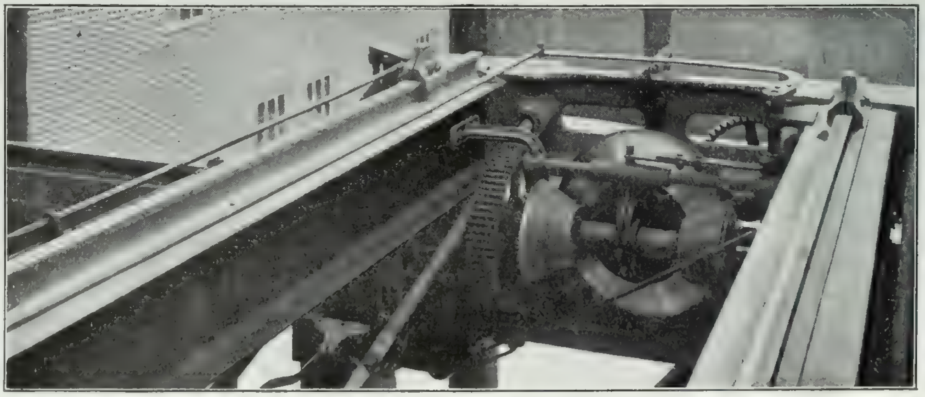
The following list shows some of the recent orders placed with the Enterprise Gas Engine Works:

One 6 H. P., one 8 H. P., one 12 H. P. double cylinder, one 35 H. P. 3-cylinder for H. W. Starrett, Seattle.

One 60 H. P. 3-cylinder and one 85 H. P. 4-cylinder marine for R. A. Gaertner, Los Angeles, Cal.

One 8 H. P. single cylinder, A. Anderson, Sausalito.

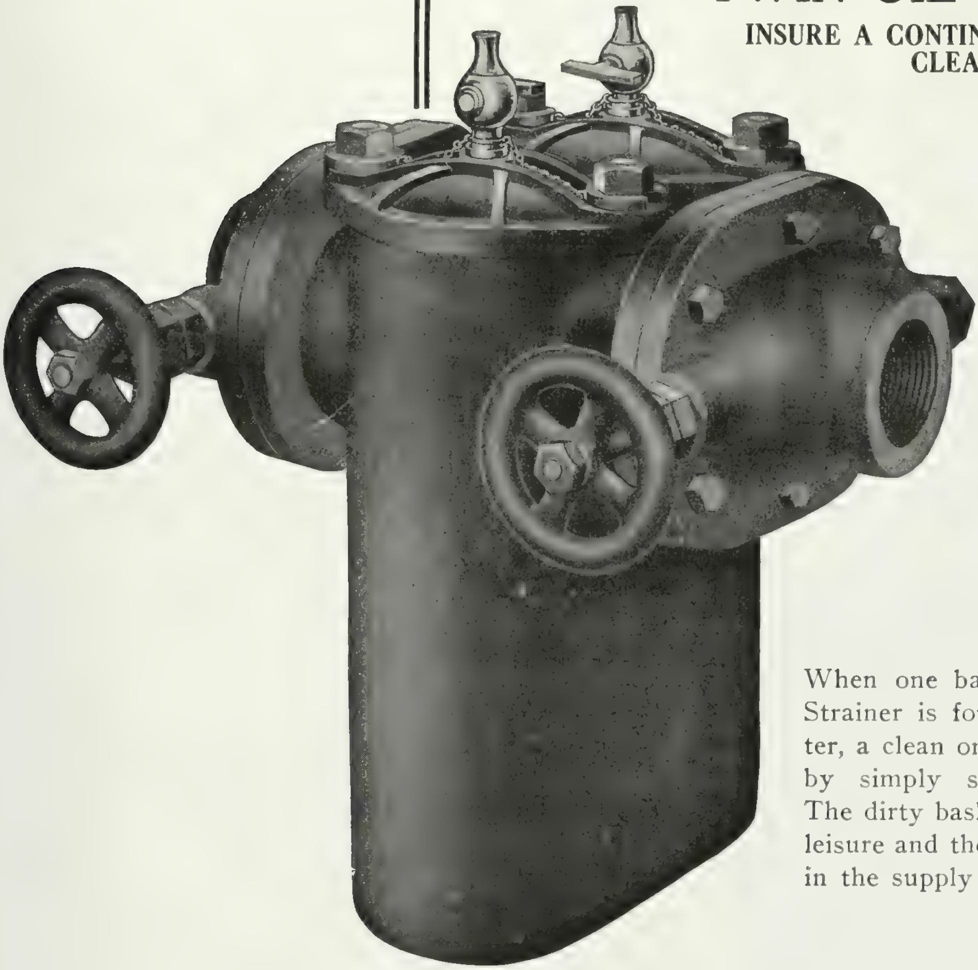
One 8 H. P. single cylinder, P. Catsarates, Sausalito.



USE TWIN OIL STRAINERS
FOR EITHER FUEL OR LUBRICATING OIL

TWIN OIL STRAINERS

INSURE A CONTINUOUS SUPPLY OF CLEAN OIL



When one basket of a Twin Oil Strainer is fouled with solid matter, a clean one is put into service by simply shifting two valves. The dirty basket can be cleaned at leisure and there is no interruption in the supply of clean oil.

The Twin Oil Strainer

gives the same service as two Single Strainers, but it is more convenient to operate, requires less space for installation and does away with all the extra valves and piping necessary to connect up.

These are the features that led to its being used in Submarines and Destroyers now being built for the United States Navy and in Cargo Boats now being built for the United States Merchant Marine.

ELLIOTT COMPANY

443 Grant St., Pittsburgh, Pa.

Sizes range from 1 to 5 inch. (2½ inch and larger sizes have flanged connection). Basket mesh 1/64 inch or larger.

For detail information ask for Bulletin AA.

NEW BRANCH OFFICE FOR INGERSOLL-RAND

The industrial growth of Texas and Oklahoma, the ever increasing importance of their oil industries and the large demand made for modern machinery in this and other lines, has led the Ingersoll-Rand Company to establish a branch office to better serve the rapidly developing industries of this territory. The new office located in the Sam Houston Life building, Dallas, Texas, will be in the charge of Mr. R. H. Brown, Jr., as manager.

Mr. Brown has heretofore been connected with the company's St. Louis office and has, for years, been in intimate touch with the Texas-Oklahoma territory.

J. H. WILLIAMS ISSUE NEW CATALOGUE

J. H. Williams & Co., makers of Superior Drop-Forgings and Drop-Forged Tools, with works at Brooklyn and Buffalo, N. Y., have just issued a catalog—4 x 6—106 pages—fully illustrating and describing their standard stock specialties. These include several lines of new goods, viz.: "Agrippa" Turning-Tool Holders, Set Screw Pattern, "Agrippa" Boring-Tool Posts, "Vulcan" Forged Cutter Tool Holders, and several new assortments or sets of Drop-Forged Wrenches.

The book contains, also, a description of the drop-forging process in very simple, non-technical terms for the benefit of those not conversant with its details.

AUSTRALIAN REPRESENTATIVE FOR SILVER STEEL SAWS

JMES N. MACKIN "started succeeding" when he entered the saw business as a young man scarcely out of his "teens." His happy, genial disposition was a valuable asset, and he eventually became an expert salesman. For twenty years he represented a Philadelphia house, during which time he traveled extensively throughout the world. He acquired experience of great value, and became familiar with business conditions everywhere. But one of the greatest facts that he learned, because it was so repeatedly impressed upon him wherever he journeyed, was the unusual high quality and great popularity of Atkins Silver Steel Saws.

During the war he represented E. C. Atkins & Company in Washington, D. C., and made hosts of friends both for himself and for the great firm for which he sold. His success here, due to his wonderful business ability coupled with a wealth of energy, vigor, and optimism, made him the logical man to care for the rapidly increasing Silver Steel Saw business in the Far East.

Atkins Silver Steel Saws and Tools have enjoyed a steady growth in Australia amounting to over 50 per cent in the last three years. The Atkins Company very wisely selected Mr. Mackin to represent them there, and he is now superintendent of the entire Australian division. His headquarters are located at the E. C. Atkins & Company Branch House, No. 5 Australasia Chambers, Martin Place, Sydney, N. S. W., Australia. His thorough knowledge of every detail concerning saws, as well as his wide experience in selling and his pleasing personality make him a man well liked by every Australasian distributor and millman who is in the least acquainted with Atkins service.

COPPER PAINT

For the bottoms of ships no substitute has yet been found for copper in some form or other as an anti-fouling covering for both wood and steel.

For many years the copper paint known as "Woolsey's Best," manufactured by the Woolsey Copper Paint Company, has been the standard paint for ships' bottoms. This company is now manufacturing a line of yacht paints and interior and exterior paints and varnishes for marine use which they guarantee to be equal in quality to the famous Woolsey's Best. This line of paints is distributed in California by the Weeks-Howe-Emerson Company, who for 25 years have been located at 51 Market street and during that entire period have handled this standard line of pigments for covering surfaces exposed to the action of sea water.

During the period of the war emergency shipbuilding program, a tremendous amount of Woolsey's copper paint has been distributed to local shipbuilders by the Weeks-Howe-Emerson Company and this anti-fouling pigment has done its bit in preventing delay in the forwarding of supplies to the forces in Europe.

Marine Boiler Logic. The Heine Safety Boiler Company, St. Louis, Missouri, has just completed the printing of "Marine Boiler Logic," a 69-page booklet dealing with the fundamental design of marine cargo carriers. The booklet was written by Charles H. Stoddard, consulting marine engineer of the Heine Co.

The main part of the booklet relates to the design and construction of Scotch and water-tube boilers for marine purposes. Evaporative capacities are worked out for the two types, using coal or oil as fuel, with natural or forced draft. The booklet contains also a discussion of power and speed of cargo vessels, formulas being developed showing the relation between boiler and prime mover capacity, and the dimensions of the hull. In making these computations the method developed by Rear Admiral D. W. Taylor of the United States Navy has been used, with certain modifications suggested by Mr. Stoddard's experience.

The last part of the booklet is devoted to a description of the construction and operation of the cross-drum type of water-tube boiler developed by the Heine Company for marine service.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of Pacific Marine Review, published monthly at 576 Sacramento street, San Francisco, Cal., for October 1, 1919.

State of California,
County of San Francisco—ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared B. N. De Rochie, who, having been duly sworn according to law, deposes and says that he is the business manager of the Pacific Marine Review, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, J. S. Hines, No. 88 Plaza Drive, Berkeley, Cal.; editor, A. J. Dickie, San Mateo, Cal.; managing editor, none; business manager, B. N. De Rochie, 908 Nielsen street, Berkeley, Cal.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) J. S. Hines, No. 88 Plaza Drive, Berkeley, Cal.

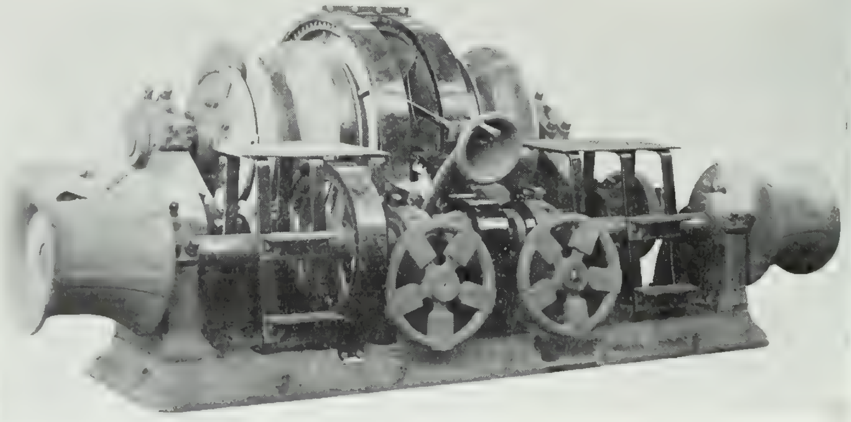
3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is ....
(This information is required from daily publications only.)

B. N. DE ROCHIE.

Sworn to and subscribed before me this 23rd day of September, 1919.
(Seal) S. I. CLARK,
Notary Public in and for the City and County of San Francisco, State of California.
(My commission expires February 15, 1921.)



No. 8 Anchor Windlass 8 x 10 Steam Engines built by the Hesse-Martin Iron Works

How Are *Your* Blocks Made?

Parish Malleable Iron Shell Tackles have edges *reinforced* at eight different places, and four wide and *heavy ribs* run transversely across the inner face of each cheek.

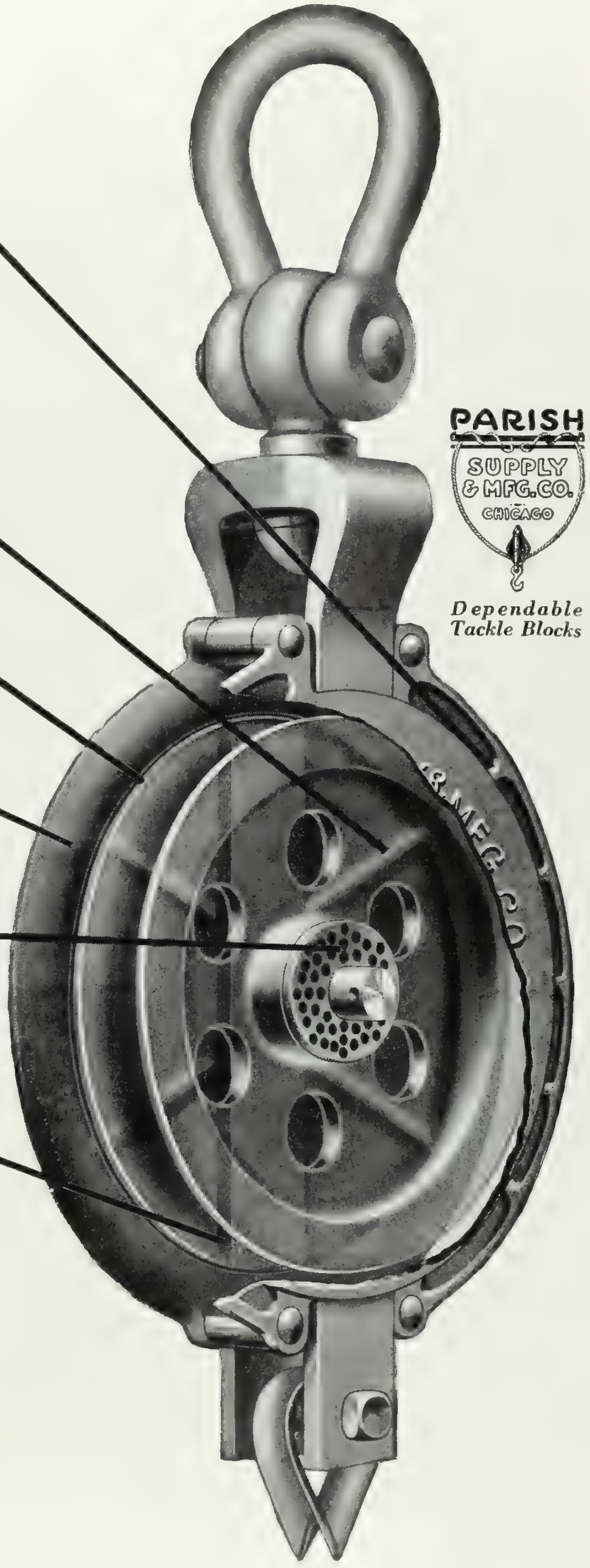
Heavier constructed sheaves run in a *recess* in the cheeks, giving a closer fitting sheave than on any other make of block.

Rounded **cheeks protect the** rope. Case hardened center pins and accurately machined bushings insure longer life and greater wear.

Supplied with self-lubricating phosphor bronze bushings and *side bearings.*

The straps are forged from specially selected steel and are drawn out to extend the *full length* of the block on both sides.

Our new catalog explains other features of Parish superiority and lists a complete line of high grade Malleable Iron and Steel Shell Tackle Blocks.



PARISH
SUPPLY
& MFG. CO.
CHICAGO

Dependable Tackle Blocks

PARISH SUPPLY & MFG. CO.

Makers of Tackle Blocks and Shipyard Tools

858 QUINN ST. CHICAGO, ILL.

PLEASE MENTION *PACIFIC MARINE REVIEW* WHEN YOU WRITE

HARRIS MECHANICAL REFRIGERATION

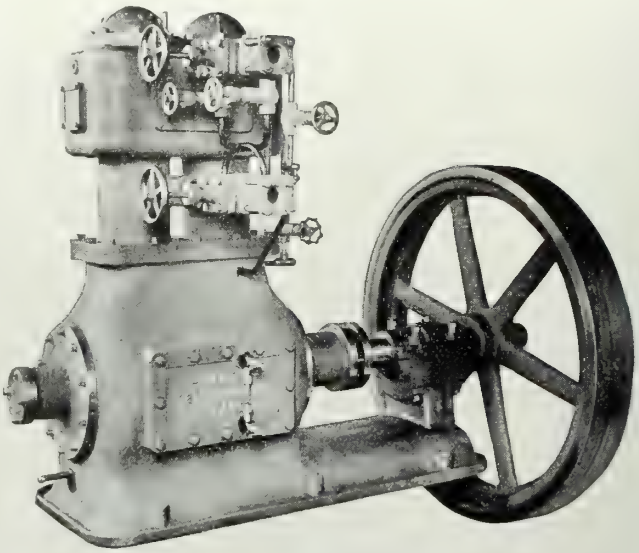
For over twenty-five years the Harris Ice Machine Works of Portland, Oregon, have been manufacturing high grade ice making equipment... This firm has proved that a carefully designed and well-built machine is the best asset in the matter of obtaining "repeat" orders for their equipment. Harris ice machines may be seen in successful operation not only in the immediate vicinity of Portland, but also in Idaho, Mexico, Alaska, and many Eastern States, as well as aboard ships operating in coast-wise and deep sea service.

During the war emergency the Harris Ice Machine Works were called upon to manufacture one-ton ice plants for ships built for the United States Shipping Board, all of which were the direct-connected steam-driven type. Thirty-nine of these ships built in the Northwest have been equipped with Harris machines. During the first few months of the ship building program, Portland shipbuilders submitted specifications of ice machine equipment to the Harris Ice Machine Works and their engineers outlined plans not only to manufacture the ice plants, but also to handle the complete installation aboard the ships.

That handling of the complete installation work for the shipbuilders has been a wise policy is evidenced by the general satisfaction which has resulted from Harris refrigeration equipment on ships delivered to the Shipping Board, and wherever these ships operate they will help further to increase the high reputation which Harris equipment has already attained during the many years of ice machine manufacture.

Harris ice machines are the result of many years' experience in mechanical refrigeration. The oversize bearings, leak-proof packing glands and massive construction throughout and the use of close-grain semi-steel castings are important features of the Harris machine. The Harris machine is not "assembled" but is completely built at the plant. Labor-saving jigs and templates with modern shop tools and machinery are used for reducing production casts, consistent with a sturdy and reliable machine.

The Harris line includes a complete assortment of machines, built in the vertical enclosed type from one-half to twenty-ton daily capacity, while a large line of horizontal open type machines are regularly constructed from 7 to 125-ton capacity.



Harris Enclosed Type Refrigeration Machine

FAIRBANKS POWER HAMMERS

For many years the United Hammer Company of Boston has been manufacturing under the Dupont patent, the Fairbanks line of power hammers in sizes up to 300 pounds weight of ram, recognizing the need for hammers of this nature for heavier classes of work such as frequently are found in locomotive and car shops, shipbuilding plants, tube and steel mills, etc.

The company has now added two larger sizes, the 400 and 500 pounds weight of ram, respectively. These larger sized hammers will no doubt find a ready market and prove very useful in a geat variety of operations.

The United Hammer Company has introduced another innovation in hammer design by equipping its entire line with a safety guard which completely covers the working parts of the hammer. This device complies with practically all the safety laws enacted by the various states, and while effectively protecting the operator leaves the working parts easily accessible both for adjustment and oiling through a large door provided for this purpose. This safety guard is easily attached to any Fairbanks hammers that are already in operation, and the United Hammer Company will be glad to quote on this device to any of its customers who may desire so to equip their machines.

Finishing a Steel Life Boat at the Apex Manufacturing Company

IMPORTS HARDWOOD IN AMERICAN SHIPS

J. Henry Dieckmann has found that American shipbuilders and other consumers of hardwood are fast realizing the many advantages in the use of teak for decking, railing and interior work. On account of its age resisting qualities and the economy with which it may be finished, teak is finding many new uses. Shipbuilders have found that it needs practically no finishing and a high polish can be obtained from teak without the use of finishing materials such as oils, waxes, etc.

Mr. Dieckmann takes a very active part in the importation of teak and in addition to the large stock which he has at the present time he reports another shipment en route from the Orient. This shipment contains approximately 230,000 feet of teak planks and 100,000 feet of teak logs. This shipment is coming on the American steamer "Santa Cruz" from Saigon, French Indo-China.

That the American importer and purchasing agent should stimulate shipment in American ships is the opinion of Mr. Dieckmann. This progressive importer has always insisted that his shipments be carried in American owned vessels.

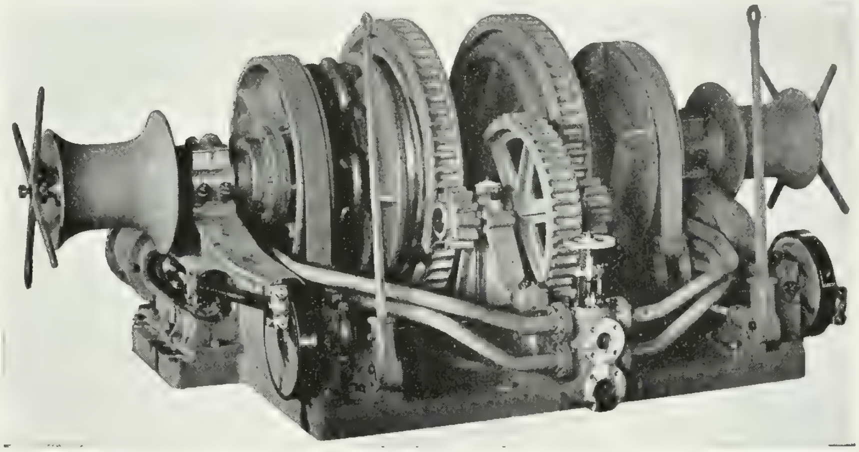
SCHUTTE & KOERTING ISSUE NEW CATALOGUE

Schutte & Koerting Company announce that they have issued a revised 8-B catalog on Stop, Stop Check and Emergency Valves, and will be pleased to forward a copy to those interested and inquiring for the booklet.

ANCHOR AND CARGO WINCHES

Type Built for U. S. Shipping Board Vessels

Quick Delivery



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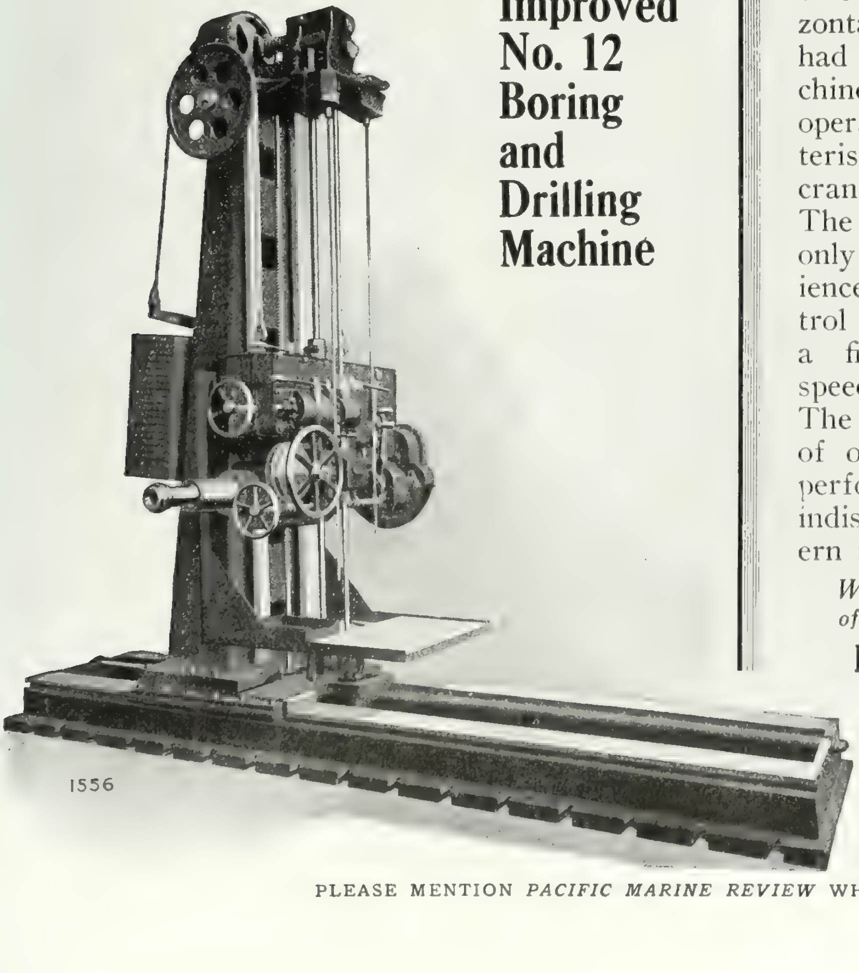

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Electric Steel Foundry at Portland

The Molding Floor

Pouring from one of the Electric Steel Furnaces

IN 1907 a group of foundrymen found there was a need for small castings of extra fine quality, and in order to fill this demand they organized the Portland Bronze & Crucible Steel Company. Following a period of healthy growth and a rapidly expanding market, the necessity for increased facilities required a new organization. The Electric Steel Foundry of Portland was then organized. Their installation of a one-ton furnace was one of the first electric furnaces in the West.

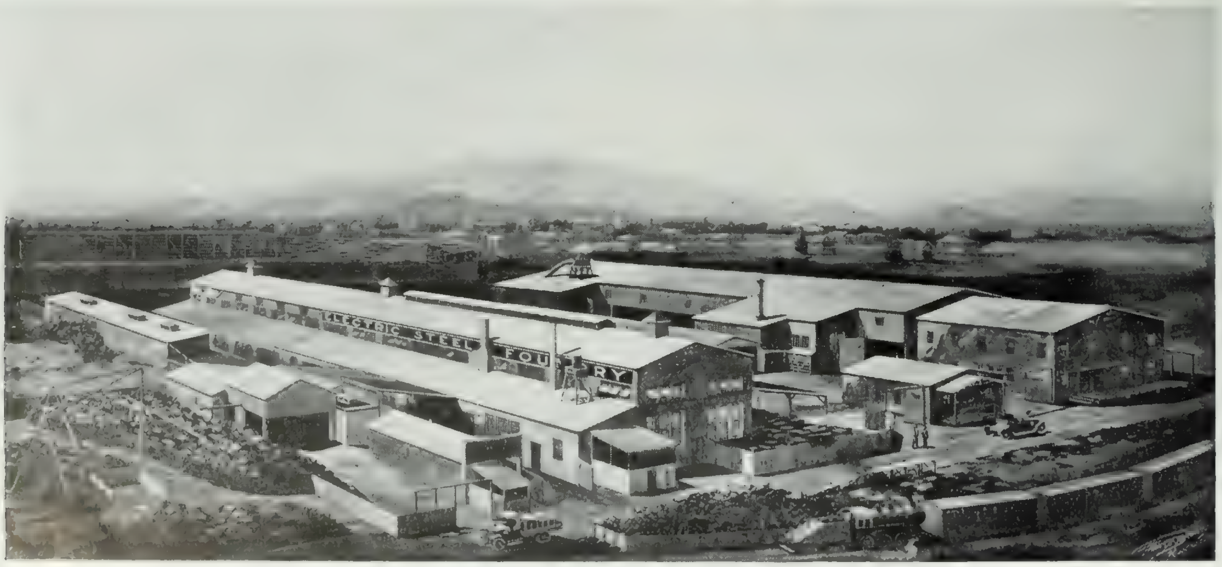
In the winter of 1916 the foundry was completely destroyed by fire. In rebuilding, the plant was greatly enlarged, and the steady growth since then has required continued additions.

The equipment includes a battery of two annealing furnaces with electric recording pyrometers; a two-ton and a three-ton furnace. These furnaces were not built until the most exhaustive tests had proved them to be the type best able to meet the exacting requirements of the Electric Steel Foundry standards.

A noticeable feature of Electric Steel castings is the fact that a particular point is made of their cleanliness. Sandy and scabby castings are not welcome in the modern machine shop; they are the source of too much trouble to cutting tools. The cleaning department of the Electric Steel Foundry occupies a building of its own and is equipped with a battery of four swing grinders, the one sure method of removing all sand spots and scabs from castings.

At the outbreak of the war the entire plant was placed at the disposal of the government. The company specialized on intricate castings, such as manifolds and all steam pipe fittings. During the past two years under Lloyds, the American Bureau, and the Bureau Veritas, they have not lost a single casting on account of failure of material. Since the armistice the plant has been specializing on logging and mining work.

Bar of Electric Steel in the Testing Machine



The plant of the Electric Steel Foundry of Portland, Oregon

Pacific Marine Review

December
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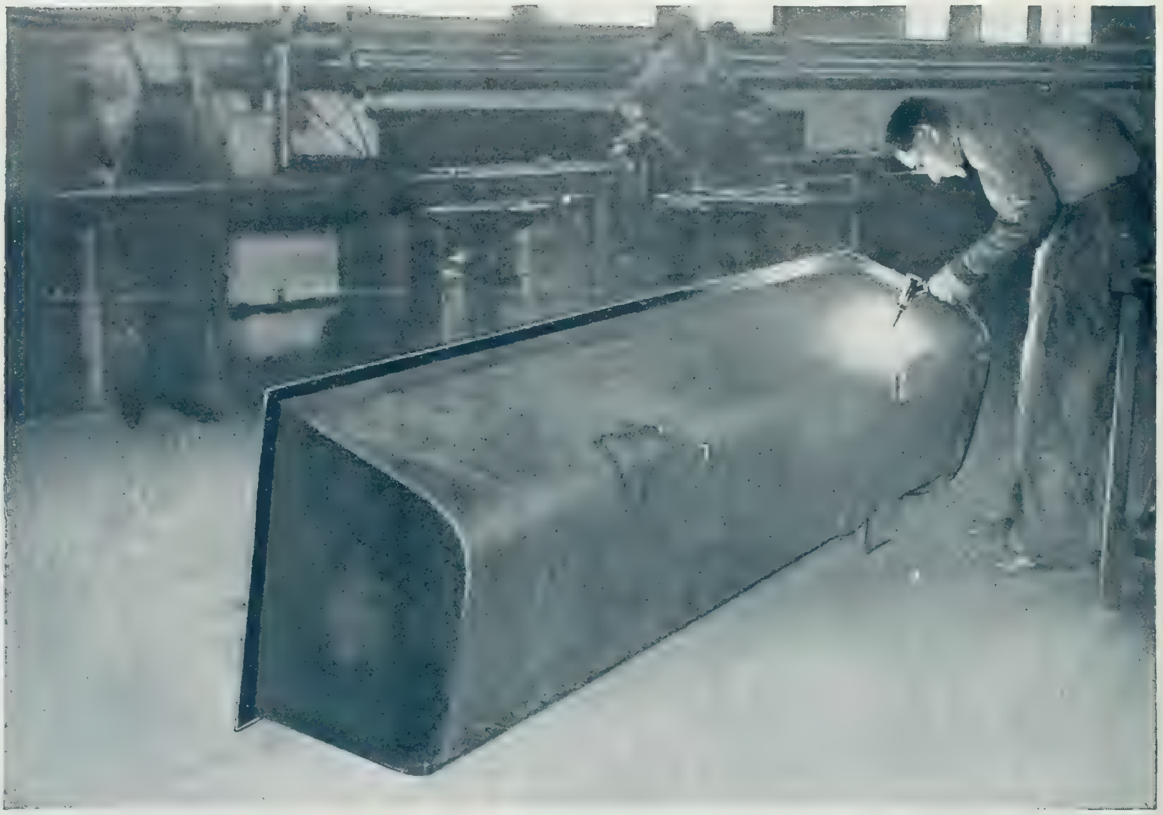
Pacific Marine Review, Vol. 16, No. 12. Published monthly at San Francisco. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. $3.00 a year.



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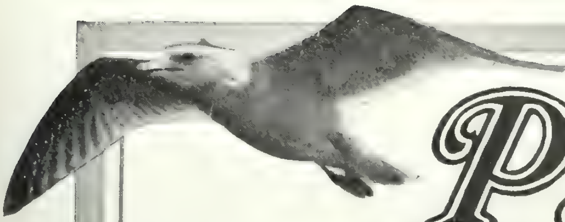

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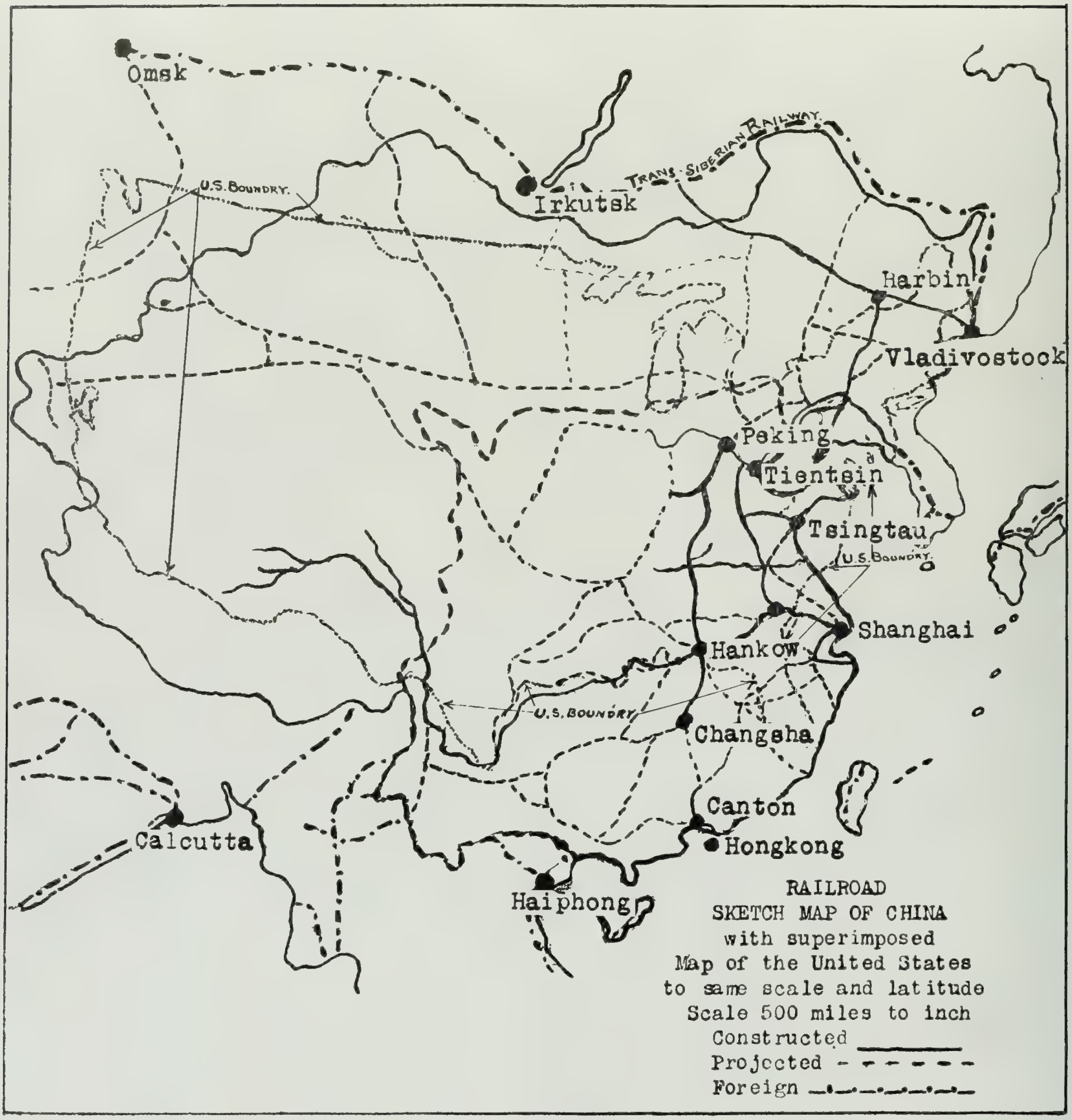
CHINA

Railways of China



China has under operation six-thousand miles of railroad; the United States, with slightly less area and one-fourth the population, has 250,000 miles. This comparison is often used to show the backwardness of China, and yet it has been stated by experts, and may be proved, that the comparison shows only the carefulness of China in that she has refused to allow herself to be exploited by foreign railway builders. At the present time there is under consideration in the neighborhood of 100,000 miles of railway to open up the Chinese interior and bring its products out to the seaboard. Practically all of this extensive program will be under Chinese control, and there is every reason to believe that under normal conditions the work will be pushed ahead rapidly. As this system develops, American manufacturers undoubtedly will find a tremendous market for their products in the equipping of these lines and in the supplying of the needs of the regions which are opened up through their operations.

Pacific Marine Review

The National Magazine of Shipping

December, 1919

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China

FOR a number of years many Americans have known that a greater expansion of American trade with China would be very desirable and profitable, and yet, as Julean Arnold points out in a recent article, how few Americans realize the following facts:

1. That the United States is closer to Asia than it is to South America, being about fifty miles distant via Alaska from the shores of Asia.

2. That it is possible to connect Asia and the United States by rail through a tunnel across Bering Strait.

. That Manila, in American insular territory, is closer to China than is Tokyo.

4. That the United States has for the past twenty years governed an Asiatic colony nearly as large in area as Japan proper and with a population of about 10,000,000, not with the sword but with the schoolhouse, and has given to these people the most advanced and enlightened system of public elementary instruction anywhere in the world, a most brilliant achievement.

5. That the United States, including its insular possessions, has a greater Pacific coast line than has any other nation and probably as great as Japan and China combined.

6. That the first foreign consul to China was commissioned by George Washington, in 1784, and that the American Flag was at one time predominant in China waters.

7. That the United States, by virtue of its territorial propinquity, is entitled to consider itself especially interested in China and the rest of the Far East.

China is the greatest single factor in the Far Eastern trade situation, possessing a territory more extensive than that of the United States and a population nearly four times as great. She has wonderful natural resources that are practically untouched. Although China has had a very remarkable civilization for over four thousand years, her endeavors industrially and commercially have been very largely confined to agriculture and its by-products, and though for many centuries her metal workers have possessed a degree of skill scarcely surpassed anywhere else in the world, yet the natural stores of coal and iron underlying much of her mountainous country have never been tapped in any commercial way.

China in her history has had periods of development in the industrial arts which have brought about construction works unsurpassed on earth in their extent and scope. Chief among these is the Great Wall, stretching 1500 miles over hill and valley, 12 feet thick, 24 feet high and with 40-foot masonry towers at very frequent intervals. No other human structure has even approached the magnitude of this work.

Chinese Junks at anchor

A beautiful Pagoda near Nanking, China

The Grand Canal is another instance of the patient industry of the Chinese. Running 800 miles and joining the Hoang-ho River with the Yangtse, this great waterway has for hundreds of years borne much of the internal commerce of China. These two works are so well known that no comment is here necessary, except the statement that American engineers are now engaged in the widening and deepening of the Grand Canal and the improvement of its locks, so as to make it a modern commercial waterway.

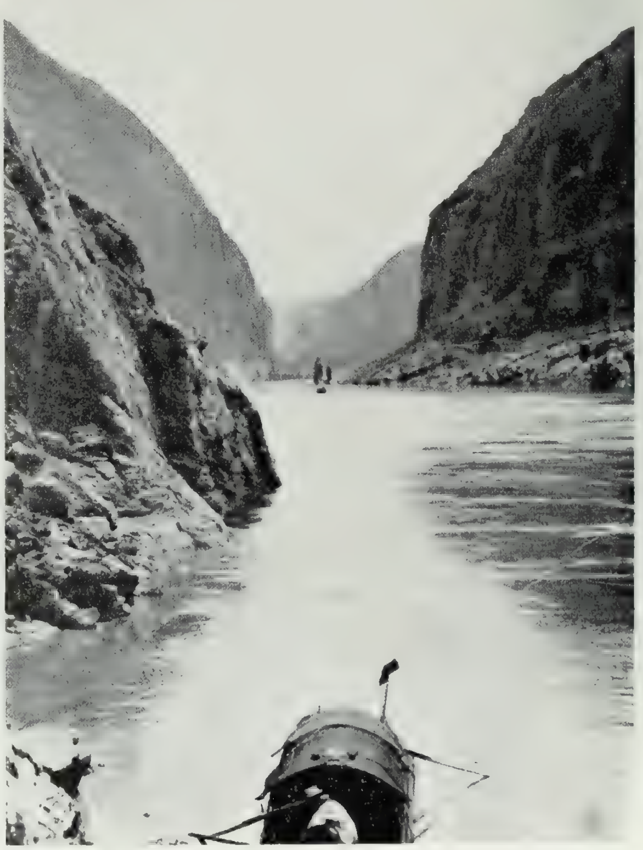
But apart from these great well-known achievements, there are scattered all through the middle kingdom a multitude of public and private monuments to the industry of the Chinese race. Digressing, it is rather remarkable that China impresses the minds of students so differently. That great American, Theodore Roosevelt, is often quoted as warning the United States not to fall into the error of China with regard to conserving natural resources, referring especially to the conservation of forests, a matter in which China has certainly been very remiss. On the other hand, the late Professor F. H. King, in his very important and interesting book, "Farmers of Forty Centuries," calls the attention of the United States to the need of taking lessons from China in the matter of conserving natural resources, referring especially to their methods of building up the agricultural land by the deposit of sediment from their river and canal systems.

In the great alluvial plains of Eastern China, surrounding the lower reaches of the Yangtse and the Hoang-Ho Rivers, the Chinese have for centuries been raising three crops a year, building up at the same time the fertility of the soil, so that today their intensive farming yields larger quantities an acre than do the virgin soils of the United States. All this section is covered with a network of large and small canals, between which nestle the homesteads of the farmers. These canals are annually filled with silt which is removed by hand and added to the ground surface. This plain is so flat that at the river port of Ichang, nearly 1000 miles up the Yangtse, the elevation is only 130 feet above the sea.

Earlier than 2250 B. C., or more than 4100 years ago, Emperor Yao appointed the great Yu superintendent of public works and instructed him to perform the work of draining off the waters of disastrous floods and canalizing the rivers. Yu devoted thirteen years to this work. He wrote several treatises on agriculture and drainage, which became classics, and was finally called, much against his own wish, to serve as Emperor during the last seven years of his life.

For forty centuries the Chinese people have measured their strength against the mighty Hoang-Ho, which river is known as "China's sorrow." Much of it races past their farms above the level of the fields, confined only between dikes of their own construction. They have not always succeeded in controlling the river, but they have never failed to try again. Some idea of the immensity of the problem may be gained from the fact that at Tsinan, in Shantung, the normal flow of the river is 4000 cubic yards a second, and in flood time it frequently has three times this volume, an amount of water sufficient to flood thirty-three square miles of level country ten feet deep in twenty-four hours. The amount of patient labor that has gone into the construction, reconstruction and repair of this vast system of dikes and canals is incalculable and can hardly be imagined.

There is indisputable evidence that through all the forty centuries during which it has been car-



Gorges of the Yangtse river in Szechuan province, which is known as the Switzerland of China ried on, this work has followed along the broad, well-defined lines laid out by the original engineer, and we venture the statement that nowhere on earth has the influence of one man's constructive thought been carried out with such fidelity or for anything like such an extended period.

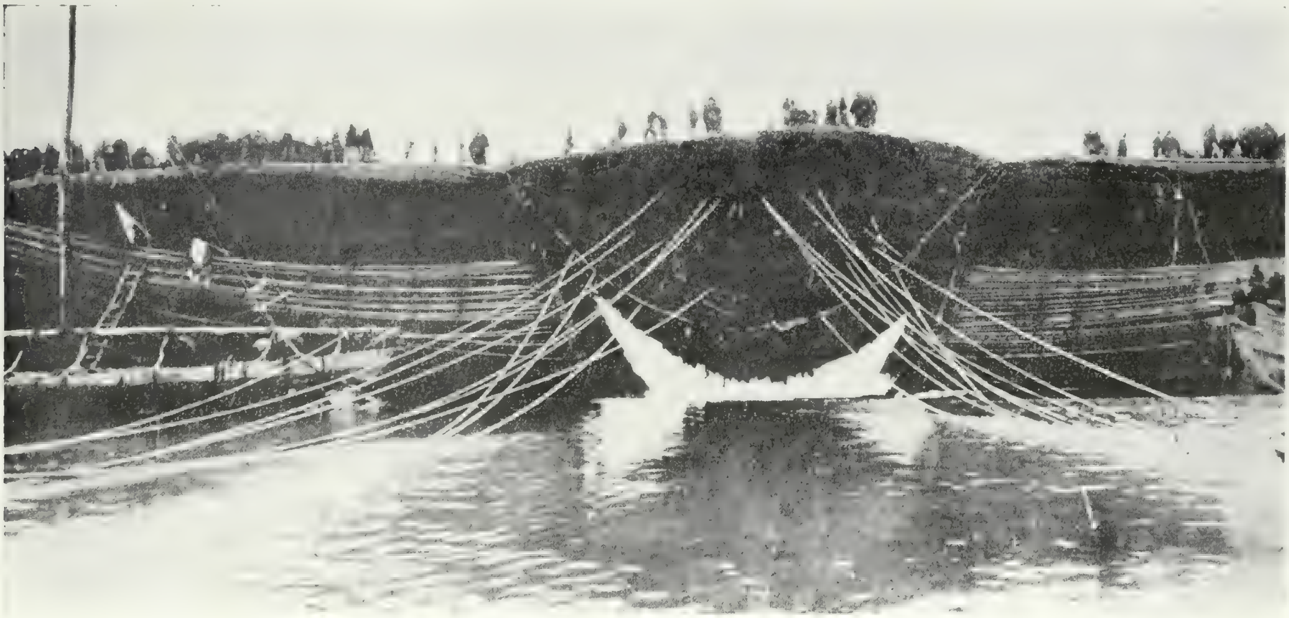
John R. Freeman, consulting engineer of the American International Corporation, who has been making a very exhaustive study of the problems connected with modernizing the Grand Canal of China, says that while visiting the Great Wall at Nankow, the Sea Wall at Hang Chow and some parts of the Grand Canal, he was so much impressed with the magnitude of these works and the ability of the ancient engineer who had designed them, that he felt like a pilgrim worshipping at some shrine.

Not alone in the civil engineering field, but in many other directions, we find the ancient Chinese very much in advance of the rest of the world. Five thousand years ago Si Ling Chi, the favorite wife of the Emperor of Huang-Ti, discovered the art of obtaining silk cloth from the filaments of the silk worm. The Chinese even today call this lady the "Goddess of the Silk Worms." For three thousand years China held exclusive knowledge of the art of making silk and still remains the greatest field for the development of the silk industry.

In education, in various manual arts, in the democratic institutions of popular government, in the matter of inventions such as the magnetic compass, movable types, paper making and many other manufactures, Chinese civilization was for thousands of years in advance of European culture, and it is the testimony of Mr. John R. Freeman again that "five and six hundred years ago Peking held more cultivation of art, more appreciation of education and more wealth, more wise, beneficial government—in short, more of civilization—than did any capital of Europe at that time." In fact, Mr. Freeman goes even further and says that in this broad, fair land of China he finds the counterpart of the United States in climate, fertility and mineral resources; that in one great, largely dormant asset China leads all the world—namely, that of the kindly, patient people, steadfast for more than a thousand years in habits of industry and in appreciation of the scholar, and that he finds in China the greatest, truest democracy that exists in any great country in the whole world.

Ancient stone bridge over the Chinese Canal. Note the true arch

This great nation of China, with its wonderful calm and poise—the result of long ages of veneration for the ancestor and the scholar—has been very unfortunate in its contact with sporadic western civilization. This contact was at first either by sea, through the medium of the piratical seafaring peoples of the Straits Settlements, or overland through the savage tribes of the Himalayas or th desert country of Western Asia, and it is easy to understand how this contact brought to the Chinese mind the conception that the peoples beyond


Chinese engineers placing the last pakwerk of millet roots and earth to stop the gap in the dikes holding the Hoang-Ho River

Headworks of the diversion canal on the Min River, Chengtu Szechuan. This canal has for 2200 years watered the rich plains of Western China

the borders were all barbarians, and that China, the middle kingdom, was the home of all culture and refinement. Later on, when the navigators of the European maritime nations, the Portuguese, the Dutch and the British, began to make direct contact with the Chinese, this impression was rather strengthened than weakened, as practically every foothold gained on Chinese soil by the nations of Europe has been forced by them in a manner which to the Chinese must seem indeed barbarous. America has, on the whole, been much more fortunate in her relations with China, and, according to the testimony of the majority of travelers, has gained the confidence of the Chinese people.

The first foreign trade venture of the American republic was the voyage of the good ship Empress of China to Canton, starting February 22, 1784. The shrewdness and the energy of the Yankee traders, and their supremacy in the matter of clipper ships, soon brought America to the forefront in the silk and tea trade with China, an advantage which she held until about the middle of the nineteenth century, when the lead went to Great Britain and has been maintained by her ever since. At present, the foreign trade of China amounts in round numbers to one billion dollars. If China were to increase her foreign trade to the same proportion per capita as the foreign trade of Australia, it would be equivalent to sixty-five billions a year, and the testimony of competent witnesses is that the resources of China make this staggering total a very possible achievement.

The British free port of Hongkong has, since its establishment, largely dominated the foreign trade of China, and the trade of China with that port now amounts to more than 25 per cent of the entire foreign trade. Before the war, Germany was rapidly increasing its trade with China through its treaty ports, and the trade of that portion of China dominated by Tientsin and Tsingtau, now

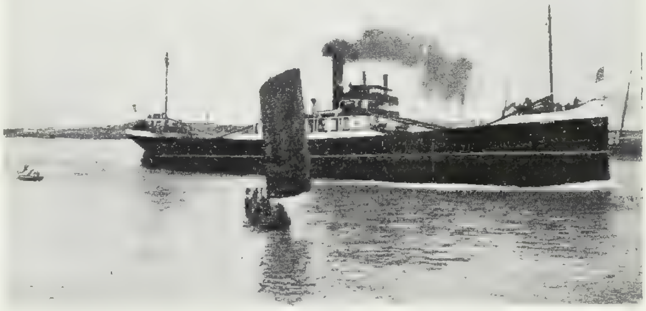
The great steel works at Hankow

in the hands of Japanese interests, is still showing a very decided increase. The report of the consul general at Shanghai for the Chinese trade of 1918 shows that Japan handled 40 per cent of China's foreign trade, the United States handled 13 per cent, the foreign trade direct to the United Kingdom amounted to 7 per cent, and the Hongkong business reached 26 per cent. The percentage carried by the United States has shown a gradual increase since 1910. The percentage carried by Japan has shown a very remarkable increase since that time, amounting in 1909 to 15 per cent and in 1918 to 40 per cent, while the Hongkong business has shown a gradual falling off, as has also that to the United Kingdom direct. The great question, however, with regard to the foreign trade in China is, Who will control the tremendous increase in that trade which is sure to come in the near future?

Of all the nations doing business with China, none is more favorably situated to benefit from the development of China's trade than is the United States of America. It is therefore highly important that American merchants, importers, exporters and shipping men in general should familiarize themselves with the needs of China and study how best to approach the Chinese people. Other articles in this issue of Pacific Marine Review contain suggestions from experts with regard to methods of approaching the Chinese business man and the types of men best suited to act as business representatives in China, so that in this article we will confine ourselves to pointing out some of the needs of China that can be filled by American manufacturers and exporters.

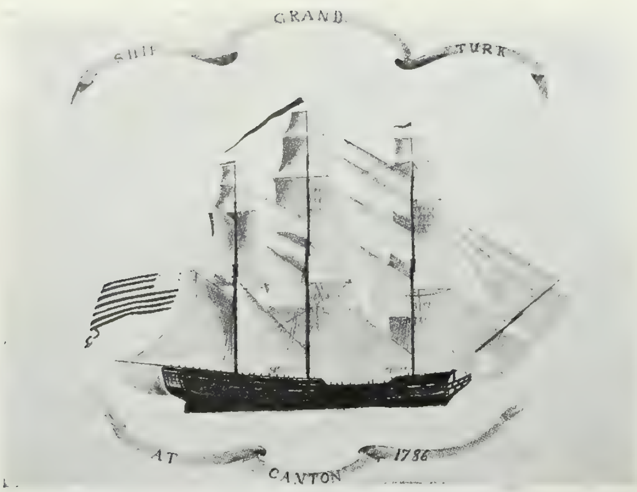
Railroads

One of the great needs of China, in order to increase her trade possibilities and bring the great resources of the interior to the coast or to river ports, is the extension of her railroad system. Sixty years ago a British railroad engineer, Sir MacDonald Stephenson, conceived for China a great railway system, studied all the routes and drew his plans, but it was twenty years before a rail found a permanent resting place on Chinese soil. Some thirty years later there came another grand attempt from abroad to build a railroad in China; nearly every nation on the globe was represented by some would-be builder; almost 6000 miles were built and then construction stopped. Again grand plans are in the air and soon Stephenson's vision may become a reality. The financial market open to the promoter of railroads in China is very broad, much broader than was open to the American promoter in 1870. And yet in the forty years succeeding 1870 America built over 5000 miles of railroad a year and she now has over 250,000 miles of rail. China, too, offers a much more stable basis of revenue for railroads than did America at that time, and enough experience has been gained by the management of China's lines to show that with ordinary management privately



Two examples of modern steel shipbuilding in China

Fine seagoing junk



The American trader Grand Turk. One of the first ships to carry the Stars and Stripes into the Chinese trade

handled railroads in China can be made to show a very good margin of profit. It is needless to say that in the building and equipping of the 100,000 miles of railroads projected for China, American manufacturers and engineers may find much profitable employment.

Inland Waterways

China is now considering, as has already been suggested, the improvement of the Grand Canal. The republican government has authorized the expenditure of six million dollars in gold for the improvement of that canal with special reference to protecting it from damage by the floods of its tributary rivers, and the insuring of ample water for an all-year-round operation of the canal as an inland waterway of commerce. American engineers are at present engaged on the preliminary study of this work, and while undoubtedly the great bulk of the material and labor going into its completion will be Chinese, its successful completion will lead to an immense amount of similar work on the river channels and the connecting canals throughout the alluvial plain of China.

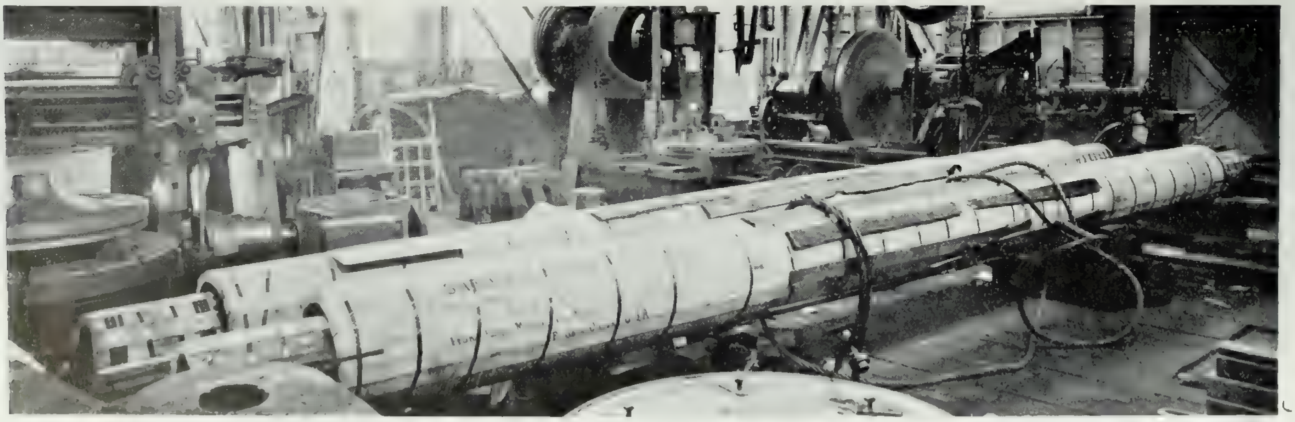
Manufacturing

At the junction of the River Han with the Yangtse, 650 miles inland from the mouth of the latter, there are three cities having an aggregate population of 1,200,000 known to Chinese as the Wu Han group. These three, Hankow, Hanyang and Wuchang, form a sort of Chinese Chicago and are building up a very rapidly increasing trade in manufactures. Hankow is the point where the freight to and from inland China is transferred to larger steamers. For several months each year the port is open to fairly large ocean vessels, and all the year round large river steamers ply up and down the river between Shanghai and Hankow. As the Yangtse is navigable for small steamers to a point 800 miles and more above Hankow, and as many of the tributary rivers are navigable by steamers and native boats, Hankow as a distributing port becomes very important in any schedule of interior communication in China. Across the Han River at Hanyang are located the great iron and steel works and government arsenal, whose steel works had an output in 1914 of 135,000 tons of pig iron, 47,000 tons steel rail, and 16,600 tons of mild steel. The market for the pig iron from these works has heretofore been very largely in Japan. That country in 1914 imported 84,200 tons of pig iron. Pig from this plant has been brought to the United States and found to be of very high quality. The works are equipped with much modern machinery, but still a large portion of drudgery is done by primitive native hand labor. This company employs 2000 skilled workmen and about 2500 coolies. The foreign experts in charge give very high testimony to the mechanical ability of the Chinese, who seem to possess marvelous intuitive comprehension of foreign machine tools. Across the Yangtse River at Wuchang they are planning to install a cotton mill with 40,000 spindles and 1000 weaving machines, American and British machinery. This mill will employ 2000 workers and 300 dwellings are to be erected to accommodate the spinners and weavers.

There is available in the river watersheds of China an immense latent hydraulic power which can be utilized in manufactures, and which will be available for use when the present plans for flood control have been put into effect. The modern engineer does not need a very great amount of imaginative power to conceive of Central China as being covered with a network of electric power lines and dotted with manufacturing plants similar to those now seen in Central United States manufacturing districts. The iron ore is there, the hydraulic power is there, labor supply is there, and easy access to markets is already provided.

Shipbuilding

From time immemorial the Chinese have built vessels for carrying freight. Their junks for sea service are just about on a par with the European vessels of the seventeenth and early eighteenth centuries. The Chinese men make excellent sailors. It is not surprising, therefore, that they have been found to be excellent shipbuilders under British and American supervision in modern shipyards.



Rolls for a steel rolling mill at the shops of the Pacific Marine Iron Works, Portland, Oregon, ready for shipment to Shanghai

The work of the native shipbuilder in the yards of Hongkong, Shanghai and other ports has produced many vessels that are as good as anything in their class built anywhere. Many of these yards are using American labor-saving tools and will use many more in the future.

Material-Handling Machinery

The development of China's ports, both river and oceanshore, will create a very large market for the surplus product of the American manufacturers of dock and harbor machinery. Swatow, Amoy, Hang-chow, Shanghai, Nanking, Ta-ku Bar and many less important ports on the coast of China will require great improvement in the way of cargo-handling machinery, warehouses and docks. On all the navigable rivers there are many ports where similar improvements will have to be made, and the aggregate business in this one line would make a tremendous total.

Agricultural Machinery

The development of the great Mongolian and Manchurian plains is calling for large numbers of tractors, threshing machines, harvesting machines, gang plows and all the various implements which combine to make possible western farming on a large scale. Quite a trade has already been developed in these machines through the ports tributary to the trans-Siberian Railroad, and undoubtedly this trade will be gradually increased when conditions return to normal. In short, China offers an almost limitless market for probably the next half century. She contains the most abundant stores of raw materials yet left on the earth, both as to the products of the vegetable and mineral worlds, and while we might hesitate from the fear that perhaps we are forging industrial chains for ourselves by furnishing China with the tools we possess, we must remember that there are in the hinterland of China enormous surfaces of the earth which are still undeveloped.

The second language of China is English, and there are thousands of schools where English is part of the curriculum. This gives America and Britain an enormous advantage in direct trading with the Chinese. There are numerous dialects in China, but long contact with the British at Hongkong has enabled many Chinese merchants situated in the inland of the empire to carry on their communication in the English language. There is today hardly a town or village in China in which you will not find some evidence of imports from the western world, either in the way of patent medicine, cigarettes, the five-gallon kerosene can, or some printed book or an article of Occidental clothing.

China, with the rest of the Far East, is awakening. Anglo-Saxons have been chiefly responsible for the changes which have brought about this awakening, and undoubtedly China, when fully awakened, will give to the western world, not only great contributions of mineral wealth and vegetable products, but also new inventions and scientific discoveries, which will assist in the progress of civilization. There is no doubt but that America, with her enormous wealth and her favorable location on the Pacific, can, if she will, benefit very largely from future intercourse with China and from the future development of China's resources and trade. The Chinese people look to the United States of America as their friend, and in the maintenance of this friendly relationship will lie America's safest course in future dealings with China.

Two views of Manila and its fine harbor

Logical Course of American Trade in the Far East Is Through Manila

"SINCE 1898," says James J. Rafferty, director Philippine Bureau of Commerce and Industry, "Manila has been the American outpost in the Orient. Unlike other great nations, you have failed to establish yourselves there as a maritime power, or to improve the possibilities of this friendly port.

"To date, your gateway to Asia, with its hundreds of millions of inhabitants, is relegated to the status of a 'port of call' by all American steamship lines.

"Manila is the one port in the Orient where those in authority wish you well, and desire to see your business prosper. It is a port without malice toward you, where ideals of American justice and fair play prevail; and where the ordinary risks of transshipment are reduced to a minimum. Can you safely continue to overlook its importance from a commercial standpoint?

"Through the Philippines you have a real opportunity to open the vast markets of China to Americans in a manner heretofore impossible. China is a fertile field, the cultivation of which is bound to yield a rich harvest to the Americans who handle it with intelligence and understanding. America is regarded by the Chinese as friendly, disposed rather to help than to hinder, to protect rather than despoil her territory. But with all of these advantages, if you are to meet competition, you must have a powerful organization, a base and rallying point close at hand, something more tangible than labels on boxes and bales as indicating American force. The Chinese merchant bases his judgment largely on outward signs; and as he has a natural tendency to deal with the strongest firm—other things being equal—I fear that America's poor showing on the Pacific is convincing proof to him of her inferiority as a maritime nation.

"The markets of the Philippines and China are not the only ones in the Orient awaiting development, but they are perhaps the largest; and the others will require more time and effort."

The Department of Commerce and Communications of the Philippine government is greatly interested in developing Manila to the highest and most efficient degree possible, with a view of facilitating the arrival, departure and unloading of vessels, within the minimum amount of time.

No effort or money is to be spared in the construction of new, modern and up-to-date piers, equipped with the latest types of cargo-handling cranes and other mechanical devices, both exterior and interior. It is the intention to provide every facility to enable ships to rapidly discharge and load freight at this port.

At present Manila is provided with three medium sized piers, one of which is used exclusively by the United States Army. A fourth pier, approximately 240 feet in width by 1000 feet in length, is now under construction, and will be completed during the next year. A fifth pier is now under consideration, and construction operations may commence early next year. More than 1000 linear feet of marginal wharf has been constructed, together with numerous marginal cargo sheds. The length of this wharf will likely be trebled during the next year.

The present depth of anchorage at Manila is approximately thirty feet, but will be dredged within the coming year to a depth of forty feet. Ships such as the Empress of Asia and the Empress of Russia, of 30,000 tons, have no difficulty in quickly mooring alongside of the present piers.

The construction program contemplated for the coming year also makes provision for the enlargement and extension of two of the government piers, thus affording ample facilities for all possible incoming and outgoing freight.

Permission to erect fuel-oil storage tanks upon the port area at Manila has been granted, and each pier will be piped so that ships burning oil may receive bunker fuel within a very short time after tying up.

There is at present under consideration the construction of a new and modern dry dock at Manila to accommodate ships of 20,000 to 25,000 tons and between 600 and 700 feet in length.

A Grand Canal scene

Navigation Laws—Some Criticisms and Recommended Changes

The call issued by the National Merchant Marine Association to shipping men throughout the country for suggestions for the amendment of America's navigation laws has aroused our friend The Traffic Manager and brought him to the front again with this very timely article. We venture to hope that the information contained therein will induce much study of the navigation laws by practical shipping men on the Pacific Coast and that we may have many suggestions from them to offer to the National Merchant Marine Association, which is very evidently acting in good faith and trying to accomplish some constructional betterment in the body of our marine law. That there is great room for improvement in these laws no one who has tried to operate under the American flag can have any doubt, and perhaps the combined suggestions of our practical shipping men put before Congress at this time will enable us to start something in the right direction.

THE administration of the shipping laws in the United States is vested in several government departments, with the result that confusion exists and the execution of the legal formalities connected with the shipping business is far more complicated than it is in Great Britain, where only one department of the government — namely, the Board of Trade — deals with the enforcement of the statutes affecting shipping.

The Board of Trade is a body of permanent officials, headed by a cabinet officer, and his appointed immediate assistants, who have charge of all matters affecting trade and shipping. A special division, known as the Marine Department, discharges the supervisory functions vested in the board by act of Parliament and is the sole authority with which British shipowners or foreign ships trading to British ports have to contend. The marine department of the Board of Trade has charge of the inspection and measurement of vessels building, of the shipping of seamen, of the enforcement of the law relative to the loading of ships, the inspection of passenger-carrying vessels, and the investigation of wrecks. It combines, in fact, the functions which, in this country, are split between the Bureau of Navigation, the Steamboat Inspection Service, the Treasury Department, the Bureau of Foreign and Domestic Commerce, and, to some extent, the Immigration Service and the Department of Justice.

All the shipping statutes of Great Britain are contained in one organic law, entitled the Merchant Shipping Act, which is in itself a maritime code. Thanks to the power exercised by the permanent officials of the British Board of Trade, shipowners are insured against any sudden changes in the shipping policy of their country, as no shipping bill is ever proposed except as an amendment to the merchant shipping act, which is the fundamental law, and no amendment to the act is ever considered by Parliament, except as a government measure which has received the assent of the Board of Trade; that is to say, of the one authority directly in touch with the shipping industry and cognizant of the conditions affecting it.

In the prosecution of its supervisory duties, the Board of Trade is assisted by such eminent institutions as Lloyds' Register, the British Corporation and the Bureau Veritas, which approve the scantlings of new vessels and assign load lines, in addition to various consulting committees composed of eminent professional men. A parliamentary committee also forms a link between the Board of Trade and the legislative power, so that every care is taken to preserve the instrumentality of the powerful industry of shipping from sudden disturbances due to the promotion of legislation by adverse interests.

This organization is the result of centuries of study, and something along the same lines should be recommended to our government by the committee now at work on recommendations for the betterment of our navigation laws.

It is too great a task for any one man in daily business to give the necessary time to thoroughly render a complete review of our present laws and indicate where as the result of experience he finds them inadequate and burdensome.

The editor of Pacific Marine Review asked the writer to do the best he could, and stated that the article must be ready by the eighteenth of November, so the following criticism of our present laws comprises just those that come to his memory, and some data collected from time to time. Many other shipowners and operators have been asked by the Navigation Laws Revision Committee to communicate complaints and remedies so that from the miscellaneous data submitted our present navigation laws should receive a very thorough revision.

Measurement Laws

Many complaints have been made concerning the higher net measurement imposed upon American steamers than those of European register. Quoting from Mr. J. H. Rosseter's address before the meeting of the American Manufacturers' Export Association, New York, March 4, 1919:

> "Ships under the American flag are discriminated against in rules of measurement and other stupid regulations, but this undoubtedly can and will be changed."

The measurement laws of England and Japan should be carefully studied and the best adopted, and if, as some authorities state, there is practically no difference between our rules and the British rules, our rules should be interpreted and applied as the British interpret and apply their rules.

Load Line

Since 1876 British ships have had marked on the side plating amidships a white disc traversed by lines representing the safe draft for Indian summer and winter loadings. The loading of ships has been scientifically investigated, and with the help of the committee of Lloyds' Register, the British authorities have succeeded in formulating very complete tables for ships, which have since served as a basis for similar legislation in many other countries. The United States should adopt a load line regulation, and legislation to this effect is now having consideration in Washington. There is no doubt that the absence of a compulsory load line in this country has had a bad effect on insurance of our ships. The underwriters have in mind that there is always a tendency to overload, and insurance rates are charged accordingly.

Classification

England has her British Lloyds, France her Bureau Veritas, and Italy her Registro Navale Italiano. Our government should adopt the American Bureau of Shipping as its sponsor for vessels newly built under the American flag, and in some way make it obligatory to class American-built vessels in this bureau. We are now the largest shipbuilding nation in the world, and therefore must have our own classification society. Quite logically, marine insurance companies prefer to have the classification placed on a vessel upon which they are to assume a risk, by a society organized and operated by their own nation.

Annual Inspection

Our inspection laws are too exacting and inelastic. The rules are not interpreted alike by inspectors in different districts. Some portions of equipment will pass the local inspectors at New York, while that same equipment may be condemned by an inspector at San Francisco; furthermore, the rules are constantly changing, and equipment ordered on a vessel at one inspection is often discarded at the next annual inspection for something different.

Boiler inspection, especially, is considered to be, not only costly, but dangerous, and unnecessarily rigid in its requirements. Under the practice adopted by the United States authorities, a cold water pressure test, denominated the hydrostatic test, is imposed. The pressure applied is so far in excess of the designed working pressure of the boiler that it strains and reduces the term of its life, and when the boiler is fired, leaks usually show up as the result of the severe treatment received. It is very seldom that such a test is imposed without its being attended by the breaking of stays, which not only have to be replaced at great expense but also delays the vessel in port. This **annual** hydrostatic pressure test is not required by other nations. British Lloyds have a system whereby a ship may be inspected and carry on its work at the same time, and if it is impossible to make a complete inspection without delaying the vessel, a portion of it is left undone to be completed in the next port, and Lloyd's representative at that port is advised of what has been left undone.

In Great Britain it is not necessary to completely discharge a vessel in order to have it inspected by the officials of the Board of Trade rules. In our country the formalities attending the annual inspection result in a very costly detention to the ship, which has to be completely discharged, the fires drawn, or out, and the boilers all cold before the United States inspectors will go ahead with their inspection. British Lloyds' rules should be carefully studied and the best of these combined with the best of ours.

It is generally understood that the personnel of our inspection bureau is of the highest technical efficiency, and this is as it should be. It must be recorded here, however, that the government pay to these exceptionally trained men is not at all adequate and in line with the compensation paid generally for men of lesser experience going to sea, and over whom these supervising inspectors are supposed to exercise control and direction. At present there is not sufficient inducement in this service to influence exceptional men to seek employment as inspectors under the United States government.

Work Day

The law specifies a nine-hour work day at sea or in port. The Seamen's Union is endeavoring to enforce an eight-hour work day both at sea and in port. The average shipowner is willing to grant an eight-hour work day in port, but there is no reason for reducing it at sea, which would put added burdens on the American shipowner attempting to operate against foreign competition, for an eight-hour day at sea means a little larger crew.

Pay Days

That portion of the law, Section 4530, permitting seamen in ports other than the home port to draw two and one-half days' pay every five days, should be abolished, as should also that portion of the section which applies the American law to seamen on foreign-owned vessels while in the harbors of the United States.

Naturalization and Citizenship of Seamen; R. S. 2174

The present law reads that—

> "Every seamen being a foreigner who declares his **intention** of becoming a citizen of the United States and shall have served three years on board a merchant vessel of the United States subsequent to the date of such declaration, **may** on his application to any competent court . . . be deemed a citizen of the United States."

Many seamen have very ancient intention papers but have never taken out their final American citizenship papers. When it was necessary for our country to enter the late war, it was found that the alien seamen on the American ships would not enter the American naval reserve. This must be remedied, for the seamen of our merchant marine must constitute the backbone of our naval reserve.

Shipping Commissioner

R. S. 4508 reads:

> "The general duties of a shipping commissioner shall be—
>
> 1. "To afford facilities for engaging seamen by keeping a register of their names and addresses."

This part of the law has become obsolete and should be revived. The only place to get a sailor, oiler, fireman, cook, etc., is from the Sailors', Cooks' and Oilers and Firemen's Unions.

> 2. "The shipping commissioner is to provide means for securing the presence on board at the proper time of men so engaged."

This law is obsolete in San Francsco. The attaches of the shipping commissioner's office do not render such assistance.

> 3. "The shipping commissioner is to facilitate the making of apprentices to the sea service."

This part of the law was very much neglected up to our entering the war, and then Uncle Sam had to make up a new department called the Sea Service Training Bureau to get his apprentices.

Seamen's Wages and Clothing Exempt from Attachment

It is a question in this enlightened seamen's age whether the law protecting the seaman's wages and clothes from attachment by any court, notwithstanding any previous sale or assignment of wages, is any longer necessary or fair. No such protection is afforded the illiterate laborer working on shore. The law seems obsolete and the present-day, educated American sailor does not need it.

Desertion of Seamen Abroad

A seaman's contract should be held as binding as that of a contract made by any other citizen not following the sea. In this country the old law providing for the arrest and imprisonment of officers and seamen deserting without cause from merchant vessels of the United States in foreign countries should be reinstated.

Return of Seamen from Foreign Ports, Alaska and Insular Ports

R. S. 4578 states:

> "All masters of vessels of the United States and bound to some port of the same are required to take destitute seamen on board their vessels at the request of consular officers and transport them to the port in the United States to which the vessel is bound, but that the master shall not be obliged to take a greater number than one man to every 100 tons burden of the vessel."

If this law were applied to a present-day ten-thousand-ton freight vessel, where would sufficient accommodations be found? This law is obsolete and should be modified.

Offenses and Punishments

R. S. 4596 reads:

> "For neglecting and refusing without reasonable cause to join his vessel or to proceed to sea in his vessel, or for absence without leave . . . he (seaman) shall be punished by forfeiture from his wages of not more than two days' pay, or sufficient to defray any expenses which shall have been properly incurred in hiring a substitute."

This law is entirely inadequate and is ridiculed by seamen. As a general rule a seaman never has enough money coming to pay for hiring a substitute or to even begin to pay for the delay to his vessel caused by his absence. The punishment should be made to fit the crime.

Seaworthiness

R. S. 4559 reads:

> "Upon a complaint in writing signed by the first and second officers and the majority of the crew of any vessel while in a foreign port that such vessel is unsuitable to go to sea . . . shall be sufficient to authorize an inquiry. . . . "—and thus detain the vessel.

As this is a serious charge, a penalty should be provided should such accusation be unfounded.

Corporal Punishment—R. S. 4611

This law makes the vessel, as well as the master, liable to damages if the master fails to use diligence to prevent the escape of an officer who has inflicted corporal punishment on a seaman. The vessel should not be held liable for personal differences between crew members, because the owners can exercise no control. The liability should be personal.

Requirements for Qualification as Able Seamen

It requires at least three years' service on deck at sea to make an able seaman. There is no doubt but that this period of time was necessary to make an A. B. for a "wind jammer," but the services of an A. B. on a steamship or motor ship do not require such a long apprenticeship, and the time should be considerably reduced to make sufficient seamen for our greatly increased merchant marine.

Crew

An American steamer in the foreign trade carries a larger crew than a British steamer, and if, as is often written and claimed, the American seaman is the most efficient in the world, why is a larger crew necessary? The British steamer requires two licensed engineers, the American four, and in addition to this the American vessel requires three water tenders. There is now a ridiculous bill before the Senate for licensing and making officers of marine firemen—Senate Bill 3559 providing "that the Board of Local Inspectors will be required to license marine firemen on oil-burning vessels, such licensed men to be considered licensed officers." This, of course, will increase the number of officers on board American vessels and the wages of the firemen, which is no doubt the object of the bill. Notice should be taken of the fact that only marine firemen on oil-burning vessels are to become such officers.

Language Test

There is a clause in the Seamen's Bill which states that 75 per cent of the crew in each department shall understand the orders of their officers. On the Pacific Coast the shipowners know that Mr. Andrew Furuseth intended this clause to prevent the carrying of Chinese on American ships. However, it does not prevent our Pacific competitor, the Japanese steamship, from carrying Japanese crews with Japanese officers. That is why the Japanese are rapidly gaining control of the Pacific commerce. Owing to the scarcity of American seamen this law has never been enforced.

This section further provides that—

> "The collector of customs may upon his own motion, and shall upon the sworn information of any reputable citizen of the United States, setting forth that this section is not being complied with, cause a muster of the crew of any vessel to be made to determine the fact, etc."

As Captain Robert Dollar has truthfully stated, any waterfront "sore-head" can hold up a ship. This portion of the law has proved so unreasonable that it also has not been enforced.

Cadets

Some law should be provided compelling vessels of a certain class to carry cadets to build up our naval reserve. This expense should be assumed by our government. Japanese lines receiving government subsidy are compelled to carry cadets.

Carriage of Passengers

R. S. 4465 states:

> "It shall be unlawful to take on board any steamer a greater number of passengers than is stated in the certificate of inspection, etc."

The law should be amended so that vessels not permitted to carry passengers, or those having passenger certificates for a limited number, when not engaged in transporting passengers should be permitted to carry workmen from one place to another in the same customs district where they will be required to handle cargo or do repair work on the ship, such workmen not to be carried as passengers and to pay no fare.

Expiration of Annual Inspection Certificate

R. S. 4421 provides:

> "When a ship's certificate expires she must stop at the United States port she is in, even if there are no inspectors there, to be re-inspected."

The law should be changed to permit vessels to go to their home port for their inspections, provided the time occupied does not exceed thirty days, thus giving the owners an opportunity to look after and supervise the repairs, which generally can be done more satisfactorily at a home port.

Defects of Hull, Machinery and Boilers

R. S. 4448 provides:

> "Licensed officers shall point out to **the United States inspectors** all the defects and imperfections on hull, equipment and boilers known to them."

The law should be changed to read that on arrival of a vessel at any port, the licensed officers shall immediately communicate with **the owners** and report any defects or imperfections in the ship, **as well as** reporting them to the United States local inspectors. The owner is vitally interested in knowing the condition of his property.

Illegal Boarding of a Vessel

R. S. 4606 states:

> "It is illegal for any person to board a ship until it is completely moored to the dock, without the permission of the master."

This law should be changed to read that no person be allowed to board a ship at anchorage or at dock, or any place where she may happen to be, without first having obtained the consent of the master or officer in charge. The penalty provided in this section should remain as it is.

Seamen's Record of Employment

A continuous discharge certificate book should be carried by all men in the merchant marine service, which will act as a certificate of character and efficiency, showing on what ships the man has served, and the time. This requirement should be added to our navigation laws, and is in line with the laws of Great Britain, and makes it easier to secure efficient and competent men.

In Conclusion

Business relations with foreign countries is indispensable to the welfare of our own country. When we travel by sea, or ship goods by sea, we pay for ships whether they be American or foreign (as ships are paid for out of earnings), and also in one case we pay for foreign labor and material, while in the other case for American labor and material.

American ships are necessary to back up the military and the navy; therefore, let us employ our money in the building up of our own merchant marine, and back up our own military and our own navy.

We now have a merchant marine, and that merchant marine will be supported by the American people only so long as it can meet competition of foreign-owned merchant marines, and sentiment will play no part.

More favorable navigation laws and more favorable inspection rules are absolutely essential to lighten the operating burdens of our merchant marine, and the Shipping Board has taken a commendable step in the appointment of a navigation Laws revision committee of experienced shipping men. It is now up to the American shipowners to do their part, and not lag. To make the work of this committee a success, they must supply the helpful suggestions it has petitioned for.

SHIPBUILDING COMPANY AND ITS APPRENTICES

Messrs. Swan, Hunter, and Wigham Richardson, Ltd., Wallsend, have opened a new institute and training department for their apprentices. The building is on a site near the graving dock department.

Any suitable boy of the age of fourteen who commences work in the shipyard can enter as a junior apprentice. He attends school and goes into the training shed or into the works for alternate weeks for two years and receives wages during that period. An opportunity of improving their general education will be given the boys at the apprentices' school. Games, reading and recreation rooms and a gymnasium are provided, and classes in shipbuilding and naval architecture will be held on two nights of the week. Rev. J. W. Bottomley, the firm's welfare supervisor, will be in charge of the new institute.

A fine type of general cargo steamer

Keep 'em There

By "Americus"

We are fortunate to be able to present to our readers as a regular contribution to Pacific Marine Review the viewpoint of the writer of this article. He is an American steamship operator of long experience and is one of the old, faitnful vanguard in the merchant marine propaganda who for many years presented this subject without ceasing to the American public. That he has been able through all the lean years to keep his cheerful optimism speaks volumes in his favor, and we are sure that his lively and optimistic treatment of this very important subject will entitle him in the minds of Americans to the nom de plume of "Americus."

OUR ships are on the ocean; we have and will continue to have the goods to ship, and there is a demand for them in every other nation. Our young men are going back to the seas—hence the caption of this article, as referring to ships and men.

Two important events have transpired within the past fortnight, which are of intense interest to Americans and the American merchant marine. The first is an article by a well-known English shipping authority, Mr. Gould, which has been copied largely in the Eastern papers, wherein he predicts that our present robust attempts at a merchant marine will disappear from the seas within a decade. The second event was the practically unanimous passage of the Greene bill in the House of Representatives providing for the sale of all government-owned merchant vessels, and a return to a privately-operated merchant marine. Government operation of railroads and ships has been tried and found wanting. The American people, through their representatives in Congress, have spoken their opinion in no uncertain manner and we shortly are to go back to a safe and sane basis for our transportation on land and sea. There is no question involved regarding land transportation; we all know the necessity of the railroads and the vital import of this means of transportation to our very existence. An enlightened public opinion, long delayed by the vicissitudes of misconceptions, political machinations and government operation, is about to place the great railroad systems of the country in a position where they best can serve the interests of the public.

Our sea carriers, now recognized by thinking people as of almost equal importance to the railroads, have a more difficult row to hoe. Years of inactivity and an atrophied public opinion have begot difficulties at home, and the keen competition of our national rivals is an ever present menace abroad. A faithful few Americans have for years preached the doctrine of a merchant marine to ears that were almost deaf. Suddenly the world-wide war broke, and then, and then only, was brought poignantly to the manufacturers and farmers of our great country the need for ships and yet more ships to carry their products abroad. We of the shipbuilding fraternity may well feel proud of the noble response to this demand. The ships have been produced as if by magic, yet at great expense, as was but natural. We have paid the price of our national inanition, but from the salvage of our feverish haste of atonement we yet may turn our efforts into a national blessing by skillful and wise management.

During what appeared to be a death struggle for civilization, our every effort was turned to the production of ships—of steel, of wood, of stone, of anything to fill the insatiable maw created by the underwater activities of a conscienceless enemy. The war was won, and no one can underrate the influence for victory of the vast fleet which we created. During the struggle our allies applauded our efforts, as well they should, but now we are calmly informed that our ships are inferior products, our men are not real seamen and that we are not capable of operating a merchant marine anyhow. Aye, and more than that, we will disappear from the sea within a decade. After all, this is but human nature. Gratitude has been well defined as a "lively sense of favors yet to come." Our entrance into the sea-carrying business on a large scale bodes no "favors yet to come" for our rivals; hence gratitude has disappeared with the close of the war, and we may as well accept the gage of battle for commercial supremacy on the seas.

"Clear ship for action" is the order in the navy as a prelude to an engagement. A statement of available ammunition is also a preliminary which every commanding officer demands. Hence let us treat our merchant marine forces on the same basis

American freighters at dock in a western port before we begin in earnest the commercial battle on the seas. If there are any faint-hearted among us, send them below and out of sight, as this is going to be a battle royal, where only the fighters are wanted. We have already commenced the battle, yet there is still time for the "quitters" to get below and out of danger.

Our fighting forces consist of a not too well balanced fleet of ships, hastily constructed, it is true, yet withal good ships, and better than the average vessels of our competitors, as we have but few old ships in the fleet to lower our average of efficiency. Our reinforcements will consist of another huge fleet now in various stages of completion, which is being built much more carefully, and consequently will add to our efficiency.

Our crews are rapidly being reinforced by American-born products of training schools and discharged men from the navy.

The attractions of large freight rates have drawn many bright minds into the field as ship operators; more will follow and gain experience as our fleets grow. American bankers and other moneyed men are putting capital into ship investments, where heretofore they have held aloof.

Foreign agencies are being established to dispose of goods and engage freights for homeward voyages.

Fuel stations have been established abroad and are furnishing coal and oil to American ships at reasonable rates.

Small ships, not necessary for our trade, have been and will further be disposed of in order to "clear for action."

The government will withdraw from shipbuilding and operation and allow private interests to carry on the contest, where the prizes incident to success will act as a stimulus for the best that is in them.

Back of it all is the sentiment of a large portion of our American citizens who have received a rude awakening as to the value of ships as an incident of war-time wants. This sentiment is being intelligently expressed by their representatives in Congress, who thus far have shown and are still showing a determination to back up our merchant marine in its great international struggle.

Let no one imagine that this is to be an ordinary fight. We are going against antagonists who have been training for years on the seas, while we have slothfully been waxing fat on shore, allowing things maritime to drift from bad to worse. We are but at the threshold of the engagement, and not a gun has yet been fired. Large freight rates and a shortage of carriers by sea must not lull us into a sense of optimistic security before the gong has sounded for the real fight. A huge fleet of ships does not make a merchant marine by any means. They must have men to man them properly and they must have goods to carry both ways; they must have efficient management at both ends of the voyage; they must have good financing; they must have reasonable insurance rates, and last but not least, there must be liberal navigation laws, which, while protecting the interests of the public, will bring no undue hardships on the operators. The interests to bring all these desired functions about cannot be confined to our coastal communities; they must be nation wide. The North, the South, the East and the West must join hands to bring about the proper results. The farmer, the merchant, the manufacturer, the railroads and all other means of transportation must be co-ordinated to bring about success, just as they were in the prosecution of the war through which this nation has so successfully emerged. Ships in foreign trade are the wards of the nation and must be treated as such. All other nations do so and we cannot be an exception if we are to have success crown our efforts.

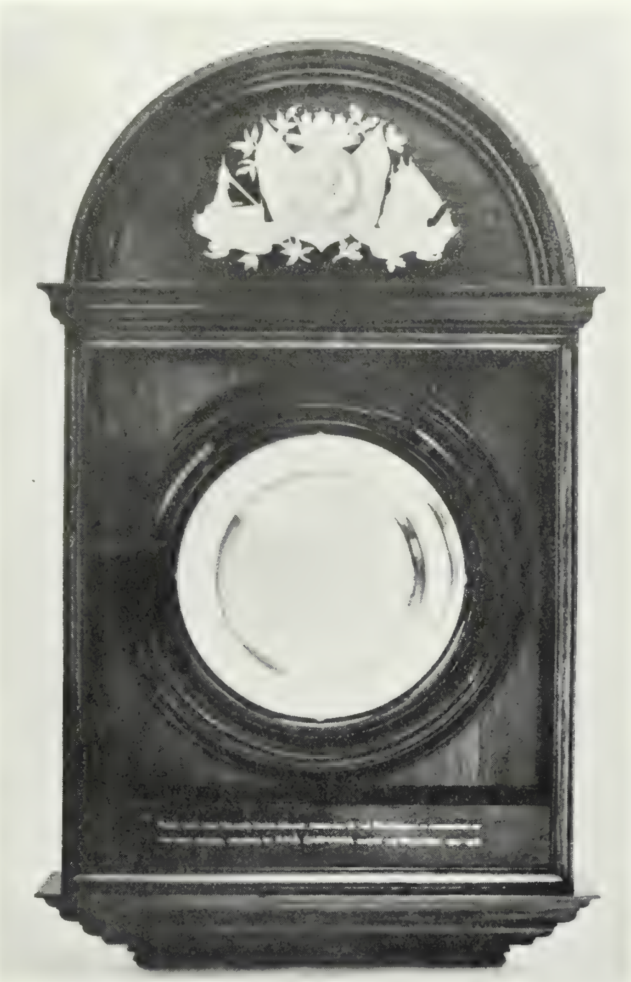
Americans may be slow to act, but we are not quitters, and once our national spirit is aroused, no one need fear the ultimate results. It was said at one time that we could not compete with our European rivals in the manufacture of steel, one of the greatest industries in which civilized nations embark. The odds against us then seemed more insurmountable than the difficulties we now foresee as besetting our efforts at a merchant marine, yet today we can sell steel, in normal times, and deliver it to any rival at less than it costs them to produce it and deliver it in their own countries.

This commercial battle on the seas is going to be one of intense interest to all true Americans. The writer is one who believes thoroughly that we are going to succeed. The cherished hopes of many years for a successful merchant marine seem about to be realized. An interchange of ideas and news from all sections will be a necessary adjunct to the battle, and by the kind indulgence of the publishers of this journal it is proposed to furnish a series of articles, for the common good, containing the happenings on and suggestions from the Eastern battle front which may be of interest.

Being in a position where the current news concerning matters maritime is available, it is hoped that by this means some information or ideas conveyed in these articles will be helpful to others in the prosecution of the battle.

A modern oil tanker

Merchant Ship Honored for War Service



Silver plate from Lord Nelson's dinner service presented to the Cunard steamship Carmania by the British Government

THE fifth anniversary of the sinking of the German commerce raider Cap Trafalgar by the Cunarder Carmania was celebrated in Liverpool by the presentation to the ship of a silver plate from Lord Nelson's dinner service. The Carmania is the only merchant steamer to be so honored, although similar pieces from the same historic service have been presented to some of the fighting ships of the British navy.

The presentation took place in the dining saloon and was made by Mr. McLean of the Navy League, supported by Admiral the Hon. Sir Edmund R. Freemantle, G. C. B., C. M. G., and Rear Admiral Ronald H. Hopwood, C. B., R. N. The plate was received by Sir Thomas Royden, Bart., C. H., M. P., deputy chairman, on behalf of the Cunard Company.

The Cunarder R. M. S. Carmania arrived at Liverpool from New York on August 7, 1914. She was refitted as an auxiliary cruiser and placed on the Atlantic patrol. On September 14, 1914, off Trinidad, she sighted the German liner Cap Trafalgar, only just completed, and also fitted as an auxiliary. The German ship came out to meet the Carmania and fought bravely, at times almost at point blank range. At the end of an hour and forty minutes the Cap Trafalgar ceased firing, began to settle by the stern, and sank. The Carmania was struck in 304 places, her bridge was put out of commission, and she was badly on fire.

The Carmania saw further service on patrol and as a transport before being restored to her owners.

The following extract from a letter of Captain Noel Grant, R. N., who commanded the Carmania during the action, gives an eye witness impression of events:

> "When I first looked around after the action, I found that we were in the very uncomfortable position of having no effective compass, no charts, no chronometer or sextant and no secret wireless code. The ship had to be steered from the after lower position, the only communication from deck being by a relay of men to pass the word down. There were no engine room telegraphs, so orders had to be passed down the engine room skylight by blasts on a mouth whistle. I afterwards found that two midshipmen, Coulson (who, I am sorry to say, was later in the war killed in a submarine) and Dickens, had gone on to the burning bridge, and, at great personal risk, got the bowl of the standard compass, some charts and the remains of the much-burnt wireless code. A sextant was found in a cabin between decks, so that by fixing the compass on a long pole (deadening the vibration by placing it on a feather pillow) we were able to steer a moderately correct course and were very pleased to find our signalled position was correct enough to enable the Bristol to pick us up the next morning and escort us to a safe anchorage, where we met other ships and with their help were able to make the ship seaworthy for the cross Atlantic trip to Gibraltar.
>
> "This action was the only one throughout the war in which an equal—or, as a matter of fact, a slightly inferior—force annihilated the superior force. My contention that we were the inferior force is based on the fact that the Cap Trafalgar was the faster ship and her guns outranged ours by 2000 yards. I am therefore thankful that the German captain came in towards me and put up a perfectly fair fight, instead of taking advantage of these two great assets in a naval action."

SEVENTH NATIONAL TRADE CONVENTION

One of the important features of the Seventh National Foreign Trade Convention, to be held at San Francisco, Cal., May 15-20, 1920, will be the world conference of American foreign traders, according to preliminary announcements just mailed to American firms represented at previous conventions, who are requested to have their representatives, living or traveling abroad, time their visits to this country so as to take advantage of the valuable opportunities afforded by this convention.

Three special steamers, chartered for the accommodation of delegates from abroad, will be provided for the ports on the Pacific Ocean. Another steamer starting from New York, will go by way of the Panama Canal.

Information regarding steamer routes, days of sailing and the program of the 1920 convention, is being furnished by O. K. Davis, secretary, National Foreign Trade Council, No. 1, Hanover Square, New York.

Pacific Marine Review
The National Magazine of Shipping

576 Sacramento Street
SAN FRANCISCO, CALIFORNIA U. S. A.

Official Organ of the Pacific American Steamship Association

Subscription Price, per year (Domestic)	$3.00
(Foreign)	$3.50
Single Copies	25 cts

J. S. HINES	Publisher
B. N. DeROCHIE	Business Manager
A. J. DICKIE	Editor
ANDREW FARRELL	Associate Editor
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SEATTLE OFFICE
560-561 Empire Building
J. A. KENNEDY, Manager

PORTLAND OFFICE
1029 Northwestern Bank Building
F. E. SHORT, Manager

Pacific Marine Review is sold at all leading News Stands
Entered as second class mail matter at Postoffice
San Francisco, California

Published on the First of Each Month. Copyright
1919 in the United States by J. S. HINES

REVISION OF NAVIGATION LAWS

NEVER before in the history of the American Republic have the minds of its legislators been so disturbed and uncertain over marine legislation. The possession by a government board of the largest single fleet of general cargo carriers in existence has brought many departments of the government face to face with the fact that our present system of Federal supervision and present code of navigation law is entirely inadequate to meet the requirements of modern business in foreign trade and international commerce.

Not only is this question agitating the minds and disturbing the consciences of our law makers, but, to use a slang phrase, "the buck has been passed" direct to the people themselves, and every organization of any kind whatsoever which has any political influence has been bombarded by propaganda setting forth various views of interested parties as to the disposition, operation, management and control of the huge government-owned fleet of merchantmen. The majority of the great organizations of citizens interested in agriculture seem to be determined that these ships shall be held by the government and operated by the government. The majority of labor organizations hold to government ownership, but are somewhat divided as to government control and operation, preferring in many cases that the control and operation of the ships and the proceeds accruing therefrom, if any, shall be turned over to labor. On the other hand, the majority of all the organizations which present the views of citizens engaged in business, and particularly those citizens engaged in shipbuilding, shipping, importing, exporting and merchandising branches, are very emphatic in their demand that the ships be sold into private ownership and allowed to operate as free from government control as is consistent with the public safety and their possible future use as naval auxiliaries.

We do not intend at this time in the short space which can be devoted to an editorial article in these columns, to try to present arguments either for or against any of these propositions, but we do wish most emphatically to emphasize, for the benefit of shipbuilders, shipowners and ship operators, the fact that there is now presented to them an opportunity almost unprecedented in the history of this nation to have their constructive advice acted upon by Congress with intelligence and sympathy. The whole course and trend of the inquiries made by congressional committees into the affairs of our merchant marine has, during the last six months, indicated their desire really to assist the program of America's overseas commerce, and if the citizens whose financial interests demand the expansion and welfare of this overseas commerce can really get together promptly with some constructive program on which they are all agreed, there is no doubt but that the bulk of such program would be adopted by Congress.

A very representative committee is now holding sessions for the purpose of aiding the Shipping Board to "examine the navigation laws of the United States and the rules and regulations thereunder and make such recommendations to the Congress as it deems proper for the amendment, improvement and revision of such laws; and for the development of the American merchant marine." This committee is composed of the leading men interested in shipping, shipbuilding and ship operating, and includes representatives from every organization directly interested. The committee has asked that all ship operators and shipping merchants, ship owners and shipbuilders address to its secretary any suggestions which they may have for the revision of the navigation laws. On another page in this issue of Pacific Marine Review appears an article by our friend, the Traffic Manager, suggesting many changes that have occurred to him. A careful reading of this article will no doubt offer to our readers many additional suggestions of change in the present laws or of additional statutes which may seem to them necessary and we urge most earnestly that careful study be given to this matter at this time by those who are directly interested, so that we may not lose this opportunity for bringing our needs before Congress at the most advantageous moment.

This committee has already presented its report on the subject of classification and rating of vessels. Briefly summarized, this report sets forth that the importance and the international character of classification societies demand that the United States government give the same recognition to the American Bureau of Shipping as is given by other governments to their classification societies; that all classification rules and procedure should be made as uniform as possible; that every builder be free to select his own classification society. With a view to carrying out these suggestions, the committee specifically recommends that all matters regulated by statute pertaining to technical questions of construction be submitted to the American Bureau of Shipping as the government's advisor; that the American Bureau of Shipping be the constituted authority for fixing load lines and free board; and several additional recommendations subsidiary to the above. This report will be published in full, and analyzed in the next issue of Pacific Marine Review.

NATIONAL MERCHANT MARINE ASSOCIATION

THE Council of the National Merchant Marine Association unanimously adopted resolutions calling on Congress to enact legislation for the prompt sale of Government owned vessels. The association recommends that vessels of under 6000 tons deadweight be sold with privilege of transfer of flag, and that the larger ships be sold to American individuals and firms only. It is also recommended that the entire fleet be sold within a period of two years.

Copies of the resolutions were immediately presented to the House Committee on Merchant Marine and Fisheries, which is preparing a general ship policy bill, and will be incorporated in a bill to be introduced in the Senate next week by Senator Joseph E. Ransdell of Louisiana, president of the association.

The association will take immediate steps to bring its program to the attention of Congress and the country. The House Committee on Merchant Marine and Fisheries will hold no further hearings but the association will appoint a special committee to appear before the Senate Committee on Commerce in support of Senator Ransdell's bill.

The resolutions are as follows:

Resolved, That in the opinion of the National Merchant Marine Association it is essential to the permanent success of an American Merchant Marine that the vessels comprising it should be owned and operated by American individuals, firms, corporations and associations. To this end, the association recommends:

(1) That all steamers of less than 6000 tons total deadweight capacity be promptly sold with privilege of transfer of flag at such prices as may be obtainable. That the Shipping Board be directed to sell as speedily as possible and in any event within two years all the remaining merchant vessels constructed or owned by the United States, including the ex-German tonnage, at world market prices (having regard to sales made by other governments since the Armistice) to American citizens, firms or corporations on terms of 25 per cent cash and deferred payments of the balance of the purchase price over periods of ten to fifteen years. The deferred payments to bear interest at a rate not exceeding 5 per cent and be secured by a first mortgage.

(2) That after the sale of a portion of the fleet of vessels of over 6000 tons total deadweight capacity each, the unsold remainder should, as far as practicable, be allocated by the Shipping Board to those who have purchased, on a basis of payment of a commission to the operating firms or corporations and payment by the operators of the proportion of the consolidated net earnings of the ships owned by such operators and the government owned tonnage which the operated tonnage bears to the total tonnage operated by such firms or corporations.

(3) All corporations, firms or individuals who shall purchase and operate ships in the foreign trade in pursuance of the foregoing plan should be exempt in respect to the earnings of such ships from all Federal excess profit taxes for a period of 10 to 15 years. Provided that such firms or corporations be permitted to charge off 10 per cent of the net earnings of such ships on account of depreciation and deduct such amount in their tax returns as operating expenses, and provided further that an amount of earnings equivalent to the excess profits taxes that would otherwise be payable shall be invested by such corporations, firm or individual in the building of new tonnage in American ship yards or in the purchase of tonnage built in American ship yards.

(4) The government should enact special legislation to assist existing passenger lines in the construction and operation of new passenger tonnage of the highest class and latest design and type, and to inaugurate and develop additional passenger and freight lines on routes where it is desirable, in the national interest, that direct passenger and freight service should be established.

POSSIBILITIES IN EDGE BILL

It is perhaps possible to overstate the importance of the pending Edge bill, but there can be little doubt that many of its provisions will be valuable as they afford additional opportunities for co-operation along lines that will benefit foreign trade. The bill allows banking corporations to be formed under the supervision of the Federal Reserve Board, which corporations, speaking generally, may discount the securities accepted by American merchants and manufacturers in payment for sales made in Europe. As the Webb Law allows manufacturers and others to combine for the purpose of selling abroad, the present bill allows combinations for the pooling of credit. The proposed corporations may issue debentures covered by the securities accepted from its customers, and so may permit the general public to share in the financial operations in which it is engaged. There is no government participation or guarantee explicit or implied in the bill, but it is at least an attempt to mobilize the credit of industry for the assistance of foreign trade. Organizations similar to the type proposed are already in existence, but they are not as a rule members of the Federal Reserve System, and most of them are the subsidiaries of banks and not of manufacturing concerns.

THE ROWE BILL

CAPTAIN ISAAC N. HIBBERD, General Supervisor of the Sea Training Bureau, United States Shipping Board, in a letter to Henry Avila, Supervisor of the Sea Training Burea, San Francisco, says that the Rowe bill which passed the House on October 8th and now goes to the Senate, should be of considerable interest to shipping men on this coast as well as to apprentices of the American merchant marine.

Under the terms of this bill an American boy who has been through the training school or who passes an examination given by the training school, can go up for his able-seaman's certificate after nine months at sea instead of three years, as called for by the La Follette Act, but the foreigner still has to serve the three years.

Since the establishment of U. S. Shipping Board training ships and free navigation schools about two years ago, these schools have trained and placed into service a large number of officers and 20,000 American citizens as seamen. The history of the past two years has proven that it is not necessary for American boys to spend three years on shipboard in order to become able-seamen.

When the war broke out in Europe we had something like 2,000,000 tons of overseas shipping under the American flag; now we have about 8,000,000 tons and expect to have by the end of next year approximately 14,000,000 tons.

At the present time the recruiting service is securing all the young men it desires and these are drawn from all parts of the country. Most of them are well educated, having completed a high school course, and not a few have spent a year or more in college. The passage of the Rowe bill will mean still better opportunities and chances for advancement for young Americans who adopt the sea as a vocation.

MERCHANT MARINE REPORT, UNITED STATES CHAMBER OF COMMERCE

THE Chamber of Commerce of the United States has submitted to its 1236 member organizations the report of its committee on ocean transportation about what the United States government should do with the two thousand or more merchant vessels the Shipping Board now possesses, or has under contract. The organizations in the membership are to vote on the committee's recommendations and will determine the attitude of the national chamber on a question which will soon come forward for congressional action. The committee's recommendations are:

1. That wooden vessels, and steel vessels under 6000 tons deadweight, be sold on the best terms obtainable from American or foreign bidders.
2. That other government-owned vessels be sold to regional associations for transfer at cost to private individuals and corporations of the several regions.
3. That the government absorb the difference between the war cost and the present value, as a war loss.
4. That there be freedom from regulation as to routes and rates.
5. That there be restriction for a period of years upon transfer to a foreign flag of steel vessels over 6000 tons deadweight purchased from the government.
6. That preference be shown for American underwriters, and that the underwriting market of the world be used for insurance not covered by American underwriters, without intervention by government insurance.
7. That encouragement be given to an American classification society.
8. That Congress be asked to make a general declaration of a policy to give aid toward the maintenance of a privately owned and operated American merchant marine.
9. That the operation of the competent American shipbuilding yards, on private account both as to yards and the vessels they construct, be continued.

The committee which prepared the report is made up of Edward B. Burling, Washington, chairman; John F. Deems, Burlington, Iowa; M. E. Farr, Cleveland; Homer L. Ferguson, Newport News; C. F. Gregory, New York; B. F. Harris, Champaign, Illinois; Charles H. Jones, Boston; Frederick J. Koster, San Francisco; August F. Mack, New York; N. Summer Myrick, Boston; John H. Thomas, New York; Samuel W. Weis, New Orleans; Egbert W. West, Glen Falls, New York.

Every member organization is provided with a statement of the question and arguments on both sides. Ballots must be in the office of the secretary of the national chamber in Washington on or before December 15.

This is the twenty-ninth referendum submitted by the Chamber of Commerce of the United States.

RED CROSS CHRISTMAS SEALS

OCCUPATIONAL THERAPY has been successfully applied in the treatment of tubercular patients. Reduced to its simplest terms this means the occupying of the minds and hands with light work which will assist in effecting a cure.

One of the first experiments of this kind has been tried out in a California sanatorium and is described by Dr. H. A. Pattison, medical secretary of the National Tuberculosis Association.

"Present medical science knows but one cure for tuberculosis and that consists of sunlight, fresh air, good food, plenty of rest under competent medical supervision," said Dr. Pattison. "All these can best be obtained in a sanatorium, but when the patient begins to improve he wants to do something. His mind needs to be occupied if he is to maintain the cheerful attitude toward life so essential to a complete cure. Herein lies the value of occupational therapy.

"The patients in the institutions I visited are happy and contented. They are now turning out wonderful baskets and bead work. Their finished product is as good as any I have seen in business houses."

The National Tuberculosis Association is cooperating with the California Tuberculosis Association in this work, which is but one phase of the educational campaign now carried on by the national organization and its 1000 affiliated societies.

The combined budgets of the state and local organizations call for the expenditure of more than $6,500,000 during the coming year. The fund will be raised through the annual sale of Red Cross Christmas seals, which begins December 1.

Direct Selling in China

By F. R. Sites

Formerly Resident Engineer in China for United States Steel Products Company

THE more directly and continuously a manufacturer maintains cordial and personal contact with the foreign consumer, the more satisfactory will be the resulting business; but the question as to the expediency of making a large expenditure for personal representation in the Far East depends upon the volume of business which the manufacturer is prepared to handle, and the market to offer. While the large producer can afford to have his own men in the field, the smaller manufacturer must depend on either a joint representative for several manufacturers, or on agents and commission houses.

This paper will deal primarily with "Direct representation in the Far East;" but since there are a hundred small manufacturers who desire to enter foreign trade for every "big manufacturer," the means available to the former should not be overlooked, namely, the commission houses. The degree of success which may be attained by cooperation with them depends upon the energy of the manufacturer, his determination to stay in the export business, and the character of the commission houses which he selects.

It should be noted at this point that the great successes of the British, as exporters, have been developed by the thousands of their countrymen, who, during nearly two hundred years, have been drawn away from the cramped quarters of their own native islands by the lure of seeking a fortune in the colonies. These pioneers became virtually commission agents, who procured goods from "home" by correspondence with exporters, who in turn purchased from manufacturers and handled the shipments for a small commission. In time this foreign trade became the life blood of British business, to be conserved at all cost.

These historic precedents suggest that the American manufacturers should take careful note of the old British plan, and cultivate our own American export houses, established with offices in New York, San Francisco, and New Orleans.

Our very opulence of opportunity at home, among 110,000,000 well-to-do consumers, is the greatest drawback to our foreign trade. We are inclined to forget and neglect the foreign buyer when times are good, and we sadly need him when times are bad. But if a definite and considerable percentage of a manufacturer's product is allocated at all times for the foreign trade, and if the foreign buyer is given the assurance that he will be taken care of with competitive prices and prompt shipments, even when selling at home might be more attractive, his friendship and co-operation may be depended upon when he is most needed.

If you are contemplating direct representation abroad, you will probably send first the head of your sales department to survey the field. He will find the following five plans now existing as regards American business in the Far East. They are described in the order of the intensity and completeness with which direct selling is conducted. One plan is applicable to certain lines of manufactured goods, and another plan to others.

Plan One

Referring to manufacturers having their own organizations in the Far East, for importing, for merchandising, and for distributing their products throughout the country: This plan is the one adopted by firms manufacturing one article exclusively, or a small group of closely allied products, generally a class of goods which the masses of people constantly require in their everyday life; such firms as the big oil companies, tobacco companies, and sewing machine manufacturers.

They carry a large staff of British, American, and Chinese employes, who penetrate inland in China to arrange for the delivery of cargoes, to inspect the stock of native dealers, to investigate the credit of their wholesale agents, to collect payments of silver, sometimes amounting to a ton of metal, to recommend prices for meeting competition, and to advertise by distributing samples, posters and hand bills.

On a smaller scale in the larger ports, certain manufacturers of shoes, for instance, are establishing their own retail stores. In the smaller outports, their agency would be placed with selected department stores. Commodities have been introduced profitably in this way, even when the consumers consisted only of the European and American residents; for there are thousands of such "foreigners" located in each of the large cities, such as Shanghai, Peking, Tientsin, and Hankow. But, of course, sales are multiplied enormously when the native buying public can be reached and supplied with the style and quality which best meet their needs and tastes.

Plan Two

Referring to manufacturers having their own small staff of Americans or Europeans in China for the convenience of the local importing commission houses: They give out the latest market quotations as received by cable, and enter orders for shipments from the mills on the basis of c. i. f. China ports. Certain steel manufacturers, locomotive builders, and others, have employed this plan. Their representatives may sell to various commission houses, who, in turn, are the actual importers who sell to the large native dealers. Since many of the native dealers have a practice of passing their business around among the commission houses, it is well to be in a position to quote to any and all comers.

Plan Three

Referring to manufacturers having a representative in the field attached to one of the commission houses: Such a representative is often paid in part by the commission houses, and in part by the manufacturer. This plan, employed by a number of manufacturers of machinery, electrical equipment, watches, etc., offers the advantage of substantial co-operation on the part of the commission house, the use of its large staff for keeping in touch with widely scattered markets, for financing and for handling the details of shipping. Meanwhile, the manufacturer's own representative is at hand to maintain continued live interest in pushing the sales, to give expert or engineering advice, to keep his principals informed as to prevailing local prices and market conditions. But occasionally this plan has the disadvantage of hampering the movements of the representative, who finds that there would be greater chances of success in certain transactions if he had the opportunity of dealing through another house, or perhaps quite independently; for personal relationship, and personal likes or dislikes, are frequently more potent than price alone. Furthermore, national prejudices and other considerations frequently place one commission house in a much stronger position than another, if not in a dominating situation for winning certain business. For instance, on railroads financed with British capital, directed by a British engineer or general manager, business quite naturally goes through a British commission house. Sometimes a representative under Plan Three, attached to American commission houses, would not have the opportunity even to quote on such work. On the other hand, if the British house happened not to be the agent for another manufacturer of the goods in question, he might pass the business to the American commission house, and secure enough profit for both firms.

Plan Four

Referring to groups of manufacturers of allied products who have agreed together to send out one representative: This was done a few years ago by certain British steel interests under the name of the "Representation for British Manufacturers." Their progress was hindered by the war, and it was also rumored that they failed to receive the loyal sustained support of their sponsors—a natural result of a loosely combined effort of divergent interests.

Plan Five

Referring to manufacturers' agents, either individuals or commission houses: Certain of these agents believe in carrying only a few lines, and in conscientiously and intensely developing the market for each of these lines. Others continue to acquire additional agencies without limit, sometimes even for competing manufacturers with disappointing and stifling results for some of those whom they are supposed to represent. Much success has attended the honest efforts of many of these commission houses, but it behooves the export manufacturer to familiarize himself thoroughly with the character and activities of the firm with which he proposes to place his agency.

One manufacturer says that he has had experience with American, British and French commission houses, and has found them all reliable; but they move along the lines of least resistance, and he has found it best to go out occasionally to give them his advice and to check up on their activities.

The above is a mere outline of the five plans which have been noted, covering a number of existing arrangements. Further discussion should bring out new and workable ideas subject to the Webb Law, and other recent developments.

Some of the services which your representative may render and the conditions he would encounter in China will now be considered.

Service to Be Expected

When a manufacturer's own representative travels in China, his arrival in one of the outposts is a signal for native dealers to bring out their inquiries covering bills of material for replenishing their stock. These dealers often carry an inventory amounting to hundreds of thousands of dollars, and their purchases are correspondingly heavy. While the representative is in town ready to quote a firm price, good for immediate acceptance, or perhaps prepared to accept a reasonable counter offer, buying by the importers becomes active and very general. During the interval between such visits, the buying in such outposts is likely to continue practically dead for months at a time, even though facilities are always available for transacting business by correspondence or by cable. The presence of a commission house in these outposts does not alter the situation, and the visit of the salesman from a commission house does not serve to start off the game of buying as does that of the manufacturer's direct representative.

In a market like Shanghai, where there is constantly a manufacturer's representative, the buying is also spasmodic. The Chinese in business in any one guild move together. One dealer, recognized as a leader, will place his order and then there will follow a rapid succession of inquiries and orders from the rest of the trade for a week or ten days, after which there will be another period of inaction.

Exchange

It goes almost without saying that your representative will keep in constant touch with you by telegraph, and advise you as to the lowest prices prevailing locally, so that you may trim your sails accordingly; but in the China market he will probably give you some unexpected advantages as a result of "exchange." For instance, the local market for your products might have brought ten taels last week, and exchange would have made this equivalent to ten dollars gold. But the silver tael is a highly fluctuating medium as compared with gold; therefore, today, the ten taels might be equivalent to $10.50 gold. The total market for your goods still remaining at ten taels, you should now secure a price of $10.50 gold instead of ten dollars which you procured last week. Such extra profits go a long way toward paying the cost of your foreign office—a profit which you would not know of except for your own men on the ground.

Just a word of caution as to "exchange." Don't permit your representative to quote or accept orders for shipments based on prices in silver, the local currency. The banks are willing to, and should, finance the importer, and they will make a profit due to the fluctuations in silver; whereas you would be taking long chances of being the loser in this gambling game.

Chinese business may be separated into two very distinct classes—namely, the clean and the tainted transactions. The first group comprises the merchant trade which serves to supply the commercial requirements of the country, and is the lucrative substantial basis of British and American exporting. The native wholesale merchants who constitute the staunch, honorable, intelligent foundation of the Chinese people, are accustomed to negotiate for their purchases directly with the foreign importer or his compradore. Friendship, low prices, prompt shipments and reliable merchandise are the controlling considerations, and there is no occasion or excuse for graft. A certain percentage of the government railway business could also be placed today in this first, or clean group, particularly such as come under British supervision subject to open tender. But, unfortunately, most of the government purchases and those for large corporate enterprises are in the second class, and are tainted with "commissions" and "squeezes." At times it appears that the special purpose for placing the orders is to supply a medium for lining the pockets of the officials rather than for furnishing necessary equipment. Your representative, however, does not need to be involved in any of these shady arrangements. He conducts a clean-cut business with some importer, and the material then passes through various hands before reaching the railroad or other ultimate consumer.

Credit

In matters of terms, Americans have been inclined to demand rigid conditions and "confirmed credits" without due discrimination. This has worked well enough during war times when competitors were few or entirely lacking, and when all conditions were abnormal. But in normal times of keen competition, we should be prepared to accept more commonly the documentary letter of credit with drafts at sixty or ninety days' sight, a form generally allowed by our British friends. They seem to find that the risk is not too great to permit of this form of credit, particularly when the bankers can say of the importer, "He always meets his obligations." This safety lies in the fact that standard goods can be sold in the market at prevailing prices, so that the chances of loss are slight. But this form of credit is not so generally applicable when the goods are of a special nature. This is recognized also by the British producers as well as by the foreign buyers; and for such special materials for which a steady demand does not exist, it is often desirable to have the safer form, namely, the confirmed letter of credit."

In matters of credit, your representative would secure for you much valuable information. He will see with your eyes, and will make specific reports as no one else will, or can. Many of the firms which might act merely as your agents are very chary of such particulars, and consider that all detailed information which they can accumulate about the foreign consumer is their own private property and part of their capital in business.

Specifications for engineering and other materials which are sent home by a manufacturer's agent or commission house are likely to contain conditions impracticable or undesirable for American mills. Upon receipt of them you will probably either turn down the inquiry, saying, "Cannot quote," or else ignore the producer's requirements and quote at considerable expense on your own specification. In either case the business is likely to be lost, together with any future opportunities for tendering. But if your own man is in the foreign field, he will see the purchaser at once. He will explain carefully and courteously the exceptions which you are compelled to take in the specifications, and procure permission in advance for the deviations which you propose to make from the original specifications.

He is there also to combat the tricks of the trade, and when necessary, or when desired by an obdurate official for the sole purpose of "saving his face," he may meet joker with joker. For instance, it might be demanded that the time of delivery in a certain tender must be absolutely and definitely guaranteed under a heavy penalty. But finally, with the manufacturer's representative on the ground to explain the impossibility of such a guarantee, the contract may be worded just as strictly but "subject to railroad embargoes, congested docks, shortage of steamship space, war conditions, and to delays arising from other causes beyond the control of the contractor."

In financing a big deal, the manufacturer's representative occasionally finds an opportunity to assist. At one time, about five years ago, a large tonnage of rails for one of the Chinese government railroads was purchased very quietly, and without the knowledge of some of the rival houses. It transpired later that the British house which made the sale had offered a loan to the government to cover certain new railroad construction which carried with it the privilege of supplying the steel. The material was provided, however, at a low price, and this is characteristic of the British in business, for they are generally honest, reasonable and dependable, and satisfied with taking a small commission. Much of the success of the British is due to the conscientious service which they give.

Many other points might be added with respect to having direct representation for manufacturers in the Far East, which would touch upon such matters as advertising, trade marks, the peculiar demands of each local market, friendly association with purchasers, etc. It is hoped that such points will have full consideration in the open discussion to which this paper is merely introductory.

A shipment of Portland-built boilers for China

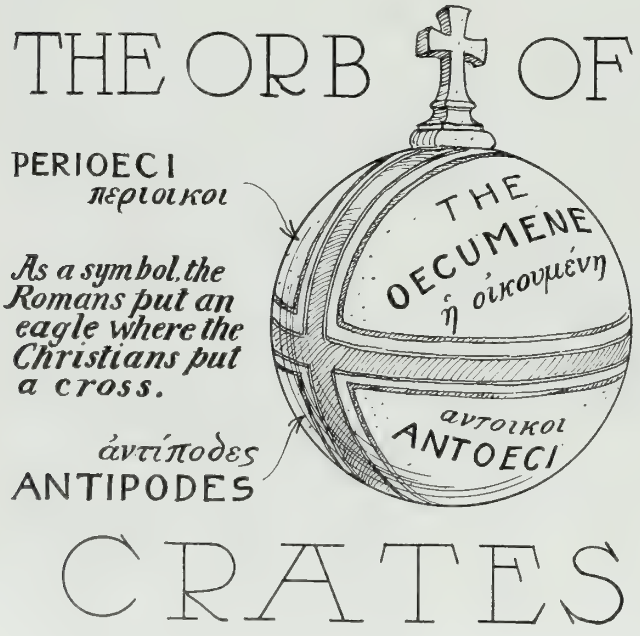
China and the Ancient Oecumene

Geographical Guesses of a Greek Grammarian

By B. J. S. CAHILL, F. R. G. S.

THE time has come when the nations of the world must cultivate neighborliness. Looking across the Pacific, we, the westernmost outposts of the old world culture, at last con front a neighbor from the East that in the past we never knew. And nothing is more remarkable in all history than the absolute isolation of the Chinese who have enjoyed civilization in mass and duration, if not in quality, equally with ourselves. And by "ourselves" I mean the human race as comprised in the Aryan group, which includes Northwest India, Persia, Arabia, North Africa and all Europe. White and yellow civilizations have, as it were, grown up side by side on this planet, and have been, broadly speaking, utterly unaware of one another.

And this recalls the curious conception of the Greeks regarding our earth and its people. Most pictures of kings, temporal and spiritual, show the orb of dominion. This orb is here illustrated and is derived from a model first fashioned by Crates, a grammarian and philosopher of Mallus in Cilicia, who taught geography among other things in the second century B. C. The orb of Crates shows a Greek geometrical conception of the world, which was assumed to be a sphere without any doubt, as we shall see. The civilized portion of the sphere, as the ancients knew it when Ptolemy published his famous geography and atlas (second century A. D.), extended from the Happy Isles (Canaries) to Ceylon, and from Thule sixty three degrees north to several degrees south of the equator. Individual Phoenician traders had gone much farther, but these limits comprised what was known as the "home" of the human race, or the "oecumene" (oikos, a house or home).



In the four-fold divisions of the ancient world China is included in the Eastern half of the Oecumene. As a matter of fact, the Chinese were almost as little known to the ancients as the Perioeci (Americans) , Antoeci (S. Africans) or Antipodeans were. An eight-fold division of the world, made by an extra vertical band, is in better agreement with Greek love of symmetry as well as with the geographical facts eventually established.

Now the orb of Crates is peculiarly divided with a strongly marked horizontal band around the equator and one similar band over the poles, dividing the world into two regions above the equator and two below it. The "oecumene," or home of the known human race, was in the upper division. While the ancients had no knowledge of the other three regions and regarded them as being as inaccessible as the Martians are to us, they nevertheless named their hypothetical inhabitants from their position. Those dwelling in the same parallels of latitude but opposite meridians (North America) were described as "perioikoi," Latinized into "perioeci" (peri, around), and those dwelling under the same meridians but opposite parallels were called "antoikoi"—"antoeci" (anti, opposite). But those dwelling in parallels and meridians that were both opposite were designated "antipodes"—opposite as to their feet—the very word being retained to this day, proof positive that the Greeks conceived the world as a sphere.

The word "oecumene" still lives in "ecumenical," meaning universal, as far as the known world, the home of humanity, is concerned. Hence also is derived the word "economy" pertaining to household thrift, and "economics" the science of world-wide thrift—the one being dependent on the other just as the welfare of any organism is dependent on the welfare of all its small cellular units combined.

Now the whole progress of civilization has consisted in the main of a growth from family to tribal unity, thence to national and again to federal and finally to planetary consolidation—the problem now facing us. This last, of course, is only possible upon the whole world's being explored, exploited and "filled up," as it were—a condition not known among the Greeks, who had to conceive of blank spaces with fancy names for those regions geometrically guessed at but geographically unknown.

Now, if we consider the ancient oecumene, we shall note a western half—all land bordering the Baltic, the Mediterranean, the Red Sea and Persian Gulf—a group of nations, irruptive and dynamic, controlling one another by turn, always tending toward consolidation but never reaching it.

In striking contrast to this kaleidoscopic west, separated by steppes, deserts and impassable mountains, self-contained and static, consolidated from the beginning in spite of irruptions from the outside, unchanging through the ages, lies the eastern half of the Greek oecumene, the ancient empire of Seres or Shin, as China was known by land from Tartary or by water through the Erythrean Sea.

Adam Smith quotes Marco Polo to the effect that China in the fourteenth century was populated to the limit, and there are good grounds for believing that before the Christian era China was as populous as the whole western half of the oecumene combined. The latter peoples, of heterogeneous language and customs, knew each other mainly by strife and mutual conquest, and in the process rose by turns to unimaginable heights of culture or sank to deplorable depths of ignorance and chaos. But in their fierce ordeals of strife and rivalry these nations developed an amazing energy handed down in long succession—Egyptian, Assyrian, Phoenician, Greek, Roman, Arabian, Norman, Venetian, Portuguese, Spanish, Dutch, French and English succeeding one another in world power until finally the surviving five overflowed, annexed, conquered and settled up the remaining portions of the earth not included in the oecumene known to the ancients.

Meantime, the Chinese, with enough enemies to consolidate but not enough to conquer them, by internal traffic over unparalleled waterways, by industry, peace and exclusiveness, built up a civilization of high quality which for endurance and unchanging standards through the entire period of known history is without parallel anywhere on this planet.

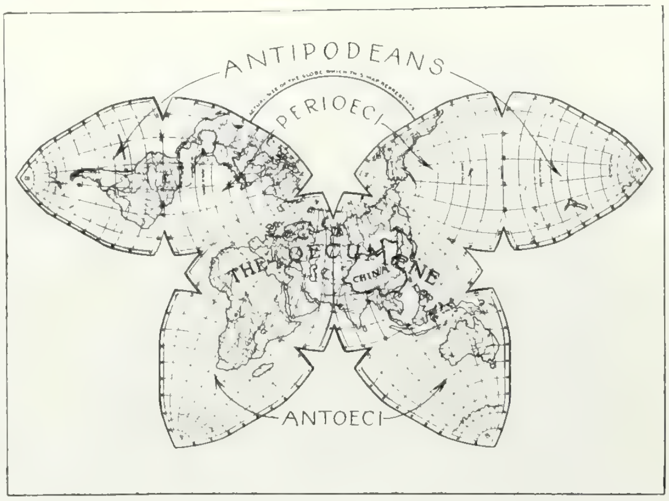
Americans often criticise the English for their habit of building high walls around their suburban homes to secure exclusiveness, but what are we to think of the exclusiveness of this most enduring and populous nation in the world, already supplied by nature with a mountain barrier, going still further and literally building around itself a wall twelve feet thick and twenty feet high, with forty-foot towers every two hundred yards, carried over hill and dale for fifteen hundred miles! This is by far the most stupendous structure ever built on earth by human hands and is the only work of man big enough to be seen from Mars! In fact, a man from Mars of high intelligence and a knowledge of our world's history more unbiased than any of us can hope to attain, might well look on China as the real abode of our world's permanent civilization, regarding the rest of us as devilishly clever but unstable and changeable upstarts who in the end may exterminate each other, meantime bequeathing what we know of science and invention to the more stable, more moral and more permanent people who in their meekness may yet possess the entire earth when we proud whites are gone and forgotten!

Meantime, it remains an amazing but a literal fact that the enormous and ancient China in the mass is almost as isolated and unknown to us as to the ancient Greeks.

This great wall is typical of its immemorial isolation and exclusiveness. There is no known nexus linking up the culture of the western end of the ancient oecumene with China at the east of it. Race, language, art, customs and religion are utterly and entirely different. The ancient Sumerians, the first settlers in Mesopotamia, show a slean-shaven, mongoloid profile that might indicate descent from a common ancestry in Central Asia, people of the great "Heartland" of the world, as H. J. Mackinder calls it, which has since dried up and become a desert. The Chinese may have had these same remote ancestors. Otherwise they are separated from the rest of the world by a solid wall, literally and symbolically.

The ancients, then, should have divided the world into a more uniformly symmetrical figure than the orb of Crates. Another dividing belt through the poles at the center of their oecumene which would have cut off the Chinese or Turanian from the Aryan or classic world, if carried completely around, would have divided the world into eight equal sections, separating the mythical Perioeci, Antoeci and Antipodeans into pairs, as they are actually and geographically separated by nature.

In a forthcoming paper we shall show that the world is actually divided into eight centers of culture instead of four, as the orb of Crates itself would have shown had the Greeks known the actual configuration of the southern continents as we know them today, and had they realized the extent and populousness of the eastern half of their oecumene—an unknown world within their so-called known world.



Map of the world showing that the ancient Oecumene, one-quarter the sphere, was in reality the dual abode of white and yellow civilizations in the West and East and that the other three mythical divisions of the planet were each geographical dualities also, so that the eight-fold divisions of the butterfly map conform much better with Greek geometrical idealism and geographical realities than the four-fold divisions of the Orb of Crates.

Meanwhile, we learn that, owing to the high price of silver, the people of India are developing unimagined buying powers, and actually becoming an importing nation. China, with even greater latent possibilities, may yet prove that the yellow man with white money can after all do big business with the white man with yellow money—and just how big it will be no one just now has any adequate notion.

AVAILABILITY OF CREDIT INFORMATION

(Prepared by the Far Eastern Division, Bureau of Foreign and Domestic Commerce)

THE Far Eastern Division has recently had called to its attention the case of a firm of manufacturers in Detroit who received an order for some goods from a Chinese firm in Penang, Straits Settlements. The firm in Penang gave as their reference two British banks and advised the manufacturers to refer to these banks for their financial standing. The Detroit manufacturers were unable to get a credit rating from either of the British banks' New York offices and advised the Chinese firm to request their bankers to place a report on them with their New York branch. When the matter was called to the attention of the bureau it was immediately taken up with an American bank which maintains a branch in Singapore, and they advised that had the Detroit manufacturer called up his Detroit bank or written to the Bureau of Foreign and Domestic Commerce they would undoubtedly have been given the name of the American banks which specialize in the financing of foreign trade, and which always are ready not only to give exporters credit information from their own files but to explain in detail how the given shipments should be handled.

In this particular case the American bank's New York office had a complete report on the Chinese importer in the Straits Settlements and would have been quite willing to purchase the manufacturer's draft on the merchant.

The river front of the Kiangnan Dock & Engineering Works at Shanghai

Kiangnan Dock and Engineering Works Shipbuilding Program

And Some Remarks by a Chinese Engineer on the Growing Export and Import Trade from Szechuen Province Through the Gorges of the Yangtsze River

SIXTEEN vessels, large and small, are at present under construction in the Kiangnan Dock & Engineering Works, Shanghai. These include four 10,000-ton deadweight steamers, contracted for the United States Shipping Board, and one shallow draft steamer for a local firm, to run between Ichang (a port in Hupeh province, about 400 miles up the Yangtsze River from Hankow) and Chungking in Szechuen province, 400 miles further up from Ichang, to tap the vast resources of Szechuen. This is to state in a nutshell the work the Kiangnan Dock & Engineering Works has at hand.

To begin, we will take the Ichang-Chungking steamer. It is interesting, not because of the steamer itself—there have been a number of vessels of the same type built and most of them by the Kiangnan Dock & Engineering Works—but because of the growing importance of the transportation trade between Ichang and Chungking. A trade developed only recently, it gives promise of requiring many, many more ships to accommodate the large passenger traffic, and to carry to outside markets bristle, hides, musk, silk, Chinese medicines, goatskins, sheep's wool, etc. Much more transportation accommodation will become necessary when the natural resources of the province come to be developed; for then it will require an unlimited amount of machinery and foreign goods. As yet Szecheun is a virgin field, waiting to be developed.

Szecheun is the largest province of China and rich in agricultural and mineral resources, justly called in Chinese history "Nature's Treasure House." It is producing food sufficient to support a population estimated at 50,000,000, and among the mineral products are coal, copper, gold. Petroleum and brine are also plentiful. In the opinion of experts, the region from the Chienchang Valley, through which flows the Anning River on the east, to the Tibetan frontier on the west, and from Tatsienlu on the north to the Chien Sha Kiang (or River of Gold Sand) on the south—a stretch of country covering 40,000 square miles—is without doubt richer in mineral wealth than any other part of China and one of the most highly mineralized spots in the whole world.

Access to Szechuen is, however, most difficult. Shut in by mountain ranges, the easiest access to Szecheun is by the Yangtsze River, which, however, on account of the rapid and treacherous currents, is most difficult and dangerous to navigate. Not until the recent advent of modern shallow draft steamers was it safe to negotiate the Upper Yangtsze, with the current dashing at a speed of thirteen miles an hour. To show the danger of this route, out of 1096 import junks handled by the Maritime Customs at Chungking in 1915, 204 junks were wrecked or badly damaged. The first steamer to reach Chungking was a steam launch in 1898, and the first cargo steamer was the Pioneer; both taken up by that pioneer of Szechuen's foreign trade, Mr. Archibald Little.

The real beginning of navigation of Upper Yangtsze with modern shallow draft steamers, especially constructed for the purpose, took place only in recent years. Among the first vessels to put on the run was the steamship Shutung, built by Thornycroft, England, and assembled in China by the Kiangnan Dock & Engineering Works. Since then, the Kiangnan Dock & Engineering Works has built steamers for the trade for the Standard Oil Company, the Asiatic Petroleum Company, and several Chinese firms, all to the satisfaction of the shipowners and passengers. Such steamers as the steamship An Lan of the Asiatic Petroleum Company and steamship Mei Tan of the Standard Oil Company are making regular runs between Ichang and Chungking.

To march with the development of the Upper Yangtsze trade, larger and faster vessels are required. With these points in view, the shallow draft steamer now under construction is designed to make her the fastest vessel on the trade; no other steamer now on the trade has a speed exceeding 13½ knots, the majority being much under 13 knots. This vessel will be powerful enough to take the middle course of the river, instead of being required to keep in the eddies at the side, as all the other ships operating now are doing.

Of the vessels now under construction in the Kiangnan Dock & Engineering Works, by far the most important ones are the four 10,000-ton deadweight steamers for the United States Shipping Board. These are the largest steamers ever attempted in China. The keels of all four were laid this spring, but no account of transportation difficulties the work was held up by delays in the arrival of steel materials. The frames of the first ship are now up, and those of the second are in the process of erection, while work is progressing satisfactorily on the tank bottoms of the other two. Good progress is also being made in the marine engines and auxiliary machinery—in fact, practically all the auxiliary machinery is completed.

These four ships will be named Mandarin, Celestial, Oriental and Cathay, according to the decision of the United States Shipping Board, to denote the place of their construction. In them America will see for the first time ships constructed in China in accordance with modern science and practice.

The foregoing is in the main the amount and kind of work the Kiangnan Dock & Engineering Works is doing. The schedule is a heavy one, but then the Kiangnan Dock & Engineering Works has recently greatly enlarged and improved its plant, thus doubling its producing capacity, and so it is more than able to handle the work at hand.

The steamers are designed as cargo carriers, each with a deadweight of 10,000 tons and a displacement of 14,306 tons. The dimensions are: 429 feet between perpendiculars, 55 feet breadth molded, and 37 feet 11½ inches depth to shelter deck, with a speed of 10½ knots. They are driven by triple-expansion engines of 2600 I. H. P., supplied with superheated steam from three large Scotch boilers.

The work is in full swing. With at least 60 per cent of the raw materials already here, the dockyard has no fear of being forced to slow down on account of lack of materials. And the weather has also relented, and will most probably stay clear for a good stretch of time ahead.

In the meantime, satisfactory progress is being made in the construction of the engines, parts of which are now being assembled. On the other hand, most of the auxiliary machinery has been finished and is ready for installation any time the vessels are launched. It is conservatively estimated that 45 per cent of the propelling machinery is completed.

Another factor which will materially assist dispatch in the construction of the vessels is the extension and improvement of the dockyard by the erection of several new shops and the installation of the latest labor-saving machines from America. On this account, the Kiangnan Dock & Engineering Works may lay claim to being one of the most modernly equipped shipyards in China. From America the Kiangnan Dock & Engineering Works have bought air compressors, pneumatic tools, electric furnaces, plate rollers, punching and shearing machines, traveling cranes, lathes, drilling and milling machines, etc., which are now filling up the new shops erected to house them.

Finally, mention may be made of the excellent relations existing between the Kiangnan Dock & Engineering Works and the special representative of the United States Shipping Board in the Far East, John A. McGregor, whose headquarters are located in Yokohama, Japan. His technical adviser, J. L. Luckenbach, makes visits to the Kiangnan Dock & Engineering Works to watch the progress and construction. With permanent offices at the dockyard, the local surveyor of the American "Lloyds" is surveying the ships as the construction progresses.

Without doubt, the construction of these four steamers has greatly strengthened the friendship of the two republics on the Pacific. Enlightened people are speaking of it as a concrete example of Sino-American co-operation, which is much desired by them. When these ships, with their Oriental names on their bows, are commissioned, sailing in and out of American harbors, it is to be hoped that they will awaken American interest in China and in Chinese industries, which are emerging into importance in the life of this country.—Millard's Review.

CHINA DISCOVERS AMERICA

Truly representative American news is being distributed in China for the first time in the history of the country. Heretofore the only American European news received in China was distributed by Reuters or by the Germany Agency Ostasiasche Lloyd or by the Japanese Agency Kokusai. In spite of the fact that American news has been made available, the news printed in the Far East has been largely limited to reports of crime and corruption.

During the early months of the war the Committee on Public Information established an American news agency which, though the Chinese people have been led to misunderstand us, leaped into instant popularity. After the armistice, when government funds were no longer available, American business men founded a corporation to maintain the American news agency with private capital. This organization intends to carry out advertising campaigns, to translate and publish American books, collect crop reports and to distribute American seeds to Chinese farmers.—The Nation's Business for November.

River steamer built by the Kiangnan Dock & Engineering Works up the Yangtse rapids

China Wood Oil—Its Production and Preparation

AN interesting treatise portraying the possibilities of China wood oil has been written by D. Y. Lin, M. F., University of Nanking, China, and issued by the Bureau of Public Information, Shanghai, China.

The Chinese wood oil or tung oil is obtained from the seeds of aleurites, a small genus belonging to the spurge family. According to Wilson there are two species of aleurites—aleurites montana and aleurites fordii. These two species for the most part occupy different geographical areas. Aleurites montana, known to the natives as mu-yu shü, meaning "wood oil tree," occurs in South China, common near Wuchow; while aleurites fordii, known as tung-yu shü literally "tung oil tree," occurs in Central and Western China, and is the hardier and more widely distributed of the two. The tung-yu shü (a. fordii) is by far the more important, for it furnishes fully nine-tenths of the so-called wood oil used in, and exported from, China.

The two species of aleurites are different. In aleurites montana the flowers are borne on the current season's shoots at the time when the leaves are expanded. The fruit is egg-shaped, sharply pointed and unevenly ridged on the outside. In aleurites fordii, however, the flowers are borne at the ends of the previous year's shoots before the leaves open. The fruit is flattened-round, apple-like, and perfectly smooth on the outside.

Both mu-yu and tung-yu trees occur abundantly within their ranges. No degree of heat can injure them. They grow luxuriantly in the region of gorges and in hilly country up to 2500 feet in altitude. They are most commonly seen in rocky situations and on the poorest of soils. They withstand drought. They flourish in cold climates and grow as far north as 24 degrees or farther, but often they fail to bear fruit on account of cold.

The wood oil trees are rapid growers, and they reach about twenty feet in height and six to ten inches in diameter. Some are said to reach a much greater size.

The tree is deciduous, shedding its leaves in October and November. The leaves are large and cordate. In March or April the tree blossoms and the flowers, produced in great profusion, are white, stained with pink and yellow markings.

The tree as a rule is a low-growing tree and, because of its stately appearance, with its green and smooth bark and spreading branches, it has been sometimes called the national tree of China.

The wood, whitish in color, is light and soft, but when seasoned is hard and durable and not liable to warp or crack. When large enough it is used for the manufacture of trunks, musical instruments, fine boxes, etc., but as a rule it is used for fuel.

The fruits are green, hidden among the glossy-green leaves. They resemble large hickorynuts and, when ripe, generally in the month of September, they burst open and the seeds fall out. Each fruit contains three to five seeds, which resemble somewhat the triangular Brazil nut in shape and color, but are much smaller.

They are gathered before they are perfectly ripe and placed in iron pans over a good fire and stirred until parched. This opens the husks. The seeds are then extracted and placed in a circular stone trough and crushed by a heavy stone roller drawn by a buffalo. The pulverized mass is then partially roasted in shallow pans and placed in wooden vats with wicker bottoms and a steaming process takes place over boiling water. Next the meal is pressed into cakes. The oil is then collected and slightly heated and, after being freed from sediment, by straining through coarse grass cloth, it is ready for market. The yield is about 40 per cent of the original weight of the kernels. The refuse cakes are used for fertilizer.

China wood oil consists chiefly of the glycerides of oleic and oleomargaric acids. Fahrion claims it contains two or three per cent of oleic acid. It becomes jellified with age. Its specific gravity is higher than that of any known oil except castor oil. It is very poisonous when fresh. Its refractive index is higher than that of any known fatty oil. Tung kernels contain about 53 per cent of oil, but only 40 per cent is secured under the native processes.

This oil is used in China as a paint oil. Native boatmen simply coat their boats with a coarser grade, which gives the woodwork a bright luster and also acts as a preservative. It is also used as a dressing for leather, as a varnish for furniture, for soap making and in the manufacture of lacquer. Large quantities are also used for waterproofing paper, silk gauze, pongees and all kinds of tissues. Chinese inks are made by burning this oil with a regulated amount of air. The fatty acids of the oil have been recommended as a substitute for shellac in the manufacture of spirit lacquers.

The New York Produce Exchange has adopted the following as the basis for character and quality in China wood oil: Prime China wood oil shall be pale in color (according to season's production), merchantably free from roots, dirt and moisture, the total impurities not to exceed 1 per cent; impurities not plainly adulterations up to 5 per cent shall not justify rejection, but allowance to be made by sellers for such impurities in excess of 1 per cent. Prime oils shall show with a Taliabue viscosimeter at a temperature of 70 degrees Fahrenheit from 7.25 upward. The oil is to satisfy the requirements of either the Bacon test or the Worstall test.

It will be seen from the Bacon test that pure oil when solidified gives a product that is pale, firm and free from stickiness. It might be mentioned also that if small portions of it are rubbed in the hand, they should break down completely into a soft, crumbly mass, which should not adhere to the fingers.

China wood oil should not be confused with Japanese wood oil, which differs from the former by its lower specific gravity and its lower iodine value, and does not gelatinise. Therefore, it is not accepted in the trade as replacing China oil.

Practically the entire output of China wood oil is produced in the provinces of Szechuen, Kweichow, Hunan and Kupeh, besides the Kwangsi product. The following table shows a total original export (i. e., combined total export abroad and to Chinese ports) for the whole of China:

Year	Quantity
1914	754,632 piculs
1915	635,728 piculs
1916	806,593 piculs
1917	702,203 piculs
1918	673,141 piculs

A picul is equivalent to 133⅓ pounds.

Hankow is the chief exporting center, shipping in 1918 more than 479,640 piculs of oil, or over 70 per cent of the original export for all China. Wuchow is the only other exporting center of any importance, but in no way rivals Hankow. Other ports which export some wood oil are Changsha, Yochow, Shasi, Ichang and Nanking.

The total exports abroad of this oil from China for 1914 to 1918, inclusive, were (in values expressed in Haikwan taels worth gold $0.62 in 1915, $0.79 in 1916, $1.03 in 1917 and $1.16 in 1918):

Year	Quantity In Piculs	Haikwan Taels
1914	438,867	3,736,275
1915	310,344	3,012,343
1916	515,173	5,511,418
1917	401,361	4,835,908
1918	488,852	5,975,926

It will be noted that China's output has been very irregular and on the whole decreasing, for records in 1912 show 582,815 piculs. This, however, is due primarily to the political disturbances in the producing regions which have been almost continual since the founding of the republic. Changsha has always been one of the leading exporting centers in Central China, but in 1917 and 1918, when she experienced the worst horrors of civil strife, she exported only 15 and 151 piculs, respectively. To this must be added the fact that practically all the European markets have been cut off since 1914.

The countries to which the oil is shipped are the United States, Great Britain, Germany, the Netherlands, Belgium and France. The United States, however, has always been the greatest consumer. Her 1918 consumption figured in gold dollars was more than $5,790,000, or 77 per cent of the total value exported. (This includes the large exportation through Hongkong.)

Year	Total Export	Total Export to U. S. A.	Per Cent of Total Exported to U. S. A.
1914	438,867	265,983	61
1915	310,344	215,921	69
1916	515,173	404,725	79
1917	401,361	301,306	75
1918	488,852	380,436	77

Regarding the price of the oil, this extract, from a report of vice consul of Hankow, in November, 1916, is of interest:

"The Hankow market for China wood oil opened in 1916 at taels 10.20 a picul for approximately $7.65 a picul, or 133⅓ pounds. It remained steady until about February, when political conditions in the region of production caused prices to rise until the maximum of the year, or taels 14 ($10.50 gold) a picul was reached. It then rapidly declined until the latter part of April, when the market value sank to 9.20 taels ($6.90 gold). From May 6 to June 15 the price once more rose to 10.80 taels ($8.10 gold), only to drop again to 9.60 taels ($7.20 gold) in the early part of July. From this point until a figure of 11.40 taels ($8.55 gold) was reached. At present the market price is 11 taels ($8.25 gold) a picul. These rather wide fluctuations were due primarily to unsettled political conditions throughout the country.

"The average price for 1917 was taels 12.47 a picul and that for 1918 was taels 10.17. It is reported that the prices this year have been unusually high. In the month of April it averaged taels 15.20 a picul (this included both packing estimated at taels 1.60 a picul), but by May 31 it jumped to 19.60 taels. It is pretty certain that such high prices will continue until internal peace is established."

CHINA HAS A MARKET FOR AMERICAN GOODS

THE Asia Banking Company has opened a branch office in Canton. This is the seventh office which it has opened in China and the Far East.

J. W. Ross, Canadian Commissioner of Trade to China, considers the most pressing needs of China to be:

(1) Great extension of railway lines.
(2) Government support and instruction in agriculture.
(3) Development, through the help of foreign methods and foreign money, of the mineral wealth of the country.
(4) Establishment of industrial enterprises "of every conceivable kind."

That industrial enterprises are still feeling the effects of the Chinese boycott against Japanese goods is indicated by the fact that Chinese manufactories of boycotted goods are working to capacity without being able to supply the demand. "The Trans-Pacific" for October, 1919, reports that a woolen and hide manufacturing plant has been erected at Kalgan as a result of the boycott. An umbrella factory, capitalized at $200,000, has been erected at Shanghai. Among the ventures discussed in connection with the present movement are plans for the manufacture of stationery, soap, tooth-powder, tooth-brushes, tooth-picks.

Dr. Sun Yat-Sen's long projected plan for the construction of a great northern port is again the subject of much discussion. Dr. Sen's program includes:

(1) The construction of a great northern port on the gulf of Pechili.
(2) The building of a system of railways from the great northern port to the northwestern extremity of China.
(3) The colonization of Mongolia and Sinkiang (Chinese Turkestan).
(4) The construction of canals to connect the inland waterway systems of North and Central China with the great northern port.
(5) The development of the iron and coal fields in Shansi and the construction of steel works.

The carrying out of this program implies state ownership and the help of foreign capital and exports. Although concerted action toward the development of China's resources will naturally await the general ratification of the Peace Treaty, China is believed to be on the eve of great industrial expansion. Th most promising market today appears to be that for American machinery and metal products.

The Pacific Coast's Stake in Foreign Trade

By Hamilton Higday
Trade Promotion Department, Rogers, Brown & Company, Importers and Exporters

A HIGH Japanese official of an important trans-Pacific steamship company stated to the writer a few days ago that the big game of competition is already on between American railways and coastwise ships for the haul of overland freight across (or around) the American continent from Pacific ports of lading to Atlantic coast points of delivery. His own line is already diverting ships to the Panama Canal for the manufactured tonnage produced within a short radius of New York, and for the cotton and Birmingham district steel available with only a short rail haul to New Orleans.

Accordingly, he said, passengers and high-insurance freight would logically continue to route via Seattle. The heavier freight moved over-ocean on regular schedule boats to San Francisco, would transship to or from the coastwise fleet to finish the Eastern leg of the journey; while full Oriental cargo shipments would "bridgehead" on the Atlantic Seaboard direct.

It is, therefore, of great moment for all Pacific Coast ports to pull together, and for foreign traders and commercial organizations in the waterfront cities to turn the searchlight of economic facts and transportation reason upon the official management of the railway.

Considering what foreign trade the Pacific ports stand to hold or to lose, a recently published analysis by W. B. Henderson of the U. S. Bureau of Foreign and Domestic Commerce is instructive. Tables of total values of imports and exports are often misleading in that a port may be important as the **recipient** of large quantities of goods, and unimportant as a **shipping-out** port.

Thus, while New York holds first place in America's foreign trade, having received 44.3 per cent of the nation's imports and handles 46.3 per cent of the exports, nevertheless, the San Francisco Bay and Puget Sound customs districts in comparison with other customs districts of the United States show leadership in a gratifying list of commodities exported.

San Francisco

San Francisco holds **first** rank in the following **exports:**

Soda ash
Dynamite
Steel plates
Brewers' Machinery

San Francisco holds **second** rank in the following **exports:**

Bones, hoofs and horns
Carbolic acid
Aniline dyes
Logwood extract
Formalin
Caustic soda
Collars and cuffs
Switches and accessories
Glue
Belting, hose and packing
Cash registers
Concrete mixers
Wrought iron pipes
Safes
Wire rope and cables
Illuminating devices
Leather belting
Babbitt metal
Motor boats
Musical instruments other than pianos, etc.
Wrapping paper
Perfumeries, cosmetics
Vegetable stearin
Incubators and brooders

Washington (Seattle-Tacoma)

Washington holds **first** rank in the following **exports:**

Bones, hoofs and horns
Copper concentrates, matte and regulus
All bars or rods of steel
Radiators and boilers
Steel sheets
Ship and tank plates
Mutton
Cigarettes
Logs and timber (fir)
Fir boards and planks
Incubators and brooders
Shooks, box

Washington holds **second** rank in the following **exports:**

Sheep
Vehicles and parts of other than specified
All other dyes
Potash other than chlorate
Roots and herbs
Engine boilers
Flour and grist mill machinery
Other woodworking machinery
Wire nails
Wood screws

Coasting steamer being outfitted at the Shanghai Dock & Engineering Company's plant

- Unrefined black, blister and converter copper
- Dynamos or generators
- Fans, electric
- Meters and measuring instruments
- Telegraph apparatus
- Transformers
- Fiber bags
- Herring
- Bar iron
- Bolts, nuts, rivets and washers
- Car wheels and axels
- Chains
- Hoop, band and scroll
- Air-compressing machinery
- Brewers' machinery
- Elevators and elevator machinery
- Electric locomotives
- Gas stationary engines
- Steam stationary engines
- Cast iron pipes
- Rails and steel
- Iron sheets and plates
- Steel plates
- Switches, frogs, etc.
- Tinplate and tagger's tin
- Axes
- Augers, bits and drills
- Files and rasps
- Hammers and hatchets
- Saws
- Wire
- Boots and shoes, men's
- Oakum
- Carbon, bone and lampblack
- Refined paraffin
- Plates and cuts
- Unmanufactured plumbago
- Dried peas
- Wall board
- Wood pulp
- Zinc ore
- Zinc, rolled in strips

Turning the proposition around, the great Pacific Coast ports show up very well in imports when compared with other customs districts of the United States; the data being for the fiscal year ending June 30, 1918.

San Francisco

San Francisco holds **first** rank in the following **imports**:

- Oil cake
- Cocoanut oil
- Spices, unground, cassia

San Francisco holds **second** rank in the following **imports**:

- Rice, paddy
- Rice, cleaned
- Rice flour
- Gambier or terra taponica
- Potash, muriate
- Cottonseed oil
- Rapeseed oil
- Soya bean oil
- Platinum, manufactured

Washington (Seattle-Tacoma)

Washington holds **first** rank in the following **imports**:

- Rice, cleaned
- Rice flour
- Sulphur
- Vegetable oils, China nut
- Cottonseed oil
- Rapseed oil
- Soya bean oil
- Other oils
- Silk, raw
- Wood, logs and timber
- Wood, rattans and reeds

Washington holds **second** rank in the following **imports**:

- Gums, copal, kauri and damar
- Copper ore
- Copper matte
- Copper, unrefined
- Chinaware, decorated
- Earthenware, undecorated
- Eggs, frozen
- Explosives
- Fans, other than palm leaf
- Cocoanut oil
- Tea
- Tin ore
- Umbrellas, parasols, sunshades, etc.

BUSINESS REPRESENTATION IN CHINA

THREE basic elements govern Chinese business—personality, education, and honesty. Regarding the first, your representative in China must be a man of education and tact. The quality of aggressiveness which makes for success in the United States must be toned down in dealings with the Chinese, a dignified race who abhor the breeziness of a certain type of salesmen. On the other hand, they have a profound reverence for a man of learning, and, if he is familiar with their customs, business relations will proceed smoothly and profitably."

Thus the fundamentals of the Chinese character to which the American manufacturer and exporter must adjust their plans if they would sell their products in China, are summed up in a booklet, "Trading with China," issued by the Guaranty Trust Company of New York.

"An outstanding feature in the character of the Chinese merchant is his commercial honor, and he demands an equally high standard from the foreigner," the booklet sets forth. "One deviation from absolute integrity on the part of your representative would probably destroy your business in China. The Chinese merchant is noted for liberality in all his dealings, is tenacious as to all that is material, with comparative disregard for trifles, never letting a transaction fall through on account of punctilio, yielding to the prejudices of others wherever it can be done without material disadvantage. Judicial procedure being an abomination to respectable Chinese, their security in commercial dealings is based as much upon reason, good faith and non-repudiation as is that of western nations upon verbal finesse in the construction of contracts.

"Your representatives should be required to study Chinese, and their progress should be tested by bi-weekly oral examinations and monthly written tests. Those showing aptitude should be encouraged to higher Chinese studies, and, as an incentive to all, a bonus might be given those who, by test examination, show that they have attained a fixed standard. The bonus given by some British firms sometimes amounts to $500.

"While personal contact wilth the Chinese by your representative in the field should be encouraged and facilitated in every possible manner, and the study of the language insisted upon in case of permanent resident representatives, the most important factor of your Chinese business will be the compradore. There is no more remarkable figure in the history of commerce than the 'compradore' of China, who discharges duties of large trust with almost uniform fidelity. In the early days of European trade with China the compradore was somewhat of a combined interpreter and steward, to whom was committed the business of bargaining with the natives on small matters, but by degrees the compradore has grown in influence until now he is practically indispensable.

"Determination of a purchaser's credit is in China well-nigh an impossible task to a foreigner. Of course, prominent, active and honest Chinese firms in the treaty ports have a standing and credit known to all; but when the prospective customer hails from the interior, as is often the case, the fixing of his reliability is beyond the power of the ordinary foreign trader. Because of this situation the compradore exists in all foreign firms in China."

Scotch Boilers Versus Water Tube Boilers for Merchant Marine Ships

By Henrik Greger
Consulting Marine Engineer, New York City

THE question of improvement of boilers for merchant ships has received scant attention in the last thirty years. For the limited number of ships built during that period, builders and operators have preferred to follow established practice, using Scotch boilers, the reliability and safety of which had been proved and with the operation of which their engineers and firemen were familiar, rather than experiment with untried improvements. This tendency has been increased by the disastrous results accompanying several of the few efforts to introduce novel designs of water tube boilers.

The result has been little progress or improvement of design as compared with advancements made in stationary practice during the same period. Within more recent years increased construction and increased competition have resulted in closer attention to highest possible efficiency and greatest saving in weight and cargo space. The first development took place in the larger ships of the navy and in first-class mail and passenger ships, in which weight, space and fuel economy became first consideration. Water tube boilers are now used almost exclusively in the navy, but up to 1914 little effort had been made by water tube boiler manufacturers to offer a boiler for the merchant marine.

When the United States entered upon its extensive shipbuilding program, the standard merchant marine equipment was Scotch marine boilers for about 180 pounds' steam pressure with reciprocating triple expansion engines. Neither sufficient shop capacity or sufficient material was available for the production of the number of Scotch boilers required to keep pace with the rate of ship construction demanded as a war measure. There were, however, a large number of shops building water tube boilers for stationary work. Experience previously gained by these shops in stationary practice and their information, heretofore considered trade secrets, having been immediately placed at the disposal of the government as a matter of patriotism, it was possible to combine all into a new design of boiler eminently suited to marine service and meeting the most rigid requirements of the classification societies. For the 3500-ton Ferris wood ships the Emergency Fleet Corporation designed a complete new water tube boiler of 2500 square feet heating surface which was built by a large number of shops located in all parts of the country under careful inspection and supervision by both the Shipping Board's officials and the classification societies' engineers.

Scotch boilers have become so standardized that the conventional design, shown in Figure 1, is almost universally used.

The water tube boilers can be roughly classed in two types:

A. Single cross drum with straight tubes and headers, such as shown in Figure 2. This design, with slight modifications, is manufactured by the following companies:

Babcock & Wilcox Company, Babcock & Wilcox boilers.
Power Specialty Company, Foster boilers.
Heine Specialty Boilers, Heine boilers.
Ward Boiler Company, Ward boilers.
Wickes Boiler Company, Wickes boilers.

The Emergency Fleet Corporation's standard boiler used on the wooden ships also comes under this class. These types of boilers have been very successful and are used extensively in the new merchant marine.

B. Several manufacturers of water tube boilers have developed a variety of designs with special arrangements of tubes and headers, often using bent tubes. These designs have been made with the idea of increasing the efficiency. Figure 3 gives an example of one of these boilers.

The most important manufacturers of these types of boilers are the:

Badenhausen Company, Badenhausen boiler.
Bethlehem Shipbuilding Company, Yarrow boiler.
Puget Sound Machinery Depot, Scott boiler.
New York Engineering Company, Colvin boiler.
Pusey & Jones Shipbuilding Company, Howden boiler.
Craig Shipbuilding Company, Craig boiler.

Some of these types have proved quite successful; others have had varying success.

Due to the variety of types of water tube boilers which have been made, it becomes essential for the shipowners to use the utmost care in selecting a type which has proved successful in operation. This is a most important point.

During the intensive shipbuilding program of the United States Shipping Board, the following number of water tube boilers were bought, all of which will be in operation in 1920.

Emergency Fleet standard design	994
Babcock & Wilcox	900
Foster	422
Heine	238
Badenhausen	80
Yarrow	64
Ward	48
Colvin	32
Scott	30
Wickes	24
Ballin	20
Howden	16
Craig	4
Total	2872
There were also manufactured	2233
Making a grand total of	5101

In percentage this makes -

For water tube boilers	56.3%
For Scotch boilers	43.7%

The greater part of these boilers have now been in operation for some time and considerable experience has been gained as to form an idea on the relative value between the various types.

From records kept of steel ships delivered, the following boiler troubles were found. These troubles, however, were largely due to very poor workmanship, inexperienced or careless personnel on the ships:

1918—	No. Ships Delivered	Boilers Water Tube	Boilers Scotch
February	16	—	1
March	20	—	—
April	30	—	—
May	40	—	—
June	44	1	—
July	36	1	1
August	41	1	2
September	45	1	5
October	36	2	5
November	54	3	8
December	37	1	8
1919—			
January	17	2	1
February	25	1	—
March	30	1	1
Total	....	13	32

This table shows that during the period in which data was kept, 71 per cent of the troubles were found to be in the Scotch boilers. The boilers received were approximately one-half water tube and one-half Scotch. The results clearly indicate that the Scotch boilers were not constructed with the extreme care necessary, and that the untrained crews, being very careless in starting and in operating the boilers, caused considerable trouble from leaking joints.

At the present writing (in the summer of 1919), there are over thirty ships equipped with Scotch boilers laid up for repairs in New York at an average expense of $1,000,000 per month.

The standard Emergency Fleet boilers installed on the wooden ships, although manufactured in many cases by shops not particularly well equipped for this class of work, not having marine experience, have been successful. Practically the only change made after the original design was an alteration of the baffling.

It is well known that the weights of boilers of the same capacity vary, the excessive weight of the Scotch type being due to the large diameter shell with consequent heavier plates. Below is given a comparison of weights:

	Scotch	Water Tube
Heating surface, square feet	2,500	2,500
Weight of metal, pounds	110,087	45,991
Weight of brick work and baffles, pounds	....	15,160
Weight of covering, pounds	5,364	840
Weight of water, pounds	45,048	17,000
Total	160,499	78,991

These weights do not include heated forced draft apparatus and its air tubes for the Scotch boilers nor the induced draft for the water tube boilers, consideration of which places the Scotch boiler at a still greater disadvantage.

The relative cost of the two types is approximately proportional to their weights. At present labor and material prices, the cost of the Scotch boiler may be estimated at $10 per square foot heating surface and water tube at $5, the difference being widened by the fact that internal fittings for Scotch boilers are not included in the figure mentioned.

The capacity of Scotch boilers is limited by the amount of grate surface and furnace volume which can be installed. Water tube boilers usually have 50 per cent more grate surface and 100 per cent more furnace volume than Scotch boilers of a corresponding size, thus making possible the use of low-grade fuel. With the 3500-ton Ferris wood ships this advantage has been amply demonstrated. Many ships are operating on the Pacific Coast with very low grade coal with no difficulty in maintaining ample steam.

When using oil fuel the capacity of the boiler depends largely on the furnace volume and the number of oil burners used. The increasing use of oil-burning cargo ships makes this advantage of water tube boilers of increasing importance.

There is given below the average results taken from a few of the many recent lists showing the high efficiency of water tube boilers.

Coal-firing water tube boilers of the cross-drum type, heating surface 3050 square feet, superheating surface 338 square feet, grate surface 65.8 square feet, on the average of twelve tests with the steam pressure of 205 pounds, with 55 degrees superheat, the following efficiencies were obtained:

Based on coal as fired, per cent	73
Based on dry coal, per cent	75.55
Based on combustible, per cent	75.3

For oil an average of thirty-one tests with 190 pounds steam and 55 degrees superheat showed an overall efficiency of 78 per cent.

There are no recent available tests on Scotch boilers. The United States Shipping Board is planning to make elaborate tests of a 15-foot 3-inch diameter Scotch boiler with three furnaces, within the next three months, and as soon as the data of these tests are available relative difference in economy can readily be determined. In general experience it may be said that in regular ocean service water tube boilers will average about 10 per cent greater efficiency than Scotch.

A few years ago the Morgan Lines operating from New York to Galveston built two identical ships with the exception of the boilers. One ship was fitted with six large Scotch boilers and the

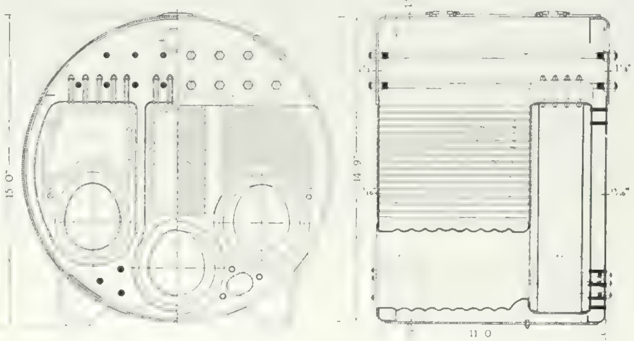


Figure 1

other with ten Babcock & Wilcox water tube boilers, both coal burners. Records kept during a five-year period showed the ship with the water tube boilers used 15 per cent less fuel, partly due, however, to the higher steam pressure carried in the latter.

Aside from the matter of efficiency, several points of comparison are important and several precautions must be carefully observed in order to obtain satisfactory results from either type:

Air Leakage.—Scotch boilers, being internally fired, air leakage is not likely to occur. Unless limited to a minimum, air leakage in externally fired water tube boilers may occasion reduction of draft and cooling of the gases, with consequent reduction of steam capacity and failure to preheat air and feed water. Ordinary care, however, in this respect will prevent any loss of efficiency.

Furnaces.—While Scotch boilers, on account of the shape and restricted size of their furnaces, are more easily fired; the advantages of the greater width and depth of the water tube furnaces more than counter-balance the additional care required in firing. Furthermore, the reduced length of the Scotch boiler, furnaces and tubes makes heat absorption difficult, a fault that can be corrected only by resorting to retarders, thus introducing the liability to clogging around the tubes. Marked success of underfeed mechanical stokers in stationary practice has directed attention to the development of similar stokers for marine service. While no marine design is yet on the market, the problem will undoubtedly be satisfactorily solved for water tube boilers. Application of the underfeed stokers to Scotch boilers is of course out of the question.

Scotch boilers have been held in esteem by engineers because of the large volume of water contained ready for steam the moment greater demand is made for increased power. This is a reserve against fluctuations of pressure in operation. Water tube boilers have from one-third to two-thirds of the water contained in corresponding Scotch boilers, and it is therefore necessary that a closer watch be kept by the water tenders. Some manufacturers of the water tube type, recognizing the value of this "reservoir of power," have, by using so-called "water legs," been able to overcome this important objection.

There is a persistent demand for higher steam pressure and superheat to obtain greater economy, prompted largely by the desire of builders to improve designs so as to compare favorably with the economy obtained by Diesel engines. The construction of the water tube boiler makes it possible to build for extreme high pressure and superheat without sacrificing safety. The Scotch boiler, with its large diameter and flat surfaces, cannot be successfully built for more than 225 pounds' steam pressure.

The sea is a poor place for brick work. For this reason Scotch boilers have a distinct advantage over the water tube type, which requires a lining of fire brick. Efforts are being made to minimize this fault. Baffles, which were originally always tile, are now being made of steel or cast iron. Manufacturers are endeavoring to develop a lining material which will give reliable service at sea.

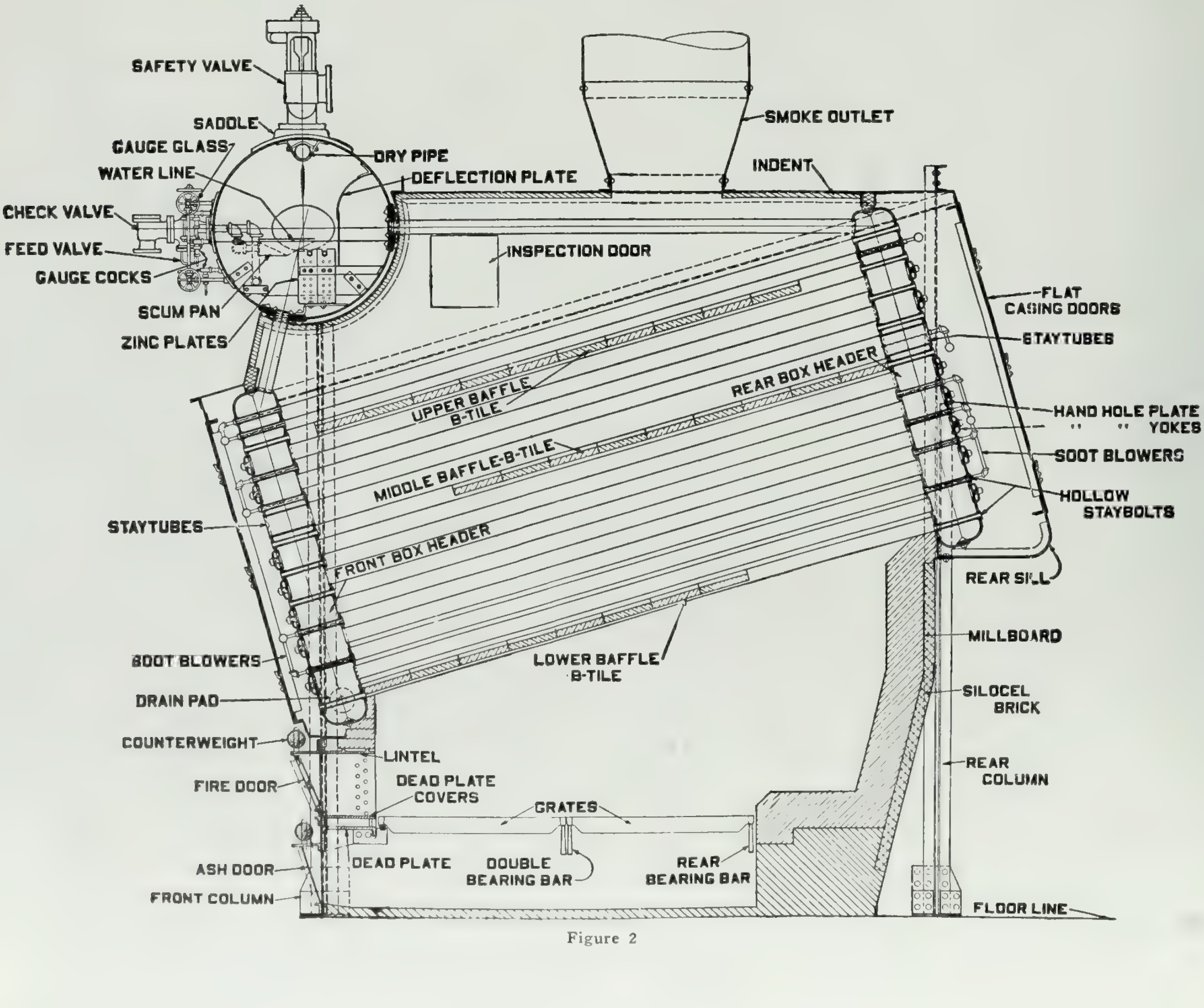


Figure 2

Starting of Scotch boilers must be slow, with careful firing, in order to start circulation without disastrous consequences to the boiler. Rapid starting has often caused serious leaks, involving expensive repairs.

The water tube boiler with its small amount of contained water, small steam space and small disengaging surface, has a rapid and positive circulation which makes it possible to raise steam quickly without causing any trouble.

Dryness of Steam

The Scotch boiler, when properly designed and operated, gives dry steam, even when heavy salted through leaky condenser or poor operation of the evaporator. This feature has been one of the valuable points in favor of the Scotch boilers. The water tube boilers, of an improper design or carelessly operated, will easily cause priming, especially when salt water is admitted to the boiler. The successful water tube boiler manufacturers have provided against priming by installing restricted dry pipes, giving an outlet steam velocity from the boiler of from 6000 to 8000 feet without any appreciable pressure drop. There is no remedy, however, against damages caused by salt water for successful operation; it is essential that the condenser be carefully packed and the evaporator carefully operated. The operating crew must, by frequent testing, be sure that the water is free from salt.

Scale and Oil

The scale-forming matter aboard a ship is due to sea water and, as previously stated, the Scotch boiler is at a decided advantage in this regard. The water tube boiler can operate with a moderate amount of oil in the feed water; excessive amounts of oil, however, will cause serious damage in either type of boilers.

First-class operation of the boilers will remove these causes by preventing the admission of either salt water or oil.

Repairs

The usual repairs to marine boilers are nearly all made in port. The only repairs of importance that can be made at sea is the plugging of a tube or a number of tubes. This temporary repair can be made more readily with Scotch than with water tube boilers. In the latter case it is generally necessary to draw the fires and put one boiler out of commission while plugging the tube. Ships from 3000 tons up are usually equipped with two or more boilers and with ample capacity for overloading; one boiler temporarily under repair occasions no serious delay to the ship.

Well-built water tube boilers should require only retubing. Present-day steamless steel tubes of ample thickness, such as are used by all first-class boiler builders, have greatly increased the length of service. Repairs to the Scotch boilers are costly. In addition to the replacement of the tubes frequent leaks develop, requiring welding and caulking. The large number of water tube boilers being installed on American ships will soon develop a great number of men acquainted with the boiler and, as a result, due to the interchangeable aspect of sea-going ships, this knowledge will soon be available for the foreign operators.

Conclusion

Scotch boilers, because of their universal use and their reliability, safety and ease of operation, are held in marked favor by the older marine operators and will not be discarded until a type of boilers is offered having not only an equivalent reliability and safety but a greater economy. Water tube boilers are fast proving themselves able to fill these requirements, with an additional advantage of less weight and lower first cost. However, in view of many previous failures experienced with novel types of water tube boilers, builders and owners must discriminate carefully between designs offered.

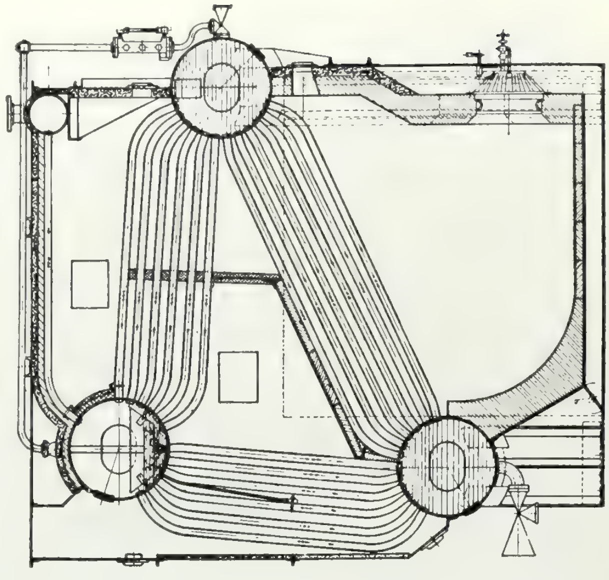


Figure 3

One example of water tube boiler operation is worth mentioning. The steamship Northern Pacific, fitted with water tube boilers using oil fuel, steamed over 250,000 miles between San Francisco and Portland without any boiler repairs whatever. In 1917, when being refitted as an army transport, the front row of water tubes were replaced at an expense of less than $1000, and no further boiler repairs have been made to date. This ship has the record of the fastest round trip from America to France, unloading her troops at Brest and starting upon the return voyage in less than two hours after docking. This ship, originally called the Palace of the Pacific, has been renamed the Ferryboat of the Atlantic, because of her wonderful speed record during the strenuous days of the war. She outstripped every transport in the service, including the vaunted Leviathan.

DUTCH EAST INDIES

A MOST favorable opportunity for gaining a foothold in the markets of the Dutch East Indies will present itself in May next year, when a fair is to be held in Bandoeng, which is two hours by rail from Batavia, Java.

American manufacturers should not overlook the fact that the population of the Island of Java alone is 30,000,000. The classes of goods which would find a ready sale are: Motorcars, cycles, lorries and vans, motorboats, oil mill and sugar mill machinery; engines of all kinds, especially engines which can use petrol, petroleum, or petroleum residue; civil and sanitary engineering requisites; electric lighting, etc.; planting requisites and articles for native use; hollowware, boots and shoes, mining requisites and portable railways. American manufacturers should certainly avail themselves of this opportunity and make a good display of American manufactures.

Mr. Asano's Industrial Chain

Soichiro Asano, President, Asano Shipbuilding Company

IT was only a few years ago that the name of Soichiro Asano was familiar to Americans, principally because of his control of the Toyo Kisen Kaisha, the trans-Pacific steamship line. Today his name is known more widely because of his organization of a chain of more or less allied industries.

At the remote end lies the smelter at Kokura, near Moji. In addition to casting steel ingots, some wire is manufactured there. Next comes the Nippon Kokan Kaisha, near Tokyo, in which the Asano interests are large. This can roll small sections, the larger still coming from America. Beyond the Nippon Kokan Kaisha is the Asano Steel Company's mill, at Tsurumi, between Tokyo and Yokohama, and immediately adjoining it is the shipyard. If one were to look out to sea from the yard and mill, he might find a Toyo Kisen Kaisha steamship, the last of the links in a remarkable industrial chain.

Thus the Asano interests are somewhat self-contained; somewhat, but not to a degree to make any single industry independent of the outside world. How to get iron ore is a perplexing problem in Japan, which explains why the steel mill cannot get enough ingots to run to capacity, and its utmost output would not equal the demand of the shipyard at full speed. If it were to work two ten-hour shifts a day, it could roll about 200 tons; however, its average daily output is some seventy or eighty tons instead. There is one roll which can turn out plates of a maximum width of ten feet, ranging in thickness from three-tenths inch to two inches. The mill employs about 350 men.

Quite dwarfing the rolling mill is that eight-way shipyard a few hundred feet away. As it stood the first of June, it was well-nigh completed, except for the boiler shop, which should have been in operation in 1918, but which was delayed month after month by the lack of machinery from the States, until finally the equipment was ordered in Japan. Mr. Asano originally planned two more ways. These will not be built; neither is there any present intention to install an engine shop, so that, by the time this is published, the yard will have been completed, although there are plans for two dry docks at Yokohama.

Mr. Asano began the organization of the shipbuilding company in April, 1916. For several months thereafter the Japanese newspapers frequently mentioned the difficulty he was having in securing rights on the harbor; at length, in July, 1916, he was able to begin work, which meant the reclamation of 240 acres of land at Tsurumi, near Yokohama, and the erection of ways and buildings and the creation of a fitting-out basin. All the yard's land was reclaimed by suction dredges. The first keel was laid in February, 1917.

In July, 1917, the first vessel, the Hakushika Maru, of 8200 tons gross, 11,000 deadweight, was launched. At that time, three ways were in. These have grown to eight, all of concrete on wood piling, two being 625 feet long and capable of elongation to 800 feet, and six 600 feet long. The eight have an annual capacity of some 200,000 deadweight tons. The largest vessel that could be constructed would be of about 30,000 tons gross. Negotiations under way for rights in Yokohama harbor for two drydocks were expected to be consummated in June. Tentative plans for these docks gave the following dimensions: 700 feet long by 90 by 29; and 450 feet long by 80 by 26.

To serve the eight bulding ways there are twelve fixed tower cranes, all of six tons' capacity—an apportionment of three cranes to each two berths. There is one 30-ton floating crane, and an 85-ton wharf crane at the outfitting basin for handling engines and boilers. All these cranes were made in Japan by the Ishikawajima Shipbuilding Company, Tokyo. Five traveling cranes also were of Japanese make. Lastly, there are five locomotive cranes.

The Asano yard has drawn on America for some of its equipment. There are three Ingersoll-Rand air compressors. The electrical equipment and the pneumatic hammers are largely American; as for the remainder of the machinery, it is almost exclusively Japanese—scarphing, drilling, punching, shearing machines and bending and joggling rolls.

Five or six boilers a month will be the maximum to be expected of the boiler shop. This number will be the approximate need of the yard, allowing it an average of a launching each two weeks. In respect to engines, the Asano yard relies upon outside shops, the Kubota Engine Works of Osaka having supplied machinery for the "C" type vessels. None of the large forgings and castings,

S. S. Kaikyu Maru on her trial trip. This 13,117 ton d. w. cargo steamer is of the "C" type, two of which are building at the Asano yard for the United States Shipping Board

stems, stern frames, and so on, are made at the yard. About 4000 men are employed.

The two 12,600-ton vessels building at the Asano yard for the United States Shipping Board—the Eastern Merchant and the Eastern Trader—probably will have a deadweight capacity in excess of that rating, if the yard's experience with a sister of these ships is a criterion. This vessel, the Kaikyu Maru, built for the Katsuda Kisen Kaisha of Kobe, delivered May 27, was 13,117 tons' deadweight capacity. She made 15.77 knots on her trial, this being the mean of six runs over a course of 2.8 miles. Her loaded sea speed will be closer to twelve knots, however, according to the estimate of K. Kageyama, manager of the Asano yard.

These "C" type vessels, as the three are known, are 445 feet long, 58 beam and 40 feet deep to the shelter deck; twin screw; have four Scotch boilers and triple-expansion reciprocating engines.

The "A" class ships of 11,000 tons are of precisely the same general design and size, but the "C's" were given a lower freeboard and deeper loaded draft, because of a change in framing, and in this manner gained 2000 tons. Six of the "A" vessels have been launched.

The keels of the two Shipping Board vessels were laid April 21 and May 1. The launchings of both may be expected in August, with delivery at a United States Pacific port within a short time thereafter.

There remain two other types of Asano vessels to be considered—the "B" and "D." The former is 400 feet long, 53 beam, 32 deep to the upper deck, and has a deadweight capacity of 8800 tons. They have only one propeller, three Scotch boilers and triple-expansion engines. Six of these have been launched, delivery of the last having been made May 30; one more is building and the keels of four others remain to be laid, which probably will have been done prior to July. All the vessels are coal burners, but those built at the Asano yard, as well as elsewhere in the Orient, can be changed to oil burners with little trouble upon their arrival at a coast port.

Designed for the Japanese coasting trade primarily, and admittedly unsuited to overseas voyages, no more of the other class, the "D," are being built. Four of them were completed, three of which, with two "B" vessels, were owned by the Asano yard and under charter in June.

The status of building at the Asano yard early in June was: Seventeen vessels delivered—six "A," six "B," one "C" and four "D," in addition to one small tug for Asano use; three vessels building—two for the Shipping Board and one "B" class; and four keels still to lay, these last also being "B" vessels.

Ready for Launching

Waiting for the whistle outside the gate of the Staten Island Shipbuilding Company

Pioneer Steel Shipbuilders of New York

ON a recent trip to New York, our representative visited the Staten Island Shipbuilding Company, one of New York's oldest established shipyards, and incidentally New York State's pioneer steel shipbuilders. This yard is especially fortunate in its equipment, which is so complete that the company does not depend upon any outside assistance in the fabricating of a ship.

The company has three separate plants. The one at Port Richmond, Staten Island (known as the lower yard), takes care of a vast amount of repair work of every description. Here, also, are the machine shop and brass foundry. While this yard must not be confused with the larger one a short distance from it, it is a complete plant in itself, with the exception of the boiler department and the iron foundry.

The upper yard, at Mariner's Harbor, Staten Island, though it does a large amount of repair work, is devoted mostly to the fabricating of new ships. This yard extends over many acres, has four concrete ways and additional space for the building of small vessels. A brief description of its big modern shops will be of interest.

The foundry is but a few hundred yards distant from the Mariner's Harbor yard.

Machine Shop

This department is always working at full capacity, and both day and night shifts have been working for years. Plans are now ready for the erection of a shop twice the size of the present one. This new shop will be erected at the Mariner's Harbor yard, between the office building and the auxiliary boiler shop.

At present the equipment of the engine-making department includes twenty drill presses, twenty-nine lathes, seven boring mills, five shapers, one ten-inch hydraulic press of 250 tons' pressure, seven turret lathes and seven milling machines, and a great number of lesser machines.

Power Plant

While the power plant of the lower yard is equipped with producer gas engines, built by the Staten Island Shipbuilding Company, power is also supplied to the upper yard by the local railroad company, at 6600 volts, which is transformed by several 5000-kilowatt transformers to approximately 440 volts and 220 volts for generators, electric outfit, etc. The horsepower used is in the neighborhood of 2000. There are two 200-horsepower generator sets, one an Allis-Chalmers direct-current 220-volt 600-ampere generator, driven by a 225-kilowatt motor; the other a Westinghouse 220-volt 250-ampere installation. The pneumatic equipment in the shops and on the ways is supplied by four compressors. The boiler shop is supplied with a 9-inch by 8-inch high-speed compressor, made by the Chicago Pneumatic Tool Company. This supplies a pressure of 120 pounds. Three Worthington compressors, one with a capacity of 4200 cubic feet per second, and two with a capacity of 1600 cubic feet per second, supply the pipe lines with 100 pounds' pressure.

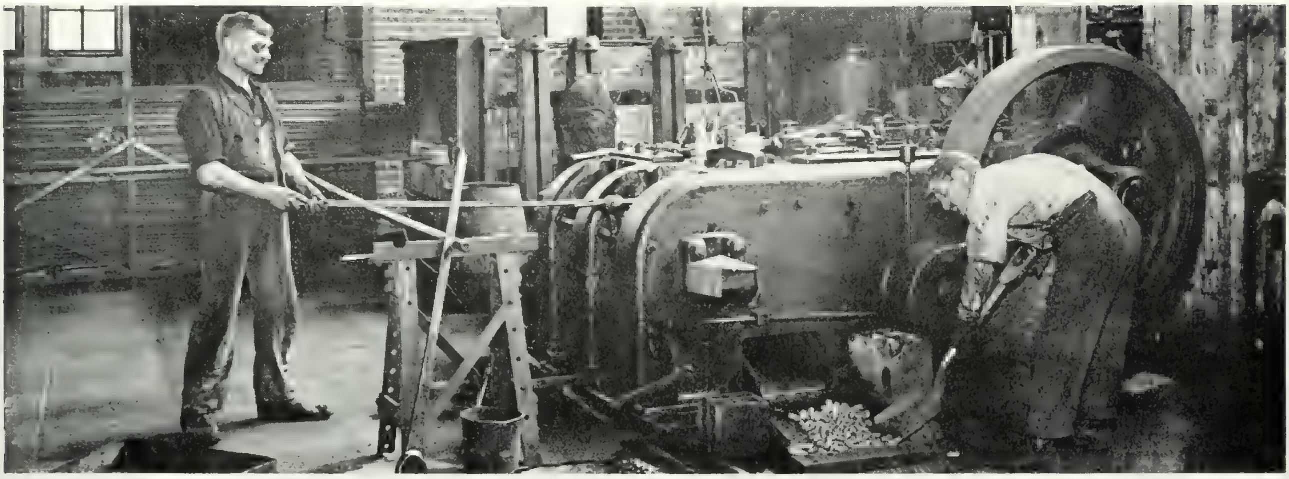
Plate Shed

A 50-foot addition has been made recently to the plate shed, making its dimensions 200 feet by 60 feet. Tracks make the shed accessible from all parts of the yard. The machinery is modern and ample to care for any amount of work upon the ways, or boats being repaired at the upper yard. There are five punches in the shop; a Long & Allstatter horizontal punch is used for the heavy work; a Cleveland 3-foot 8-inch gap punch for ¾-inch plates; a Hilles & Jones 3-foot gap for ⅝-inch plates; a Hilles & Jones 4-foot 6-inch gap and several other smaller Hilles & Jones punches.

The shop also includes a specially made rotary cutter, capable of handling ¾-inch material, a product of the Quickwork Company. There are also a Long & Allstatter and a Hilles & Jones shears. A Possil Works 1500-pound hydraulic bending and joggling machine is capable of bending plates and angles of ¾-inch thickness. There are also two plate planers, one a 22-foot Niles-Bement-Pond and the other a 25-foot Hilles & Jones. There is a set of adjustable Niles Tool Works rolls, capable of handling all steel used in ship construction. Several countersink drills, made by Dietrick & Harvey Machine Works, one Fitchburg Machine Works drill and two drill presses are also in use. The rest of the machinery includes a Gould & Eberhardt shaper, a special plate-scarfing machine, a Lambres hydraulic flanging press, a 5-ton Pawling & Harnischfeger crane and eight 3-ton jib cranes.

Ways

The construction of the ways embraces all the latest improvements. They are four in number and are constructed of reinforced concrete, 400 feet by



Rivet-making Machine and Furnace, Staten Island Shipbuilding Company

60 feet, and built for the construction of ships up to 10,000 tons or more. Between each of the ways are eight derrick towers 50 feet in height. Each tower has four 5-ton electrically-operated derricks. Under the ways, rooms for the checking of pneumatic tools, storing of rivets, etc., and foremen's offices have been located.

Boiler Shops

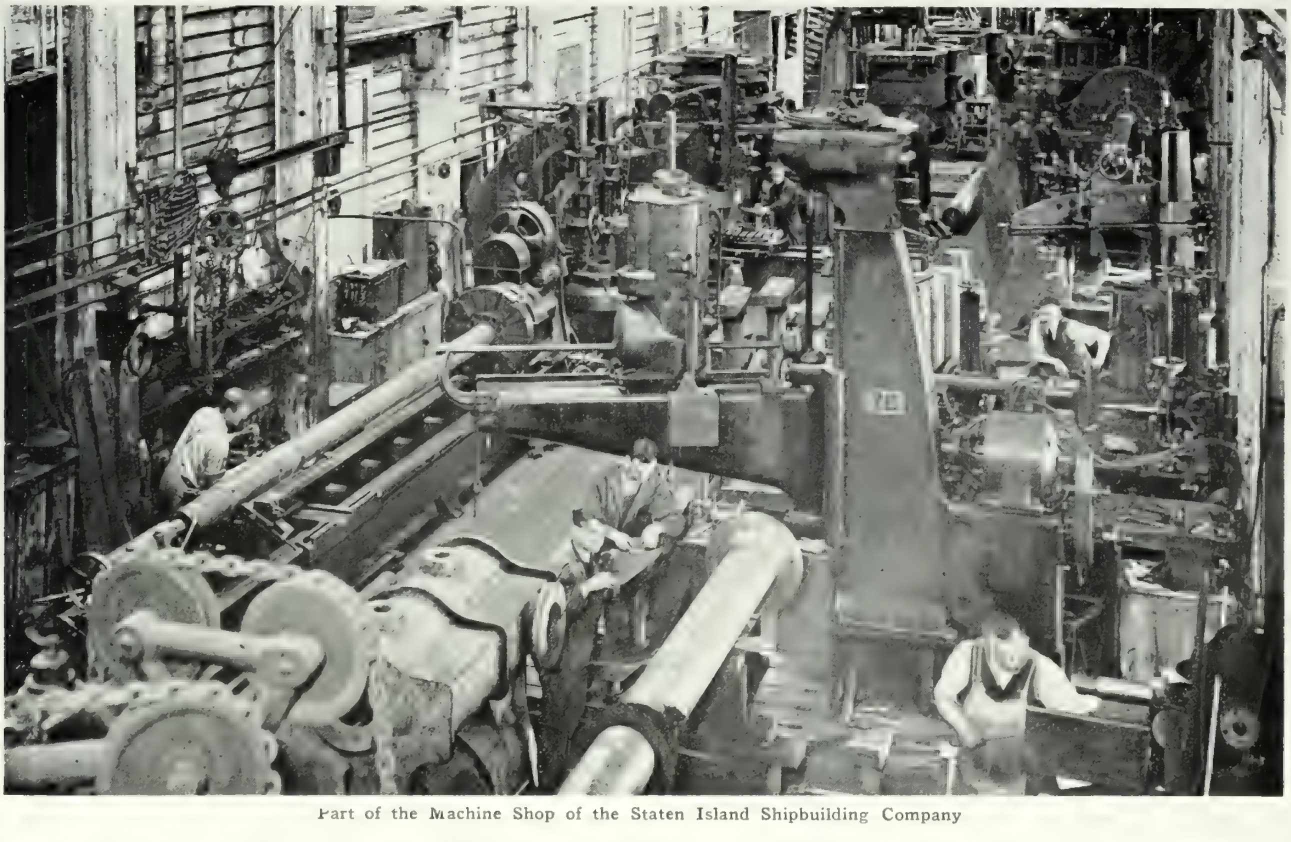
One of the features of the Staten Island Shipbuilding Company is its boiler department. This department is housed in two brick and steel buildings, the larger shop being devoted entirely to the construction of boilers of any size, as well as tanks, while the auxiliary shop is utilized in building uptakes and funnels. The main building is 250 feet by 60 feet and has an extension on one side for flange heating, 40 feet by 60 feet. Part of one of the walls is built of tile, so that an extension can be built connecting it with the proposed new machine shop.

Due to the great demand for boilers and stacks, additional facilities for their production became necessary, and another building, designed as an auxiliary boiler shop, was built. This building is constructed of steel and brick and is 40 feet by 200 feet in dimensions. It is provided with a 10-ton electric traveling crane and all other necessary equipment. At the present time stacks are being built here, the amount of boiler work filling the capacity of the larger shops.

It has become necessary for the Staten Island Shipbuilding Company to work both day and night shifts in its boiler department, which employs over 150 men.

Boiler Shop Equipment

The principal machines used in the shop are: One Morgan 100-ton flanging press; one Morgan 100-ton 12-foot gap hydraulic bull riveter; one Morgan 100-ton 6-foot gap hydraulic bull riveter; one 8-foot radial Ridgeway drill; one 6-foot radial Ridgeway drill, manufactured by the Niles-Bement-Pond Company; one 21-foot Niles-Bement-Pond plate planer; two Garvin turret lathes; one Hurlbut-Rogers staybolt cutter; three Acme screw ma-



Part of the Machine Shop of the Staten Island Shipbuilding Company chines, all of which are double type; one 1500-pound pressure hydraulic accumulator, built by the Staten Island Shipbuilding Company; one Milwaukee 20-ton traveling electric crane; one 2-hook Pawling & Harnischfeger crane, with a capacity of 75 tons on one hook and 35 tons on the other. This crane is the largest traveling electric crane near New York. Tracks run through the center of the shop, connecting on each end with the yard railroad system.

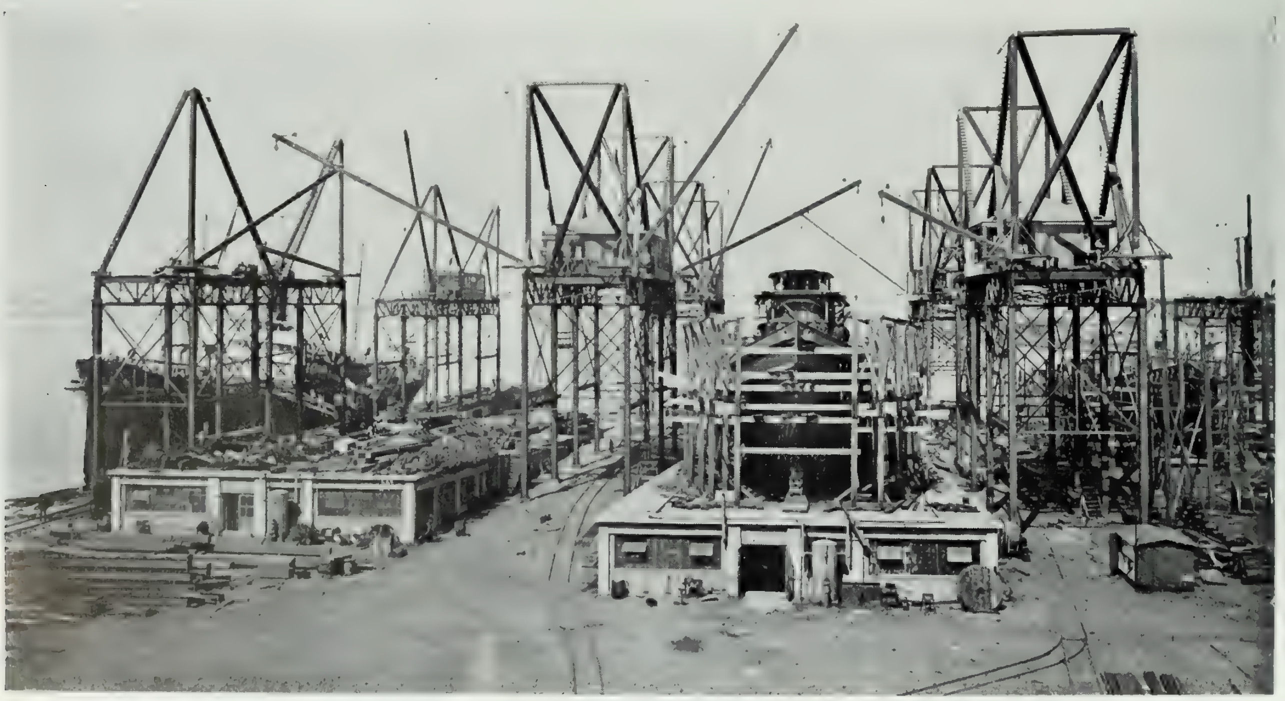
Angle Shed

The angle shed is large enough to supply the maximum needs of the yard, which at times are heavy. It has two brick furnaces, supplied by the Quigley Furnace Specialties Company. They are used for plate and frame heating. The plant furnace is the larger of the two, and is 13 feet by 30 feet. The angle furnace is 2 feet 6 inches by 66 feet. The equipment also includes an Acme rivet-making machine for making rivets of different sizes; a Quigley bar-heating furnace to supply the rivet-making machine; a 22-inch Hammond double-chamber furnace; four pneumatic hammers, one of 1000 pounds and the others in graduated sizes; one electric Porter & McDougal trip hammer for plate liners; and an auxiliary blacksmith shop. The principal blacksmith shop is situated at the Port Richmond yard. Both the electric and oxy-acetylene processes of welding are used.

Foundry Department

The Staten Island Shipbuilding Company's foundry is said to be one of the best equipped of its size in or near New York. It is situated but a few hundred yards from the Mariners' Harbor yard. The foundry comprises a group of substantial buildings of concrete and steel construction, and covers a considerable area of ground. The buildings and their equipment are of the latest designs, embodying all the most recent improvements. The pattern shop employs a number of highly trained pattern makers. One of the essentials when employing men for the pattern shop is that they must have served an apprenticeship as a molder as well as a pattern maker. There are also a large molding floor, core rooms and casting floors. In the warehouse are stored about 30,000 patterns, valued at several millions of dollars. These patterns include not only those used for marine work, but for other industries as well. Castings of twenty-five tons or more can be turned out. The capacity of the foundry is about fifty tons per day, although during the war a vast amount of tonnage was turned out daily. The Staten Island Shipbuilding Company makes all its own castings, besides supplying a great many other concerns, among them being the Barret-Nephews Company, Bayonne Bolt & Nut Company, E. W. Bliss Company, Brewer Dry Dock Company, G. H. Breymann & Brothers, F. B. Dalzell & Company, H. Dubois & Sons Company, Downey Shipbuilding Corporation, Charles Durkee & Company, H. S. Farrel Company, The Foundation Company, Gas Engine & Power Company, H. S. Griffin & Company, Inc., Providence Engineering Corporation, J. D. Hart Company, Ingram-Hatch Motor Corporation, Inter-Borough Supply Company, Johnson Shipyards Corporation, National Lead Company (Jewett Works), Johnson Iron Works, Ltd., J. B. King & Company, Charles S. Linch, Inc., Messrs. King & Witherspoon, Knowlson & Kelly Company, Lincrusta Works "Pallas," Inc., the Italian government, the Spanish government, Maintenance Company, F. McWilliams, Inc., National Dry Dock & Repair Company, Inc, New Jersey Dry Dock Company, Providence Steamboat Company, Potter Transportation Company, Raymond Concrete Pile Company, Rice Brothers Company, James Shewan & Sons, Todds Shipyards Corporation, Staten Island Rapid Transit Railway Company, M. & J. Tracy, Inc., Unexcelled Manufacturing Company, Verdon & Company, Inc., Vulcan Iron Works, Inc., Emergency Fleet Corporation, United States Navy, French government, R. H. Wager, G. H. Watters, Lighthouse Service.

Propellers up to twenty-four feet can be turned out. Two electric traveling cranes are used in handling castings on the molding floor, one a 15-ton Milwaukee and the other a 10-ton Whiting. The side floors are supplied with electric 3-ton



Shipbuilding ways and crane towers of the Staten Island Shipbuild ing Company. Note the solid concrete way foundation with storeroom space beneath

Roper & Brownhoist hand-operated electric cranes. In the main bay are two 2-ton Yale & Towne jib cranes. The clearing department has one 4-ton crane and the core room one 2-ton Brownhoist. The 10-ton locomotive cranes are used in the yard.

Both Ingersoll-Rand and Cleveland Pneumatic Tool Works pneumatic hand rammers are used in making molds. The molding room contains two sand mixers, one an electric-driven Lystone and the other a belt-driven Willoughby machine. There are two core ovens, one a slide drawing oven 25 feet by 10 feet 2 inches with a bottom draft, flue and duct around the firebox, the other a 25-foot by 17-foot oven. The core room has two sand mixers, one an electric-driven Lystone and the other a belt-driven Willoughby machine. All castings are cleaned in a room twenty feet square, with walls, ceiling and floor of concrete. A Paxson & Warren sand blast and exhaust system are used.

There are two cupolas—one, a No. 6 Whiting, and the other a No. 3 Whiting.

Part Played in the War

Since April, 1917, the Staten Island Shipbuilding Company has laid the keels of twenty vessels of different types. This work was carried on at the Mariners' Harbor yard. The boats included six cargo ships, originally intended for the Cunard Line, but commandeered by the Emergency Fleet Corporation when the war broke out. These vessels were of 3500 tons' capacity. They were 276 feet 6 inches long over all, 42 feet beam, 24 feet molded depth, powered by an 18-inch by 30-inch by 51.7-inch by 36-inch stroke triple-expansion engine of 1200 indicated horsepower. The engines were supplied with steam at a pressure of 190 pounds per square inch by two 12-foot 6-inch marine Scotch boilers, built by the Staten Island Shipbuilding Company, as were also the engines and other accessories.

United States Navy Mine Sweepers

The Staten Island Shipbuilding Company also built eight mine sweepers during the period of the war. These vessels were for the United States Navy, and their dimensions are: Length, 187 feet 10 inches over all; beam, 35 feet 4¾ inches; molded depth, 17 feet 11½ inches. The engines are triple-expansion, 19 by 29 by 46 inches, with 30-inch stroke, developing 1400 indicated horsepower, and supplied with steam at 200 pounds per square inch by two boilers.

United States Navy Tugs

The company has also laid the keels of six seagoing tugs for the United States Navy. Two of these tugs have been launched, while four others are being built on two of the ways. It is expected that before these boats are launched the keels of six bulk-oil barges will be laid for the Standard Oil Company of New York. These bottoms will not in any way hamper the taking on of new work, because there is ample space for additional built-up ways. It is expected that the six tugs will be completed before the new year. The dimensions for the tugs are: Length, 156 feet 8 inches; length between perpendiculars, 149 feet 3¾ inches; molded beam, 30 feet; molded depth, 17 feet 6 inches; mean draft, 14 feet 6 inches; full load displacement, 1000 tons; water capacity, 12.75 tons; reserved feed water, 17.5 tons; fuel oil, 260 tons; speed at 1000 tons displacement, 13 knots. The boats have been designed for towing at sea, and are of the single-deck, single-screw type. The transverse system of framing has been used. Quarters for officers, crew and stores are in a raised deckhouse amidships. Engines, boilers and castings are being supplied by the Staten Island Shipbuilding Company. The engines are triple-expansion, 21 by 33½ by 55½ inches by 42-inch stroke, developing 1600 horsepower. The boats are to have two Scotch boilers, 13 feet 5⅝-inch diameter and 11 feet 2 inches long.

Bulk Oil Barges

During the coming year the keels for six bulk oil barges for the Standard Oil Company of New York will be laid. The barges will be built on the Isherwood system of longitudinal framing and will be of the car-float type, with the deck house aft for crew, pump on deck amidships, and furnished with complete equipment. The dimensions of the barges are: Length of hull molded, 150 feet; beam molded, 27 feet; depth molded, 11 feet 6 inches; rise of bottom, 4 inches; pitch of bottom, 4 inches. Each barge will carry 250,000 United States gallons of oil, weighing 6½ pounds per gallon, in five tanks.

Repair Work

On the day that the plant was visited by the writer, there were ten large steamers in the yards for repairs, two ferry boats, one steam yacht and a great variety of other craft, such as tug boats, lighters, steel car-floats and oil barges.

During the war some interesting boats were repaired, including the interned German steamships Harburg, Adamsturn and Madgeburg. Record time was made in repairing these boats, the engines of which had been wrecked by the German crews. A great many peaceful merchantmen and yachts were converted into ships of war. The yard also took care of the overflow from the Brooklyn navy yard, as well as a formidable amount of repair work for the Emergency Fleet Corporation, in addition to the work of its regular customers.

Welfare Work

The Staten Island Shipbuilding Company has one of the most ambitious house organs that have come to our desk. The name of it is the "Sisco Periscope," and its editor, Charles Sumner Witherspoon, is to be congratulated on getting out a magazine of such general interest, not only to those in the yard but to outsiders as well.

During the war, barracks were built on the company's land to take care of the overflow of workers who could not secure boarding places.

The entire top floor of the office building is used as an auditorium, where entertainments are given. Besides this, the company has an industrial Y. M. C. A. on its property for the exclusive use of Staten Island Shipbuilding Company employes. Professional entertainers are employed to furnish amusement during the noon hour, and many interesting boxing bouts and wrestling matches have been staged. The Y. M. C. A. also provides lunch for the men at cost prices.

The Staten Island Shipbuilding Company has undoubtedly one of the best equipped shipbuilding plants in the country, and its location (on Staten Island) in the City of New York gives it many advantages of great value to its clients.

Need of Apprentices for the Metal Trades

By John Headley

Mr. John Headley, the author of this interesting article, has, in company with other expert mechanics and engineers, noted, with great dismay, the scarcity of apprentices in metal trades. Mr. Headley has been taking a great interest in polytechnic and trade schools and recently sent a questionnaire to the members of the foundry class of the Polytechnic High School, asking their opinion as to why those who took that vocational training did not more frequently go to the foundry to follow it up as a life work. The answers to this questionnaire were very candid and showed very clearly and almost unanimously that the foundry was about the last place to which these boys wished to go. Their principal objections were: "No dignity; did not want manual work; no brains required; dangerous and dirty; no promotion," and other reasons. Mr. Headley answered the boys in writing, thanking them for their candor and courtesy and pointed out to them that their ideas with regard to the foundry business were not based on facts. This led to a conference between the boys and the teacher, and, as a result, Mr. Headley was asked to go to the school and give them a talk on the subject of training for foundry work. The article reproduced herewith is a synopsis of the talk given on that occasion.

"OUR wealth, commerce and manufactures grow out of the skilled labor of men working in metals," says Richard Cobden, and what was true in Cobden's day in England of the middle nineteenth century is true today and has been true for many centuries.

In ancient times the dignity and high repute of the metal worker is attested by many references in sacred and profane history. Starting with "Tubal Cain," that original smith of whom it is narrated in the fourth chapter of Genesis that he taught all artificers in brass and iron, we come down to the first book of the Kings of Israel, where we are told of the wonderful castings of bronze and brass which the servants of Hiram, King of Tyre, made for his friend, King Solomon, for the service of the temple.

Later the Grecian molders cast in bronze a great human image for the entrance of the harbor of Rhodes, which was one of the seven wonders of the ancient world. In Asiatic history we also find many references to the wonder-working art of the foundryman, as, for instance, the great colossal figure of Bhudda, the "Dai Butsu," fifty-five feet high, made by Katusho at Nara, Japan, in the year 740.

Great princes of the church have not been too proud to work in the foundry. Dunstan, archbishop of Canterbury; Bernard, bishop of Hildesham; Theodwin, abbot of Ely, also St. Eloi of France, all became expert in the casting of metals for a pastime. In the period of the Renaissance in Europe many of the most renowned artists not only carved wonderful statues from marble, but cast many wonderful works in bronze, which survive to the present day. Among the more noted of these are Michael Angelo and Benvenuto Cellini. No one has ever accused any of these men of lacking brains or dignity.

Now it may be that your ideas of the foundryman's trade come to you through defects and shortcomings of the methods by which you are taught that trade. As a student, you spend some sixty to eighty minutes twice a week in making molds and you pour the iron into these molds perhaps once in two weeks. This takes up so small a part of your interest in life that it is not at all to be wondered at that this phase of your life seems to you of not much importance, and also you gather the idea that the casting you are making is of no particular importance to anyone, and that its quality, whether good or bad, does not very much matter. In the real foundry, on the other hand, the importance of each piece, whether large or small, is never lost sight of, as each piece has a definite purpose, and a good, staunch, sound casting is the essential foundation for the final fitness of any work into which it is to be incorporated.

It is therefore highly important that there be no lack of skill among the workers in the foundry, and yet at this time we are faced with that very condition in practically every foundry in America. The supply of skilled men from Europe has been stopped for some time past, and the expansion of foundry work in America during the last four years has been such that it has been necessary to hurriedly train a great mass of unskilled labor, with the consequent result of a large percentage of waste in the foundry. There is now, therefore, a very great need for American boys to get in and learn properly this important work. The economic pressure and the competition not only from Europe, but also to a large extent from the Orient, will now be stronger than ever, and the best defense against that competition will be a strong, well-trained army of skilled American mechanics.

The young man who is deciding on a life career would do well to note that business and professional openings are very well filled, and that it takes far more application and perseverance to succeed in that phase of life than in the skilled trades. The properly trained mechanic is always sure of a good living and should look on his skill and ability as so much capital, with which there is small chance of his going bankrupt.

The rising power of labor and the great consideration shown to it in these later days should make the life of the skilled laborer much more attractive to our young men. The great slogan of Theodore Roosevelt, "Back to the farm," might be paraphrased into "Back to a more simple mode of life," for what he meant was that it was necessary, in order to preserve American institutions, for American men to adopt a life of production. The boy who looks around him at men who have been markedly successful in life in a broad way, will find that a very large number, if not a majority, have been men who started learning their trade in the shop and climbed up slowly through hard work and perseverance. There are many such examples locally in executive positions around San Francisco Bay.

Can we afford to let other nations do our work for us? The answer should be "No" to this question in the mind of every healthy American, for when others do our work for us, decay is setting in and we are slipping back in the scale of civilization. The war has shown us a very woeful lack of skilled mechanics in practically every branch of the metal trades. The great waste which went on and which is still going on to some extent, due to the war, makes this lack even more evident. We now know that one great reason of Germany's ability to make such a determined stand was the skill of her vast army of mechanics, who were able to supply her tremendous wants in the field in a way which was almost super-human.

The United States training service has, during the war, emphasized the importance of foundry work and is trying to elevate it to the dignity it merits. They are trying to introduce into the foundry a higher type of young men and to increase the efficiency, scope and usefulness of the average foundry man. At the present time in San Francisco we are not training enough molders to replace the losses due to death, disability and desertion of the trade, and very often the apprentices who start fail to serve their time; therefore the unwillingness of the high school graduate to take up the foundry trade as a life work, is working a great hardship on the foundryman's business. Many attempts have been made with more or less success to teach the molder's trade to unskilled laborers of mature years, but it is the experience of the writer that very few men so taught have become expert molders. Apprentices should be started on more liberal wages than have been paid heretofore, starting at, say, $60 a month. This would attract a better class of boys to consider the foundry as a means of gaining a livelihood, and there should also be some method devised to prevent apprentices leaving the shop to work as journeymen before their apprenticeship is completed. This is not only a great injustice to the shop, but also to the boy himself, and very probably a more liberal apprentice wage would go a long way toward stopping this practice.

Mr. R. B. Wilcox

Mr. C. V. Hayes

THE WILCOX-HAYES COMPANY

THE announcement of the opening of the Shanghai office of the Wilcox-Hayes Company, importers and exporters, with head offices in the Wilcox building, Portland, Ore., adds another name to the list of American firms to take advantage of this country's increased opportunities for trade with China.

The Wilcox-Hayes Company was organized the first of this year by R. B. Wilcox, G. V. Hayes and J. S. Campbell. Mr. Wilcox is the son of the late T. B. Wilcox and was for several years associated with his father in the Portland Flouring Mills, which company has long been pre-eminent in foreign trade in its product on the Pacific Coast. After Mr. Wilcox's death and the sale of the Portland Flouring Mills to other interests, the son associated with him Mr. Hayes, who was formerly the Oriental representative of the Portland Flouring Mills Company. Mr. Hayes has had eighteen years' experience in Oriental markets and has a wide circle of friends from Vladivostock to Singapore. For these reasons the Oriental markets were undertaken first and Mr. Hayes has been in the Orient all this year arranging connections for the company of which he is vice-president.

This company is the exclusive representative of the Willamette Iron & Steel Works in the Orient and are preparing to do considerable business in marine and logging machinery.

Favorable arrangements have been made also for business in Japan, where an office is to be opened next year, Hongkong and the Philippines, and with the resources at the command of the company it should prove an important factor in the foreign trade of the Pacific Coast.

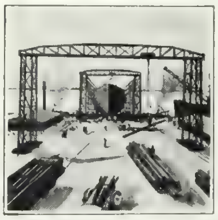
Scenes in Pacific Coast Ports

The famous Circular Quay at Sydney, Australia

A little congestion in one of the canals tributary to the port of Shanghai

Port of Callao, Peru

Material Handling



Material Handling Machinery to Help Solve the Problem of High Costs

By Zenas W. Carter
Secretary and Manager, the Material Handling Machinery Manufacturers' Association, New York

AMERICAN manufacturers are puzzled. Labor demands forty-four hours and higher wages, better housing, and less physical effort. Bankers demand higher interest rate on borrowed money. The investing public demands a higher percentage of profit on corporate stock they buy, or better dividends. The public of the United States and the world at large demand a greater volume of goods and better qualities than ever before, and in addition they ask for reduction in prices.

Coupled with it all, government and politics step in to increase transportation cost; to legislate further handicapping regulations for business; then on all and over all to impose an excessive taxation to help pay our war cost and generally extravagant American administration expenses.

Such are the causes creating the seething, bubbling mental commotion which is disturbing the sober-thinking class of American manufacturers. The non-thinking manufacturers are parading their war profits by their excess of indifference to general conditions. Few realize the need for construction now to meet abnormal competition which is soon to come.

Yet there is a remedy fair to all and useful for all. Under crushing necessity invention has always led the way out. So will it be this time. "Machinery" will solve the problem of high wages, labor shortage and the shorter hours demanded. "Machinery" will also help to solve the need for increased production in the face of labor shortage.

In general, it is common labor which is most independent at the present time, and it is common labor which is most needed of the labor shortage. And previously the application of machinery to common labor problems has been the last thing inventors have worked out rather than the first.

During recent years, however, there has been a practically new line of machinery invented, and it is solving the problem of common labor shortage. Where we formerly used dozens of men in the street digging trenches, now automatic trench machines carry on all of the processes of breaking away the earth, scooping it up and carrying it on "automatic-dumping" motor trucks, which hurry it away to the dumping ground.

Likewise, throughout our larger manufacturing plants, and especially in all of the modern ones, the industrial tractor truck, with its length of trailers behind, takes the place of the laborious, manual two-wheel trucking-by-hand of former days.

For instance, through the analysis of the proper control of its elevator movements, combined with the use of industrial trucks and tractors, the Fisk Rubber Company developed a plan which saved them many thousands of dollars per year. In New York City the piers of a few railroads and steamship lines are equipped with industrial trucks and tractors. Their officials will tell you confidentially, if not for publication, that they are installing more and more of the power-driven trucks and trailers because of the tremendous saving they make in man power, to say nothing of the relief the electric trucks give to laborers from the strenuous and deteriorating physical burden under which the longshoremen and stevedores heretofore worked.

Already the railroad officials of the country are considering methods by which they may conserve the health of their men, as well as earn dollars and cents for the profit column in the handling of goods at railroad transfer points and in the warehouses.

Shear leg on a Seattle pier performing a useful stunt

Sacks of grain tiered in the warehouse on Pier No. 1, Astoria, Oregon. Note the tiering machine on the floor at the left. See page 97.

Many material-handling machinery manufacturers are just beginning to visualize the tremendous opportunity there is in this freight-transfer field, where exists a market for mechanical-handling machinery in over 100,000 transfer points in the United States.

At Cincinnati, through the use of a system of cranes, motor trucks, standardized and interchangeable motor-truck bodies, each an independent unit for movement on its own caster wheels, with electric trucks operating in freight houses, piers and warehouses, and through the use of electric hoists, hand hoists, bridge cranes, etc., the Motor Terminals Company is now able to offer the railroads (at a very reasonable cost for installation) a saving of over 66,000 freight cars previously used exclusively in transfer, trap or ferry service, and the elimination of over 300,000 switch-cut movements per annum, at the same time giving a continuous flow of current movement of substation freight over connecting lines.

At the Hudson Motor Company plant at Detroit automobile bodies and chassis are being handled by automatic conveying systems, which greatly reduce the amount of floor space required for similar operation and movement of bodies and chassis about the factory.

At tidewater at Locust Point, in the harbor at Baltimore, Maryland, operating the entire length of an 800-foot pier on which there are three railroad tracks, is an automatic belt conveyor weighing and unloading machine which handles twenty cubic yards of material per hour over this entire area. Also with this is a car loader operating mechanism (with a horizontal travel of 270 degrees that may be raised above the highest open car), which is automatically handling bulk material, such as ores, clay, sulphur, coal, etc., directly into box and open cars from ship's hold.

At New Orleans bunches of bananas are automatically handled by a "banana conveyor," which keeps up a continuous flow of the bunches of bananas from the ship's hold to the trucks or wagons or freight cars alongside dock, eliminating the necessity for men carrying bananas long distances on their shoulders, or the passing of the bunches of bananas, hand to hand, by longshoremen or stevedores operating as a human endless chain.

At the Dill & Collins paper plant, logs are taken automatically from either barge alongside of wharf or from freight car through the use of a transferring log crane and placed on a "conveyor stacker," which piles the logs to a height of sixty feet, thus conserving ground area. At this plant the logs are then taken by automatic conveyors from the log piles to the chipping machines, through the chippers into storage bins, from the storage bins to digesters, where the salts and chemicals are again brought from storage by automatic conveyors and the pulp mass is taken from the digesters by conveyors to the coating machines, where the clay for coated book paper is again automatically supplied. All the way throughout the entire handling, from raw material to the finished paper, the electric hoists, elevators, monorail systems and industrial trucks and tractors in use keep the materials ever on the move, with no unnecessary delays, with a minimum of manual labor involved in the process, and at the least cost for maximum production.

It is probably true that in any industrial plant, any transfer or storage house, textile mill or raw material-producing plant, anywhere in the United States, the general manager of the plant would be able to save the time of from one to ten men by an installation of modern labor-saving inventions and equipment. And it is probable the cost of the installation would be saved within a period of from one to two years.

A difficulty heretofore has been, and one that

Birdseye view of Pier No. 1, Astoria, Oregon, showing warehouses and grain elevator. Note the dreadnaught Vermont alongside the pier. See page 97 exists even today, that few if any complete unit plans, such as that at Fisk's or Dill & Collins', have been worked out. This is partly due to the lack of appreciation on the part of the makers that these various types of labor-saving equipment very frequently "dovetail" as serial types of equipment to make a completed operation.

This is not caused by indifference to the opportunity, but is due largely to the newness of the material-handling machinery industry. On this point it is very gratifying that Yale University has decided to establish a department of transportation, which is to cover the study of the art of transference of all things from raw material production to the finished product, even including movement to consuming destination and disposal of waste. This course will cover not only the study of the railroad and steamship haulage, but of all forms of mechanical conveyance for both a horizontal and vertical operation as involved in the transportation of all items of industry.

Inventors and engineers also are now devoting more time and attention to this subject, and the Department of Commerce and the United States Port and Harbor Facilities Commission are making exhaustive studies of the economies machine handling will provide.

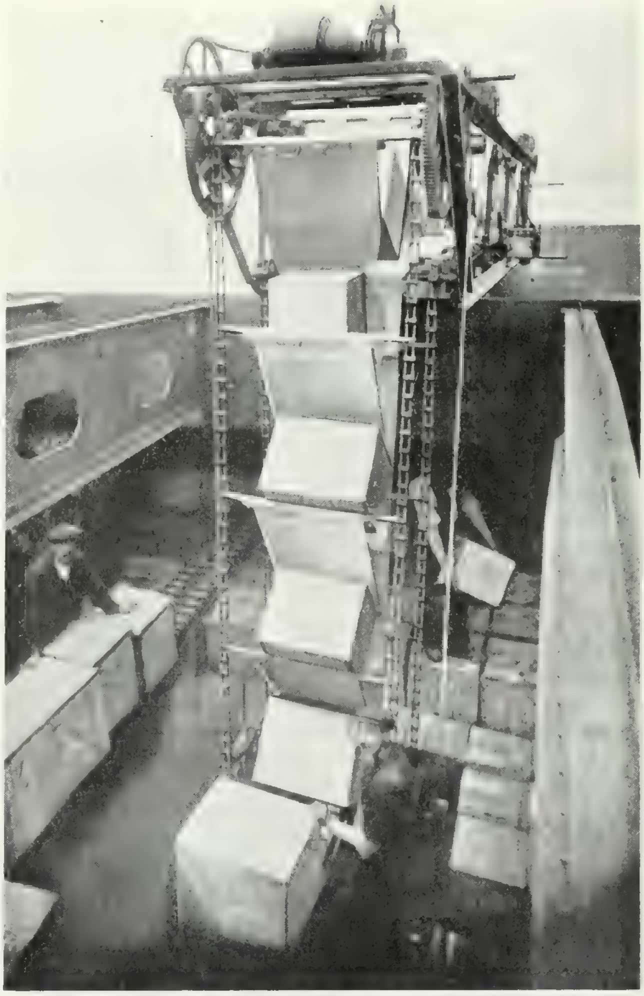
The labor shortage which developed during the war has brought to light and into prominence much material-handling machinery which was known only in specialists' lines, and applied it to general operations. This condition also developed many new inventions which, added to previously standardized equipment, has opened the way for new applications. For instance, in the elevator field, the development of the "micro drive," which automatically controls the floor-leveling of freight elevators, has paved the way for commercial application of "operatorless" elevator systems, such as that installed by the Otis Elevator Company at the New York army base and at the Boston army base.

At the New York army base in Brooklyn, seventy-two elevators, each elevator covering eight floors and each elevator having door openings at front and back, are actually being operated and controlled by just nine men, saving the labor cost of sixty-three men, while increasing the efficiency of the operation.

This is the first time in the history of the world that a group of elevators (there are three banks of ten each and six banks of seven each in this one installation) has been continuously operated by a dispatcher system.

In the operation of one of these banks of ten elevators, a man in a small office on just one of the eight floors, by merely pressing buttons and watching tell-tale lights, fully operates and controls not only these ten elevators on one floor, but these ten elevators making eighty stops, each stop with the elevator automatically coming to one-fourth inch of floor level and automatically remaining at floor level, whether the load going on or off weighs 1000 or 10,000 pounds.

American locomotive cranes at a French port


The Donald conveyor in action

So co-ordinated is this entire bank of ten elevators that the "micro drive" control will respond to the push-button at the finger tip of the dispatcher, while he safely and without danger to either the freight or any passengers which may be on the freight elevators, by the mere pressure of his finger tip on the proper buttons, raises the elevators from floor to floor, stops and starts them at will, automatically opens the doors, and all with that precision and safety which is characteristic of most American inventions.

In this army base at Brooklyn the government has employed trains of power trucks and trailers, which dash through the open door onto the "operatorless" elevators, uncouple their loads, and move on to repeat. Whip hoists, cranes, winches, portable conveyors, gravity conveyors, all synchronize to handle the millions of dollars' worth of goods and supplies of every kind needed for our armies abroad.

In the pottery industry portable conveyors are being used to take "saggers" from the storage piles into the furnaces. Conveyors and industrial trucks, cranes and elevators handle "green" and baked output of the "potter's wheel" without breakage and at minimum cost. In the tiering and piling of large rolls of paper, boxes, tobacco barrels, bales of cotton, castings, etc., automatic machines now handle these products with ease to heights of twelve to fifteen feet, thus saving floor area and economizing plant investment. In handling heavy pieces of machinery or heavy and unwieldly packages, factories are using portable or truck cranes, which enable one man frequently to do as much per day as several men could do formerly, when every movement was a "muscle" problem for human beings.

In such places as the hardware manufacturing plants, the aluminum castings plants, the canning and packing industry, there are monorail overhead conveyor systems, hoists, apron and belt conveyors and portable tiering and conveying equipment, all being utilized for the relief of common labor and for efficient operation.

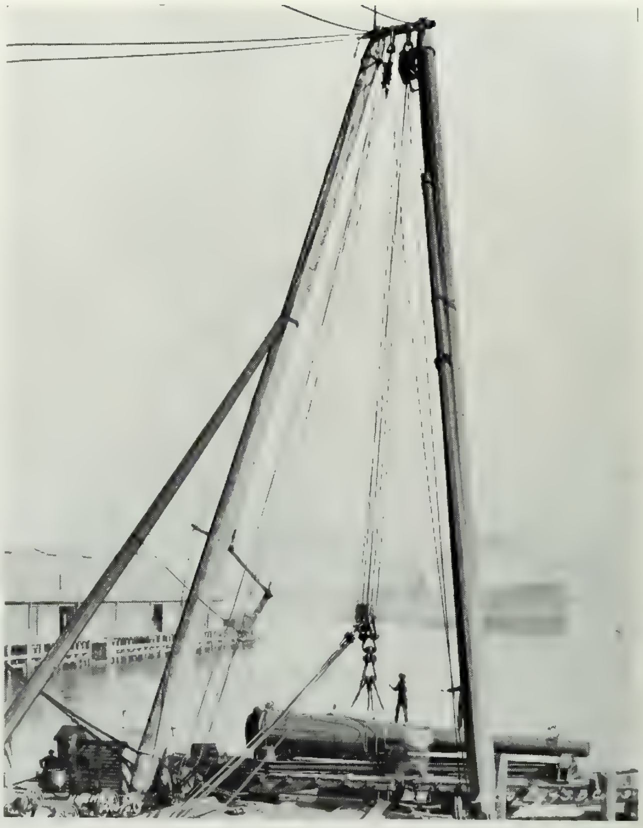
At the Chalmette Sugar Refinery at New Orleans, the automatic overhead control conveyor system handles bags of sugar for hundreds of feet in a continuous and economical way and with great rapidity. Recently at Des Moines, Iowa, when the Fred Weitz Construction Company started to build the new Des Moines Hotel, they found the shortage of common labor was going to be a tremendous handicap in their effort to keep their promise of the building. Within three weeks, through the ingenuity of Mr. Fred Weitz and Mr. Weller, a manufacturer of Chicago, they designed, made and equipped a complete automatic concrete mixing outfit, which eliminated the need for shoveling the sand and gravel or cement by hand to the concrete mixer, all being conveyed automatically from storage to mixing machine, the entire equipment being designed and erected in this short time and solving both a labor and a cost problem.

Through machines of the gravity conveyor type, brick and tile may be handled direct from cars to storage piles over long distances without breakage and with great rapidity and the least loss of human energy.

In big operations where bulk handling is required, through the use of huge bridge cranes, locomotive cranes and special unloading and loading machinery, the development of the past twenty-five years has been tremendous. Automatic car-unloading plants are in operation at some of the railroad terminals on the Atlantic seaboard handling the dumping of one 110-ton car of coal or two sixty-ton cars in one operation with as little effort on the part of the one or two men operating the machinery and equipment as would be required to shift the gears of an automobile.

It is the adoption of these devices and short cuts in economic handling, loading and unloading of cargoes, and freight movement of raw material and products through our manufacturing plants, which will make possible the higher wage, shorter hours and physical relief from the burden of hard labor which the American employe demands.

It is the very rapidity with which all varieties of handling machines and equipment have been developed and put into service in industry that has prevented the public, and even the manufacturer, from obtaining an adequate and comprehensive knowledge of what is available that may be applied to manufacturing to reduce common labor costs and conserve human energy.



Shear Legs at the Baltimore Dry Dock & Shipbuilding Company's Tower plant ready to hoist 58-ton coast defense gun on board U. S. army transport South Bend. Transport shown in background.

BIG SHEARS AND A BIG GUN

The illustration shows a twelve-inch coast defence gun being placed on the steamer South Bend by means of the big shears at the Baltimore Dry Dock and Shipbuilding Company's plant. This job took one hour. The gun weighs 116,000 pounds and its carriage stowed in the hold weighs 300,000 pounds. The gun and carriage were built by the Pool Engineering and Machinery Company of Baltimore, and is intended for use in some of the fortifications of the United States, probably in the Philippines.

The holds and decks of the South Bend were filled to capacity with other war materials, all consigned to Pacific Port army and navy bases.

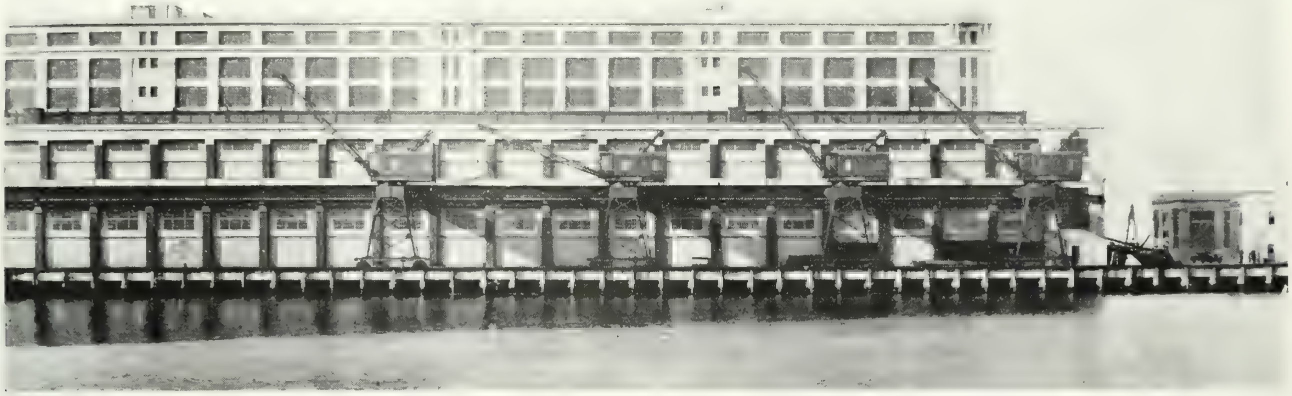
All of the shops and yards of the Baltimore Dry Dock and Shipbuilding Company are worked to capacity with repair jobs and new construction.

ELECTRIC TRUCK ECONOMY

Sisal, hemp and similar baled materials, even though bulky, are of sufficient weight to make a good hand truck load. By virtue of that fact it is difficult to secure labor to push or draw loads about a pier.

A fleet of Elwell-Parker electric trucks has been employed to advantage in making the transfer of bales as received from sling at boat. A load of ten bales traveling at 400 feet a minute, or three times the pace of a man, with one bale, demonstrates the efficiency of this method.

With a fleet of trucks handling such loads over the pier into warehouse where these materials are stacked twenty to thirty tiers high, it is difficult to understand why some concerns adhere to old-fashioned methods that waste brawn and time.



The four semi-portal bridge type dock cranes at the U. S. Army Supply Base, Boston

Government Acceptance Test of the W-S-M Dock Cranes at the U. S. Army Supply Base, Boston

THE Wellman-Seaver-Morgan Company has recently installed four semi-portal bridge type hoist cranes at the United States army supply base, Boston, to handle freight to and from ships. The Boston terminal includes a long eight-story warehouse separated by a wide street from the marginal two-story wharf house alongside the wharf where the ships dock. Between the wharf house and the water is a space thirty-six feet wide with two standard-gauge tracks on which freight cars are run in from main line tracks to deliver or receive freight from the boats. The W-S-M cranes span these tracks, as will be seen in the illustration above.

The government acceptance test of the cranes was made September 17, 1919, at which time all four cranes were operated under full load. The speed of the different motions and cycle of operation exceed in every instance those called for in the specification. The test load consisted of a steel bucket filled with cement sacks, the total weight being 5000 pounds.

In unloading wool from barges on the same day, one of the cranes made seventy-three trips an hour, taking each trip three bales weighing from 500 to 800 pounds each. It was required to unload the barge evenly, making it necessary to take a load alternately from each end and the middle and landing the loads all in the same place. This method of handling meant a considerable time spent in bringing or traveling along the dock.

The operation included the picking up of the wool from a lighter at the wharf side, about on the level of the wharf, making a vertical lift on the hoist line of about forty feet, rotating the boom through an angle of about 120 degrees, and the traveling of the bridge about thirty feet along the wharf, delivering the load on the upper deck platform along the wharf shed. The crane made the complete cycle in about forty-five seconds, which would mean eighty trips per hour, but due to unavoidable delays in the hour the number of trips made was seventy-three. The number of men employed in connection with operating the crane was as follows: One superintendent, one crane man, one foreman on the shed platform, one foreman on the lighter, one tally man, three gangs of five men each on the lighter, three men to receive the load on the upper bench level and to assist in loading the material on the trucks, eleven truckers and four men storing the material, making a total of thirty-eight men. Naturally the number of truckers and those required for storing the material is determined by the method of storing and the distance the truckers must travel to deliver the material inside the shed.

The alignment of the hoisting units and the reduction of friction by the use of Hyatt bearings is well illustrated by the following performance: The weight of 375 pounds, consisting of the lifting hook, two feet of crane chain, the fall weight and ten feet of hoisting line, is sufficient to allow the hook to lower at a fair rate of speed and pull the hoisting rope over two sheaves, unwinding the rope from the hoisting drum, rotating the drum, drum gear and drum gear pinion. This takes effect when the jaw clutch is in its neutral position, freeing the drum from the motor and the hold brake on the drum released.

A YARD RIGGER'S RECORD

ON September 19, in the yards of the New York Shipbuilding Company at Camden, a gang of yard riggers, without any special preparation or blare of trumpets, but simply by good team work, made a rather remarkable record in the handling of heavy weights. Six Scotch marine boilers, weighing sixty-five tons each, were transferred from the storage yard to their saddles in the hull of a ship on the ways in an elapsed time of two hours fifteen minutes, or twenty-two and one-half minutes to each boiler. These boilers were picked up one by one from their racks in the storage yard by the seventy-ton crane and loaded on to a special flat car. One of the yard locomotives then ran this car around by way of various switches to end of "O" ways, 1200 feet distant. From this point, each boiler in turn was picked up by a 100-ton crane over the ways, transferred to the proper position and lowered on to the saddle in the boiler room of Hull No. "248."

The riggers' gang consisted of five men, including the leader. This time is well in the lead as a record for operations in the New York Shipbuilding Company's plant. We and they would like to hear of records equalling or exceeding this from any other yard.

Progress in Transportation on the Lower Mississippi River

IN the November issue of Pacific Marine Review appeared a very complete description of the barges and tow boats being built by the United States Railroad Administration for carrying bulk oil and general cargo between St. Louis and New Orleans on the Mississippi River. This program is developing in a satisfactory way, although the delivery of tow boats has been delayed and is holding up the work. The following statement issued by M. K. Sanders, federal manager, at St. Louis, for the United States Railroad Administration, gives in a graphic way the present status of the development:

"We are beginning to get some of our new barges, two of them already having been in St. Louis to be loaded for New Orleans. Three others are being brought down the Ohio River as fast as the low water in that river will permit, which unfortunately is not very rapidly.

"Our serious want, however, is for new propelling craft. We have a fair supply of barges for the traffic at present obtainable, but we are unfortunately still operating the same old-style tow boats with which we started the service, and these craft apparently were not built for regular, continuous service such as ours, as it has been our unfortunate experience that in the last twelve months the towboats have been laid up between 30 and 40 per cent of the time, making repairs Not only has this entailed a very heavy expenditure and necessitated a large staff to supervise such work, but the constant breakdown of these tow boats have involved us with shippers, who have very naturally and very properly complained of the poor service which has resulted. We have always known and stated at the outset to the Director General of Railroads, that service with temporary equipment such as was available could not possibly prove remunerative. Our experience has shown that the tow boats obtainable on the river are even less suited for our service than either we or anyone else had supposed, and as the result, our service has necessarily proven unsatisfactory.

"So far as we can ascertain, our captains and engineers and crew are as capable as can be found on the river, and we have no reason to suppose that they are not performing their duties to the utmost of their ability, but the fact remains that seldom does a tow boat make a round trip from St. Louis to New Orleans without having to be laid up for repairs.

"Our crying need, therefore, is for new tow boats, and those which are being built not only have twice or three times the power of those we are using, but we are convinced will operate without constant breakdowns and constant disruption of our service which ensues. We are doing the best we can with the equipment available, but are somewhat in the position which Wellington was at the battle of Waterloo, "praying for Blucher," Blucher in our case being represented by efficient and reliable towboats.

"We have not been enabled to issue anything like the number of joint rail-and-river tariffs which are necessary to the proper development and success of our service, but have recently receivd authority for the issuance of a number of new tariffs on which we are at work, and shall do our utmost to expedite their issuance so that we may largely extend the territory covered by the joint river-and-rail service.

"We have demonstrated, however, in the past twelve months that there is an available navigable channel between St. Louis and New Orleans, and our freedom from groundings and other navigation troubles has been very satisfactory, so that with the advent into service of new and reliable tow boats and more of our new barges, we know that we can give the public the regular, reliable service which is essential and can carry vastly more traffic than has hitherto been tendered to us. Whilst our force of solicitors has been extremely limited, it is gratifying to us to observe the constantly increasing variety of shipments tendered to us and the largely increasing clientele of shippers who are using our service, and this we know will be immensely increased when shippers have confidence in the reliability of our service.

"Terminals are, of course, as essential in every way as floating equipment, and the Director General has under consideration at this time the authorization of such terminals as are essential for purely joint river-and-rail traffic and not for local traffic. Just as soon as we receive this authorization, we hope to commence the construction of these terminals and push forward same with the utmost speed."

Harbor Island Terminal, Seattle

PROBABLY the largest single terminal on the Pacific Coast of America is that of East Waterway Dock & Warehouse Company in Seattle, commonly called "Harbor Island Terminal." This great terminal enterprise, which covers twenty-five acres of ground and occupies the major part of the west shore of East Waterway, has developed from the empty tide flats in less than two years. Thanks to the patronage of Rogers Brown & Company, the leading importers of Oriental vegetable and fish oils in America.

In addition to nearly sixty storage tanks for bulking oil and other liquid commodities, and four miles of railway sidings and storage tracks, and thousands of feet of overhead and underground pipe lines, the company has constructed and operates three enormous warehouses, capable of handling 30,000 tons with 10,000 tons additional capacity on the open pier for the accommodation of goods in transit, imported or exported.

The open pier is equipped with parallel tracks at shipside, as well as with depressed tracks behind the docks, and is especially constructed to take care of heavy machinery, railway rolling stock, export timber, barreled oils, and the like. Three of the largest trans-Pacific freighters are frequently berthed at this terminal simultaneously. It is the only terminal in the Pacific Northwest equipped to receive a full cargo of bulk oil, molasses or other liquid freight. Storage areas for lumber, steel, on solid ground and enclosed with concrete walls or earth dykes, likewise supply space for 1,000,000 cases of Oriental oil.

A $30,000 heating plant for the transferring of cocoanut, peanut or fish oils from tin cans to storage tanks or tank cars enables 1000 cases per hour to be bulked without disturbing the regular ship business going on at the terminal's waterfront cargo sheds or open pier.

The storage tracks adjacent to the steel tanks, bulking tables or barrel yards will handle at least 200 cars at once, sixty of which can be filled with bulk oil at one spotting.

The whole plant represents an investment of $1,000,000, and the general merchandise warehouses and transit freight sheds are equipped with automatic sprinkler systems for fire protection. The oil tanks are not only protected by concrete walls, but fire curtains of water envelop them in the event of a threatened conflagration; similar in action to a giant whirling lawn sprinkler fed from a 50,000-gallon overhead water supply tank. The bulk oil capacity of the storage tanks exceed 5,500,000 gallons. The terminal has the lowest insurance rates in Seattle on goods in storage.

Harbor Island terminal is fully equipped with the most modern handling devices, including 20-ton locomotive crane, gasoline and electric tractors and truck trains, cotton and barrel machines, etc. It also operates its own tug and barge system on Elliott Bay. The pay-roll exceeds $500,000 a year, there being often more than 500 employed at once on the property. The pay-roll for July, for instance, was $69,500.

Port Improvements at Astoria

THE examination of a chart of the Pacific Coast will show that on the coast line between San Francisco and the Straits of Jaun De Fuca the best harbor for deep draft vessels is at the mouth of the Columbia River, where the city of Astoria, with a population of 25,000 people, is situated on a peninsula bounded by the great Columbia River and by Young's River and Young's Bay. This port is recognized as one of the leading industrial marts of Oregon, and must grow in maritime prominence as the Pacific Coast of America develops in its relation with the rest of the world.

In 1909 the Port of Astoria was organized under the general laws of ports in the State of Oregon. Its authority is vested in five commissioners, who are elected by the people of the county, and who serve without remuneration.

The first action of the commissioners was the examination of the harbor within the port's district, and a careful study of the terminal site was outlined. In the spring of 1913 fifty-six acres of land were purchased on the main channel of the Columbia River, and actual work was begun on the construction of terminals.

On pier 1 there has been erected a freight shed 1500 feet long with a frontage of 620 feet, and 92 feet wide. This warehouse is equipped with fire sprinkler system and stand pipes, which reduces the fire hazard to a practical minimum and allows a very low rate of insurance on the contents. There is also located on this pier a bulk grain elevator with a capacity of 1,250,000 bushels, and a flouring mill with a capacity of 4000 barrels a day. Both of these buildings are of reinforced concrete construction. During 1918 there were 997 carloads of wheat handled through this terminal, as well as several export cargoes of flour to Europe. The total investment in this pier is $1,321,498.19.

The rates for handling, loading and unloading of commodities average 60 cents a ton, wharfage 30 cents a ton, including five days' free storage; and storage for thirty days or fractional part thereof, 35 cents a ton.

Along the west side of this pier is moored the United States steamer Algonquin, which is perma-

Elwell-Parker Electric Truck with load of baled hemp. See page 94

nently located here as a coast guard, and during the visit paid Astoria by the United States fleet the dreadnaught Vermont was docked alongside of this pier. She came alongside without the aid of any tugs, and departed in the same manner.

The average tide is 7.5 feet with 30 feet of water at mean low tide.

Pier 2 has a width of 426 feet and a length of 1445 feet, on which is located coal bunkers having a discharging capacity of 175 tons an hour to ships' bunkers. Railroad tracks are located on both sides of the pier and a full complement of locomotive cranes render it possible to handle lumber and coal to and from cars, barges or vessels, and all classes of heavy package freight expeditiously and at a minimum cost. Three locomotive cranes of 50, 45 and 25 tons' capacity, and one electric stiff-leg derrick of 15 tons' capacity, will be installed on this pier.

The Astoria Marine Iron Works also have their plant on this pier for the installation of machinery and repairing of all classes of vessels. The cost of this pier was $382,877.95.

Pier 3, which is now under construction, will cost $1,225,502, and is 430 feet wide and 2000 feet long. This pier is designed expressly for offshore business, and will carry two sheds 160 feet wide by 1500 feet long. Depressed railroad tracks will serve the sheds, and two 5-ton straight line cargo cranes will facilitate the handling of cargo. Electrically operated tractors, trailers and conveyors will expedite the moving of freight from the ship's tackle to point of rest in the sheds. There is 35 feet of water alongside at low tide.

In 1917 the port increased its holdings to 304 acres with a frontage of 8940 feet. The belt line railroad, three miles in length, has been built around Smith's Point at a cost of $220,612.

A 20-inch suction dredge, Natoma, is also owned and operated by the port, which is used in deepening the channels of the Columbia and Young's River, and improving industrial sites along the waterfront.

Seawall and harbor improvements completed total over a mile, while 5200 feet are under contract. The cost of completed portion is $262,780 and the uncompleted portion will bring the cost up to $692,780 when contracts are finished.

The Standard Oil Company is erecting a large plant at the foot of Fourth street, which will have in nine tanks storage capacity for 58,434 barrels. They will have a pumping capacity of 1500 barrels an hour from steamer and 500 barrels an hour into cars. There is a depth of 40 feet at low water on the face of their dock. This dock is served by the Spokane, Portland & Seattle Railroad, and has a siding with a capacity for ten cars.

Fog statistics prepared by the United States Lighthouse Survey prove that the mouth of the Columbia River is more free from fogs than any other North Pacific Coast port. The average yearly fogbound hours for a period of ten years are:

Columbia River	696
Puget Sound	1306
San Francisco	1591

There is an average of 275 vessels of all kinds entering and clearing the Port of Astoria docks annually. During 1918 there were 213 steamers, 27 steam schooners, 21 motor ships, 45 gas schooners and 6 sailing ships.

Pier 1 handled 1716 cars of freight with a total tonnage of 59,302 tons. Pier 2 handled 1274 cars with a tonnage of 29,135 tons. This does not take into consideration the cars handled on private docks.

The Columbia River Coal Company is shipping on an average of sixty cars of coal a week over pier 2, and this coal is furnished to steamers plying between Grays Harbor, Columbia River and foreign ports, each averaging 400 tons of bunker coal. About 400 carloads of grain have been received during this season.

MARINE TURBINE GOVERNORS

It is hard to conceive of a more constant power load than that obtained on the propelling unit of a ship at sea in fair weather. The weight and resistance of the ship cannot be changed, nor can the dimensions of the propeller be altered. So, hour after hour and day after day, the load to be carried by the engines remains uniform. A governing device to prevent the machinery from overspeeding is practically unnecessary, except to guard against the possibility of breaking a shaft or dropping off a propeller, either of which is of rare occurrence.

However, in bad weather an entirely different situation prevails. With the ship rolling and pitching, the propeller is often thrown partially or wholly out of the water, thus relieving the entire load from the engines and allowing them to accelerate rapidly and perhaps reach dangerous speeds.

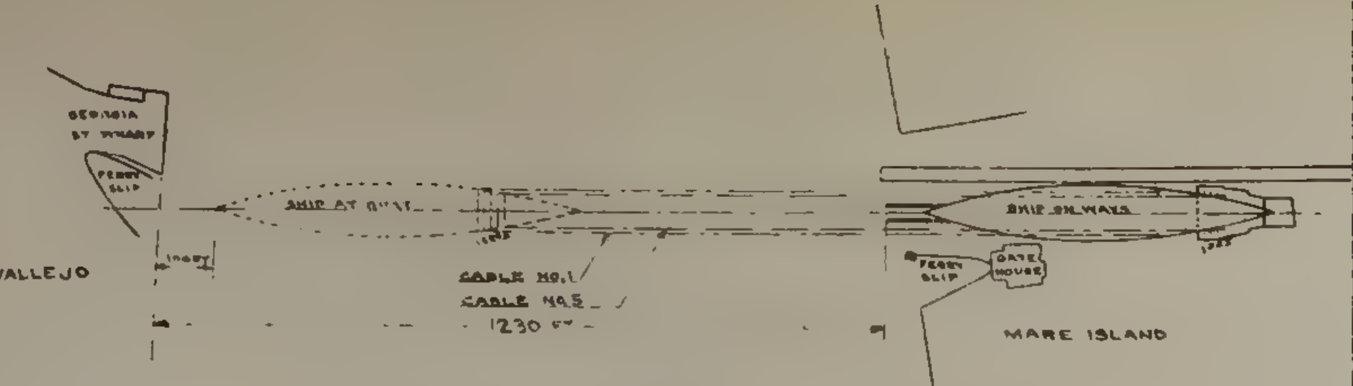
To guard against this hazard the majority of marine turbine builders install on their machines an automatic tripping device, which is set to shut off all steam to the turbine when the speed reaches a limiting point of, say, 10 per cent or 15 per cent above normal. This stops the turbine entirely, and in order to start up again the trip must be reset and the steam valve opened.

Undoubtedly such a device thoroughly protects the turbine from damaging itself by "racing," but there are certain contingent disadvantages which make it very undesirable. Chief among these is the possibility of having the turbine shut down even for a short time during a storm, when the loss of steerage way may throw the ship into the trough of the sea with a very possible result of foundering. For this reason a great many chief engineers prefer to disconnect the tripping device entirely, and leave the turbine with no protection at all rather than take the chance of jeopardizing the safety of the whole ship.

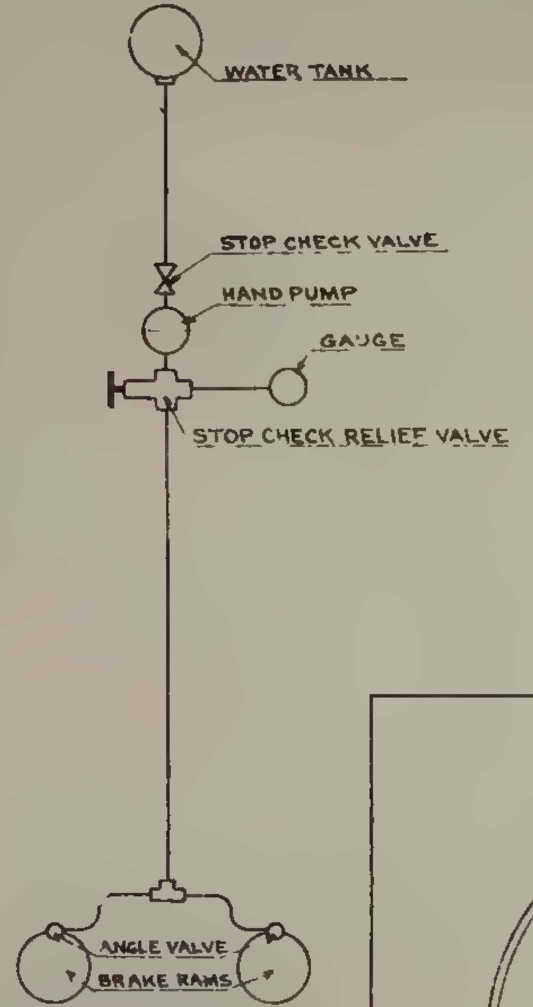
All Westinghouse marine turbines are fitted with governors, which under no circumstances will shut the turbines down completely, but which will regulate the flow of steam to the nozzles in such a manner that the speed is kept practically constant under all conditions.

The arrangement consists of a vertical spindle mounted on the forward end of the turbine, driven by a worm wheel from the main shaft at a speed of about one-quarter of that of the main shaft. At the top of this spindle is mounted a fly ball governor of the familiar type, the motion of which is transmitted through a system of levers to a small steam relay piston valve, which in turn regulates the flow of steam to the operating cylinder of the main governor valve.

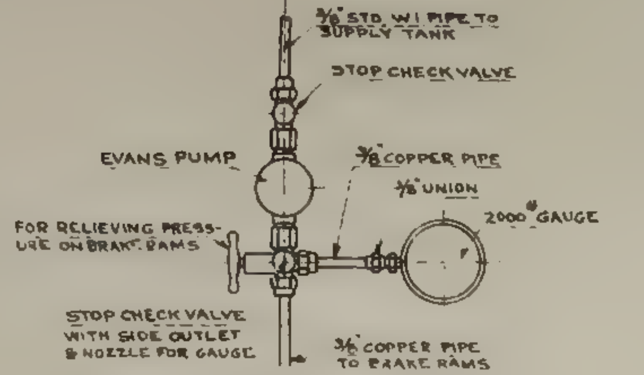
While no attempt is made to obtain extremely close regulation, such as is needed on electric generator drives, it has been found that the marine governors are very positive in their action and hold the speed of the turbine within very reasonable limits.



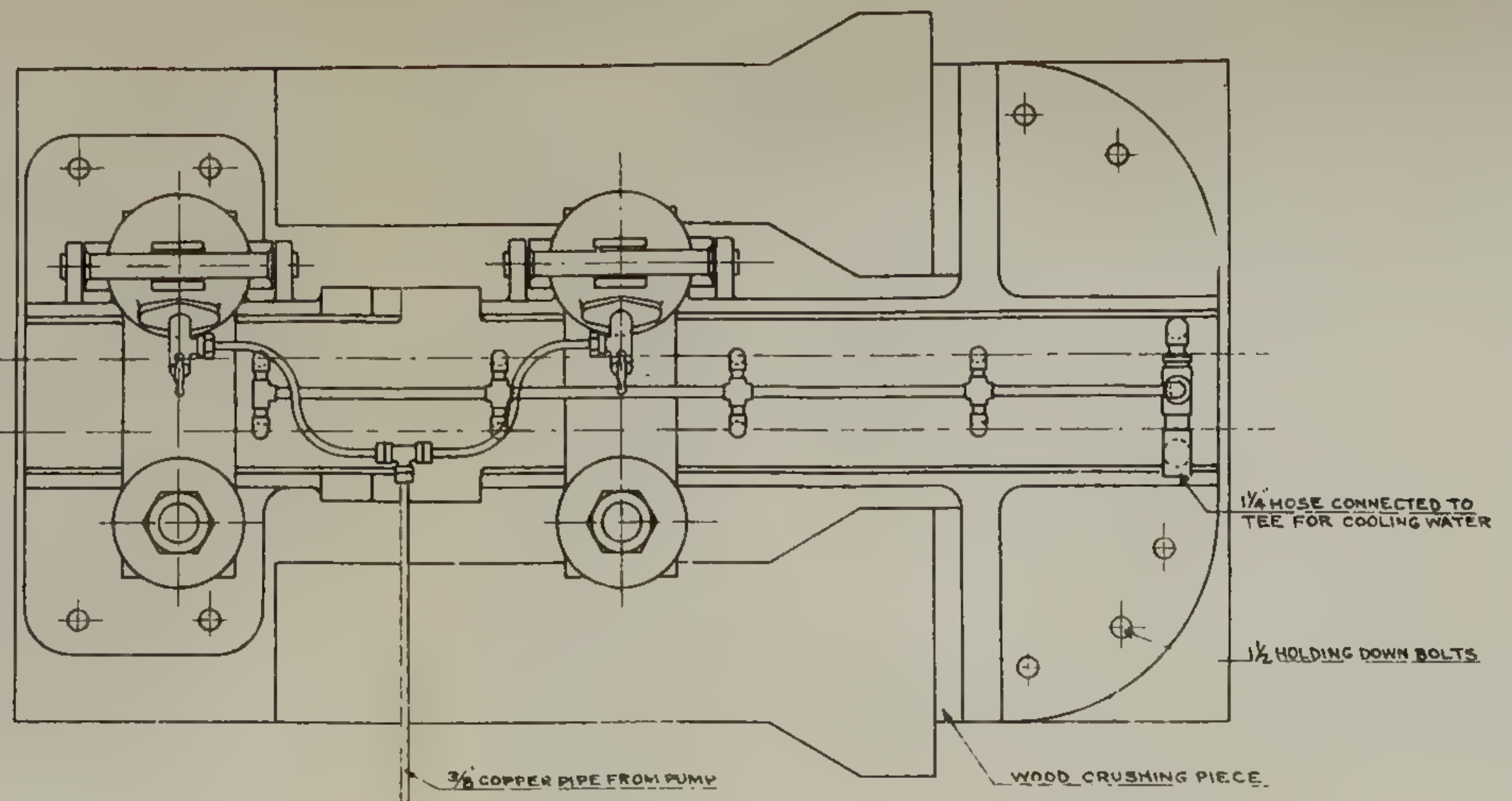
PLAN OF MARE ISLAND STRAITS
SCALE 1" = 200 FT



DIAGRAMATIC ARRG'T OF PIPING TO LAUNCHING BRAKES
U. S. NAVY YARD MARE ISLAND CALIF

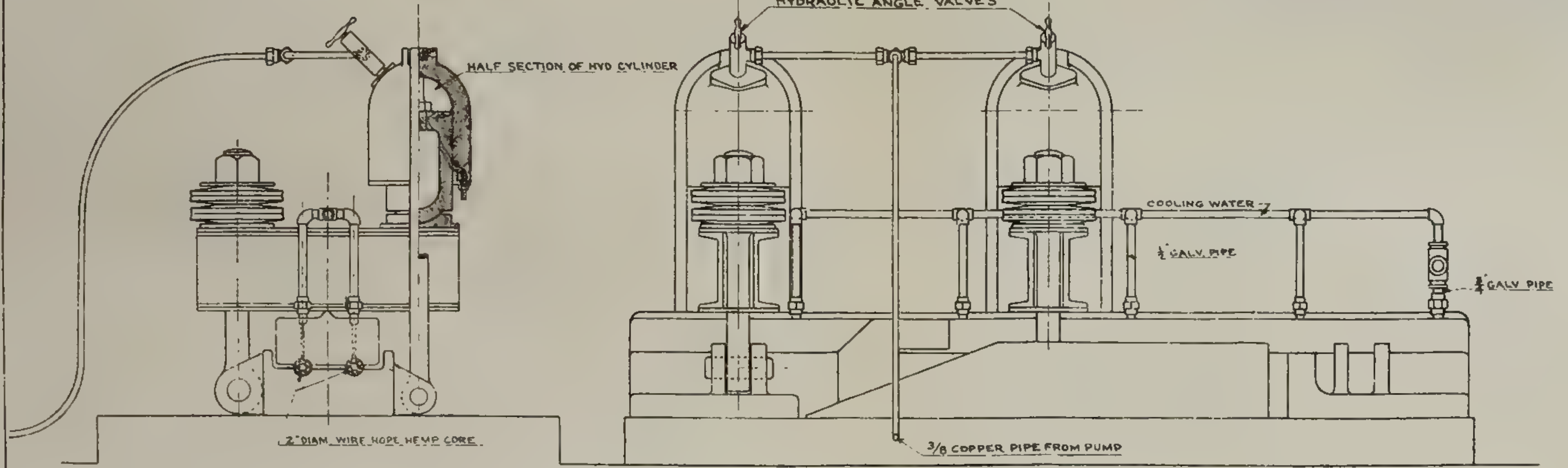

3/8" STD. W.I. PIPE TO SUPPLY TANK
STOP CHECK VALVE
EVANS PUMP
3/8" COPPER PIPE
3/8" UNION
2000# GAUGE
FOR RELIEVING PRESSURE ON BRAKE RAMS
STOP CHECK VALVE WITH SIDE OUTLET & NOZZLE FOR GAUGE
3/8" COPPER PIPE TO BRAKE RAMS

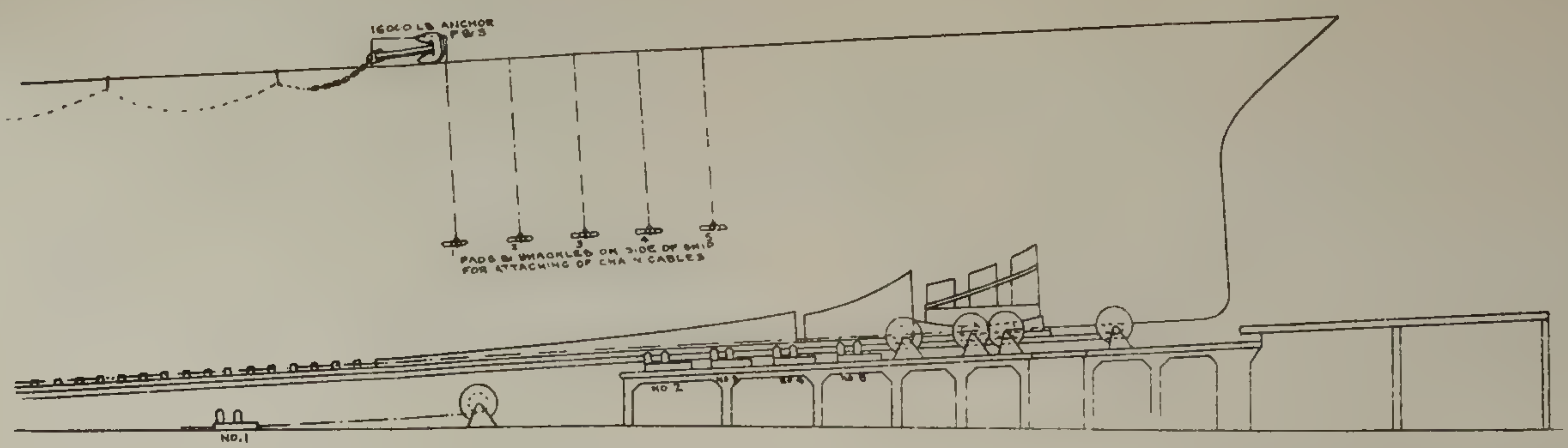
ARRG'T SHOWING PIPE CONNECTIONS
VALVES & GAUGE AT EVANS HAND PUMP
U S NAVY YARD, MARE ISLAND CALIF.
SCALE 1½" = 1-FT


1½" HOSE CONNECTED TO TEE FOR COOLING WATER
1½ HOLDING DOWN BOLTS
3/8 COPPER PIPE FROM PUMP
WOOD CRUSHING PIECE

ARRG'T OF BRAKE & PIPING
U S NAVY YARD MARE ISLAND CALIF
SCALE 1½" = 1-FT.

TOTAL CABLE PULL OF 10 BRAKES 672,000 LBS.
CABLE PULL PER BRAKE (2 WIRES) 67200 LBS.
HYDRAULIC PRESSURE REQUIRED IN EACH CYLINDER 850 LBS PER SQ IN.
NO OF STROKES REQUIRED TO APPLY THIS PRESSURE 18, TIME 10 SEC
COEFF. OF FRICTION 24

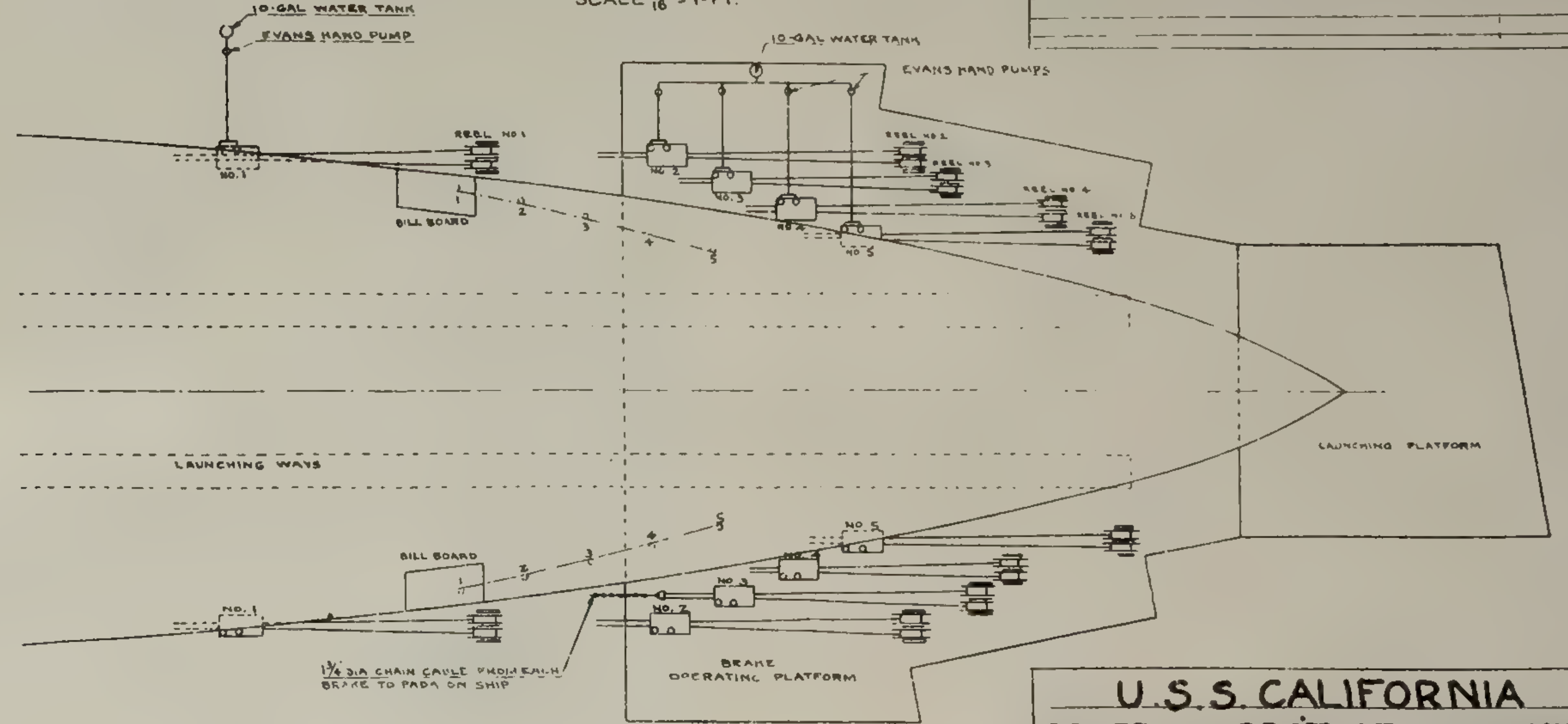

HYDRAULIC ANGLE VALVES
HALF SECTION OF HYD CYLINDER
COOLING WATER
1" GALV. PIPE
1" GALV PIPE
2" DIAM. WIRE ROPE HEMP CORE
3/8 COPPER PIPE FROM PUMP


16000 LB ANCHOR F & S
1
2
3
4
5
PADS & SHACKLES ON SIDE OF SHIP FOR ATTACHING OF CHAIN CABLES
NO. 1
NO. 2

U.S.S CALIFORNIA BATTLESHIP NO 44
ARRANGEMENT OF LAUNCHING BRAKES
U. S NAVY YARD MARE ISLAND CALIF
SCALE 1/16" = 1-FT.

REFERENCE PLANS

TITLE	Sheet No	Vault No
U.S.S. CALIFORNIA LAUNCHING BRAKE, ARRG'T & DETAILS	21416	21416
" " " & TRIGGERS	21418	21418
" " LENGTHS OF LAUNCHING CABLES	15264	15264
KANAWHA ARRG'T OF SLIP & LAUNCHING	9972	243-29



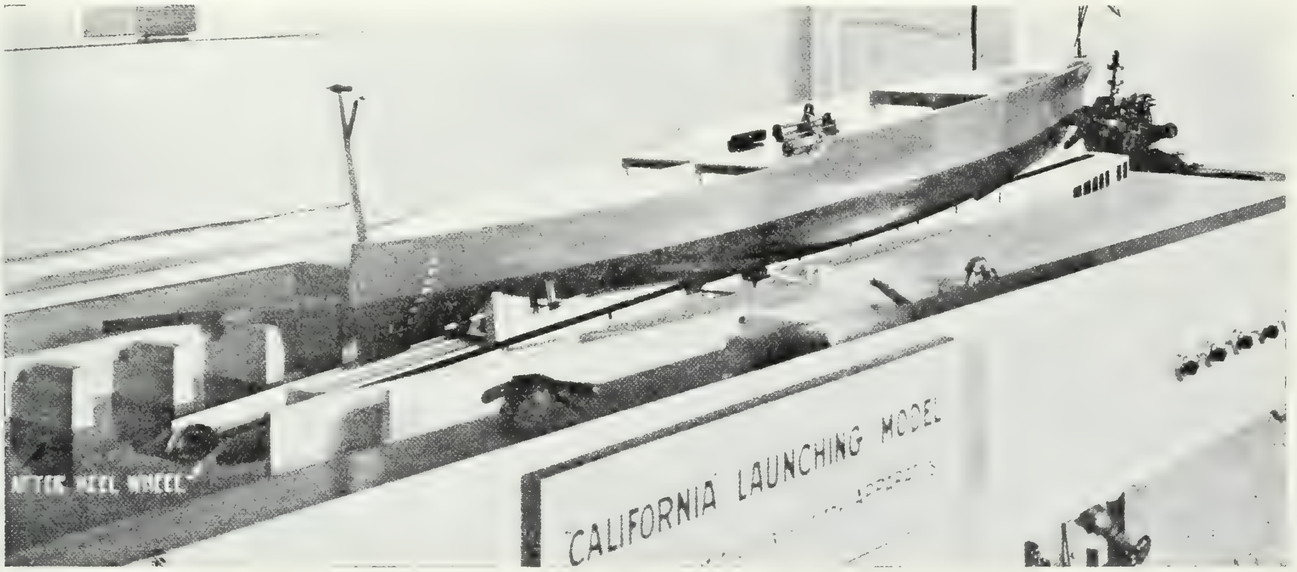
U.S.S. CALIFORNIA
GENERAL ARRG'T. OF LAUNCHING BRAKES, CABLES, PIPING, ETC.

H Gleason

Diagrams Showing Experiments With Launching Model for U. S. S. California

Launching of Ships in Restricted Waters

By **Captain H. M. Gleason,** Construction Corps, U. S. N., and **Lieutenant Commander H. E. Saunders,** Construction Corps, U. S. N.



Close up view of launching model of U. S. S. California

ALTHOUGH there have been ten papers read before this society giving notes and data on the launching of various types of ships, the subject of the launching of ships in restricted waters has not been touched upon. The authors therefore have undertaken to present this subject based upon the experience of the Mare Island navy yard.

Unfortunately, there is very little definite information obtainable from textbooks, technical papers, etc., giving the results of actual launchings in which means to check the speed of ships have been used. It is therefore believed that the subject-matter of this paper will be a welcome addition to the already published data on launchings.

The launching of a large ship is attended with a certain amount of risk under the most favorable conditions, and when there is added to this the problem of checking the ship after leaving the ways, the anxiety of those responsible is not relieved until the ship comes to rest. In most shipyards in this country there is sufficient water space in wake of the building slips to allow the ship free scope, or at least sufficient water space to check the ship by the dropping of anchors. In some shipyards situated on narrow waters, the building slips are inclined at an angle of about forty-five degrees to give greater travel.

Various methods have been successfully used to check vessels on leaving the ways, such as:

(a) The breaking of rope stops.
(b) The use of wood friction wedges.
(c) Fitting of a mask on the stern.
(d) Dropping of anchors.
(e) Slewing the stern with the channel by dropping stern anchors.
(f) Chain drags.

Anchors are generally fitted for emergency use in connection with any of the above methods.

The most commonly used method, especially in English and Scotch shipyards, is the use of heavy chain drags. The amount of chain used varies, according to the experience at the various yards, and depends upon the nature of the surface available for the drags, launching speed, etc.; but the usual weight of chain is about one-twentieth of the launching weight to bring the vessel to rest in from 200 to 300 feet after leaving the ways.

The large building slip at the Mare Island navy yard is set nearly at right angles to the channel, which is 1230 feet wide. It is therefore necessary to check any large vessel by other means than anchors, as the space available is not sufficient for direct checking or for slewing the stern. The Prometheus (fleet collier) was launched in 1908, using chain drags to stop her. Although the drags successfully stopped the vessel within 200 feet, the work necessary to pile the chain, to completely clear the slip of obstructions (blocking, shoring, etc.), and finally to untangle the masses of chain, was extensive and costly. The next vessel launched (August, 1912) was the fleet collier Jupiter, of 19,000 tons loaded displacement and 5207 tons launching weight. The problem of stopping this vessel was gone into very carefully, and the final conclusion was to use chain drags. Friction brakes were considered, but the development of the idea at that time was not sufficient to warrant the trial. A description of the chain drags as used in launching the Jupiter will be of interest. In all 390 tons of chain were used, coiled in fourteen coils ranging from ten to fifty tons each, the smaller coils or drags being arranged to take up first in succession to minimize the danger of parting the cables due to a too sudden stress. Seven piles of chain were placed on each side, connected up as shown below to three two-inch (diameter) wire ropes attached to pads on the ship. The disposition of drags, wire ropes and pads was as follows:

Destination of Drags	Weight (tons) Port	Starboard	Distance of stem beyond end of ways when drag takes up Feet	Remarks
1-A	10	10	37	Attached to pad at frame 45
1-B	15	15	50	Attached to drag 1-A
1-C	25	25	60	Attached to drag 1-B
2-A	25	25	84	Attached to pad at frame 35
2-B	25	25	92	Attached to drag 2-A
3-A	45	45	124	Attached to pad at frame 25
3-B	50	50	307	Attached to drag 3-A
	195	195	Total, 390 tons	

As a further precaution, two 3000-pound anchors, one port and one starboard, were secured on the side of the ship at frame 136, each with 10-inch hawser stopped up at intervals and carried through stern chocks. One of these anchors was to be dropped on a signal given from the bridge should the drags fail to act. These anchors were intended to turn the stern up or down stream as seemed most expedient.

The actual results of the action of the chain drags were as follows:

Velocity of ship at time of pivoting (also maximum), 16.2 feet per second.

Velocity of ship when fully afloat, 15 feet per second.

Distance run after first drag took up, 213 feet.

Drags 1-A—Port and starboard moved, 213 feet.
1-B—Port and starboard moved, 200 feet.
1-C—Port and starboard moved, 190 feet.
2-A—Port and starboard moved, 166 feet.
2-B—Port and starboard moved, 158 feet.
3-A—Port and starboard moved, 126 feet.
3-B—Were not moved.

The total weight of chain drags actually coming into play was therefore 290 tons, or one-eighteenth of the launching weight.

Early in 1913, in preparing for the launching of the next ship, the fleet oiler Kanawha, the development of friction brakes was actively taken up and experiments conducted which gave assurance of the practicability of friction brakes, using wire ropes passing through steel blocks under pressure. In the future design and development of these brakes advantage was taken of the data on this subject presented by Mr. A. Hiley, associate member of the Institute of Naval Architects, in a paper prepared by him and published in September, 1913, issue of The Shipbuilder.

The launching weight of the Kanawha was estimated at 4000 tons (actually was 4100 tons), and it was therefore estimated, from friction data obtained in experiments, that two launching brakes would be sufficient. A description of the launching brakes used and other precautions taken to check the ship is given as follows:

"The brakes were securely anchored on each side of the slip, twenty-two feet from the center and about eighty feet aft from the bow. In each brake the friction length employed was two two-inch diameter steel wire ropes (six strands of thirty-seven wires each), 600 feet long, wound on reels fitted with brakes placed about fifty feet from the brake. Springs tightened by screws produced the requisite pressure upon the ropes, which are gripped between grooves in the upper and lower steel castings. In order that the pressure applied by the tightening screws might bear equally on the two ropes, the upper casting is formed with a ridge at the center to which the pressure is transmitted by beams formed of channel sections and plate. To regulate the pressure on the rope at will, three hand winches were provided and bull wheels fastened to the nuts over the spring washers. These were connected by a three-eighth-inch (diameter) endless wire rope. The two friction cables were connected by a heart shackle to a single two-inch (diameter) wire steel hawser, 560 feet long, which was shackled to a pad on the ship's side at frame 46 and on line with the second stringer, the same arrangement being used on both sides of the vessel. To assist in stopping the vessel, a mask was also fitted on the stern, 16 feet wide by 11 feet high, the lower edge being eight feet above the keel line. As a further precaution, a 11,000-pound anchor was secured on the port side of the ship at frame 112, with a 10-inch hawser stopped up at intervals and carried to the stern bitts. This anchor was to be dropped upon signal given from the forecastle should the brakes fail to act, and was intended to turn the stern down stream. A 6000-pound anchor was housed in the port hawse pipe and was to be dropped if it became necessary to hold the bow."

The results of the launching, as far as they concern the launching brake, were as follows:

Launching weight, 4100 tons.
Maximum velocity, 16 feet per second.
Velocity when ship floats, 13 feet per second.
Total distance friction ropes were drawn through brakes before ship was stopped, 341 feet.

These same brakes and arrangements were used in launching the Maumee, a sister ship to the Kanawha. The results in the case of the Maumee were as follows:

Launching weight, 4370 tons.
Maximum velocity, 17.25 feet per second.
Velocity when ship floats, 14 feet per second.
Distance cables were drawn through brakes before ship stopped, 329 feet.

The same brakes, but without the stern mask, were used in launching the Cuyama, a sister ship to the Kanawha and Maumee. The results in the case of the Cuyama were as follows:

Launching weight, 4056 tons.
Maximum velocity, 16.7 feet per second.
Velocity when ship floats, 14.5 feet per second.
Distance cables were drawn through brakes before ship stopped, 444 feet.

By comparing the foregoing data, the effect of the stern mask may be estimated as the Cuyama, without the mask and with a slightly greater volocity (when afloat), traveled 125 feet farther than the Maumee.

The action of the wire rope cables under pressure between the upper and lower cast steel brake blocks bears a very important part in the successful operation of this type of brake. There were no reliable data on the coefficient of friction under the actual working condition, and no guide as to what type of wire rope was best suited to obtain the desired frictional resistance. These two questions were solved by numerous experiments, and actual trials on vessels launched.

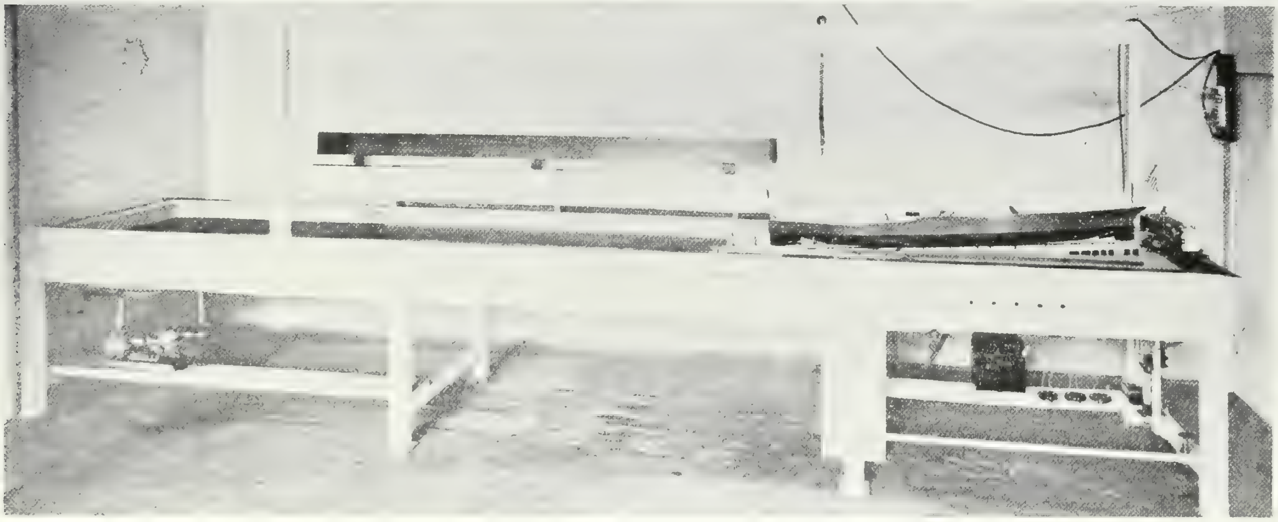
As to the coefficient of friction, the figure given by Hiley in the article previously mentioned is 0.08. All available information in handbooks and experiments on a small scale indicated, however, that the coefficient of friction was much higher than this, presumably about 0.2. To check this figure and to test the apparatus, the hydraulic brake developed for the California was mounted on a temporary stand and run with full pressure, using one friction wire in one of the grooves. The coefficient of friction deduced from these experiments is about 0.24, and the results obtained indicate that this value remains practically constant for all loads and all speeds of the wire rope.

As to the type of wire rope to be used, it was obvious that the wire strands on the outside of the rope would have to lie exactly parallel to the axis of the rope in order to prevent "rifling." It was evident, after the first experiments, that the wire would score the grooves in the cast steel blocks, but so long as the scores remained parallel to the blocks, the action of the frictional pull on the wire ropes was entirely satisfactory, causing no unlaying or tightening up of the strands. There was some question as to whether a solid rope was necessary or whether a rope with hemp core would not be more suitable. The latter rope, being more elastic, is less likely to seize in the grooves, and for this reason has been used in all the launching operations with this brake. There had also to be considered the possibility of one or more strands breaking inside the brake and causing a jam. In this event the wire rope would likely be broken or the chain pendant to the ship carried away. During the several launchings, the outside wires in the strands have been perceptibly flattened by abrasion, but in no case has any strand parted or any wire rope jammed. In this connection it is interesting to note that the same wire ropes were used as friction ropes in the launching of three large ships, and now are in condition for use with at least as many more. From the experience gained at the Mare Island yard the most satisfactory type of wire rope is two-inch diameter, black, plow steel, six-strand, thirty-seven wires each, one hemp center, ordinary lay, and 137 tons breaking strength. Particular care was required under the specifications for the rope to have the individual wires in each strand laid parallel to the axis of the rope at the point of frictional contact.

It was also considered necessary to have more definite control over the pressure to be applied to the friction blocks, and the screw, nut and bull wheel scheme was abandoned for hydraulic cylinders and pistons, as shown in photographs and plans. The experiments conducted showed that two pressure cylinders were sufficient in lieu of three.

Although previous experience with these brakes was sufficient to determine the number to be required in launching the California, the exact pull required from the brakes, collectively and individually, and the actual force required to stop the ship were not definitely known. There were also other questions on which more complete information than was available was considered necessary, such as the actual pivoting point at various tides, the depth of water required to accommodate the deepest dip of the stern, the behavior and clearance of the forefoot on leaving the end of the ways, etc. It was therefore decided to construct and try out a launching model based on the law of comparison similar to model tank experiments. This model could therefore be launched at will and as often as required, varying the conditions to suit those expected at the time of the launching.

The model was constructed with a length ratio of 1:96 (scale ⅛ inch equals one foot), as giving a craft which was easy to handle, yet sufficiently large to make possible a fair degree of accuracy



General view of launching model and tank, U. S. S. California in the results. Briefly, the dimensions of the model are as follows:

Length, 6 feet 3 inches.
Beam, 12 inches.
Weight (approximate), 39 pounds.
Material—Wood, hollow, finished in spar varnish.
Displacement, longitudinal position of center of gravity and longitudinal moment of inertia may be varied at will.

The tank and framework supporting it, shown in the photographs, require no special comment. Fresh water is used, and the contour of the river bed is represented by a layer of gravel and sand on the bottom of the tank. The water area represents the width of the channel, 1230 feet, by a certain portion of its length, 320 feet. A modified form of hook gauge records the tidal level in feet and tenths. The ground ways (with camber), the ship, the cofferdam bulkheads, crane piers, etc., are, of course, all reproduced exactly to scale.

To obtain correct results by the method of comparison, it is necessary for the model to run off the ways and through the water at its "corresponding speed." By running on a system of rails and steel wheels with hardened pivots, it was possible for the model to accelerate itself at the required rate without the application of any external force. A central rail under the keel of the model runs on two large flanged wheels, one under the vessel and one at the end of the ways; two wheels at the fore poppets run on to rails which represent the ribbands of the ground ways. This system of mounting the model on three points was suggested by Mr. Percy A. Hillhouse and Mr. William H. Riddlesworth in a paper presented by them at the fifty-eighth session of the Institution of Naval Architects, March 29, 1915, as being decidedly preferable to mounting on six wheels, especially when the ways were cambered. The forward keel wheel of the California model supports the weight until the keel track reaches the after keel wheel; the latter then supports the weight until the model pivots, when a special releasing device drops it clear of the forefoot as the model leaves the ways.

Although not shown on the photographs, the tumbling shores, cribs, wedges, cable reels and brakes were later added to the model, in order that launching drills might be held at the model, and the various gangs acquainted with their duties and the sequence of operations. A small brass preventer dog shore and a set of solenoid-operated mechanical triggers represent accurately the dog shores and hydraulic triggers on the ship. Two brass trimming masts, with pencils attached, erected at the forward and after perpendiculars, record the traces of the bow and stern at all points of the launching operation.

A special recording mechanism was designed and built, to record simultaneously all data and to make the model as nearly as possible automatic in its operation. Reference to the photographs will indicate the general arrangement of this machine. Without undue elaboration of details, the construction and operation of this mechanism may be described briefly as follows:

A small cord (or cable, as it will hereafter be called) is fastened by a wire hook to an eye plate in the bow of the model at the 16-foot water line. This cable is led forward over an aluminum idler pulley carried on a swinging frame and then back and around a small drum about one and a half inches in diameter. Sufficient cable can be wound in a single layer on this drum to permit the model to run to the far end of the channel. The drum has two silver contacts on a small commutator and acts therefore as a chronograph, giving two marks per revolution on the recording paper. A standard navy mean time break-circuit chronometer indicates seconds on the recording paper (by means of suitable solenoids and pencils) as a reference for the chronograph readings. The recording paper is that supplied for the Burroughs adding machine; it is drawn at constant speed over the paper table by two rubber rollers geared to a small D. C. motor. A small controller with adjustable segments, also driven from this motor, controls the current to the solenoid triggers and to the tripping coils of the brakes; this controller switches on and off the motor and other solenoid circuits and renders the mechanism entirely automatic in its operations. As the entire launch consumes only seven or eight seconds, it is not practicable to arrange for manual operation in this connection.

The launching brake mechanism, also to be very briefly described, does not, of course, operate in exactly the same manner as the brakes on the full-sized vessel. The small drum upon which the cable is wound is constructed with heads of highly polished steel. Cork insert brakes, carried on swinging plates, bear against the heads of the cable drum and serve to retard the angular motion of the latter when the brakes are applied.

A short account of the sequence of operations during a launch may serve to explain more clearly the exact method of recording the desired information. Assume, first, that the model has been released and is moving down the ways; the cable is paying out freely, as the only resistance is that of the small brush on the chronograph segments.

1. At the designated moment, the controller operates the brake release and allows the weight carrier and weights to drop.
2. The weight carrier, acting through the cords, causes the brakes to grip the revolving drum.
3. The latter, although continuing to revolve and to act as a chronograph, is retarded somewhat by the action of the brake.
4. A pull is exerted on the cable, which, leading around the idler pulley so as to effect a change of direction of 180 degrees, draws the latter toward the model against the action of the double springs.
5. The pencil attached to the arm records the cable pull on the moving paper strip, while a stationary pencil traces at the same time a zero or reference line.

From what has been said in the preceding paragraphs, it will be be evident that all elements of the launching conditions may be varied at will, using the apparatus to record all the data for successive series of runs. The various unknown factors are then determined as described below. With regard to the actual performance of the model, it may be said that all parts of the mechanism functioned in a most satisfactory manner and that the results for corresponding and similar runs were remarkably consistent.

To work up the results, it is of course necessary to apply the principles of mechanical similitude as is done for all work in the model basin.

The length ratio, L being 96, the corresponding speed ratio is $\sqrt{L} = \sqrt{96} = 9.798$. Inasmuch as the maximum launching speed of the model is about three feet per second, corresponding to a ship speed of twenty-nine feet per second, and as the vessel in any circumstances would never attain such a high velocity, means are adopted to reduce and regulate this velocity to correspond with what may be reasonably expected on the day of the launch. A short length of cord is attached to the model and drawn through an improvised friction brake, the length of cord being varied to suit the final launching velocity required. As the effect of this retardation is only to reduce the initial velocity, and as this action ceases long before the brakes are applied, it need not be considered except when determining the shape of the entire velocity curve. The final speed (when entering the water) may be varied in this way from twelve feet to twenty-four feet per second.

The chronograph is so proportioned that each of the intervals between record marks represents about 19.2 feet travel of the vessel. For the sake of convenience, all units, unless otherwise noted, will hereafter be expressed in proper terms for the full-sized vessel. All calculations and curves have been worked up on this basis, as the work is then more easily followed by all concerned.

The length ratio, L, as noted above, is 96.

The displacement ratio is therefore $L^3 = 884{,}736$. For a weight of ship and cradle of 16,000 tons, this corresponds to a model weight of 40.52 pounds.

The ratio of cable pull on the model and brake pull on the ship is also L^3, or 884,736. (From the theory of mechanical similitude, where $f \times s = \frac{1}{2} mv^2$.)

A pull of 500,000 pounds on the ship is equivalent to a pull on the model cable of 9.042 ounces, which, in turn, is represented by an ordinate of 0.81 inch on the recording paper. The model brake is capable of exerting a total relative pull of about 900,000 pounds, or some 400 tons.

The brake mechanism has been calibrated with extreme care, using a specially constructed and calibrated spring to exert a tension upon the cable in its normal direction, with the brakes set and the recording mechanism in operation. After repeated measurements of the resistance, due to the rotation of the drum, the rotation of the idler pulley and the friction of the pencils on the trimming masts, it has been assumed that this resistance may be neglected, as being within the limits of accuracy of the observations as a whole.

In order that the traces of the bow and stern may be correct in shape, it is necessary that the moment of inertia of the model about a transverse horizontal axis through its center of gravity should bear the proper relation to that of the large vessel; that is K, the radius of gyration, should vary as L. To this end, the model is suspended by two cords of known length equidistant from the center of gravity, and K determined in the usual manner. The inside lead ballast weights are then placed in such position as to fulfill the required conditions. It is understood, of course, that K for the large vessel must be found by more or less approximate methods. The pivoting point, the drop of the bow, the clearance of bow and stern, the final trim afloat and the position of the model when it comes to rest, are easily obtained from the record of the trimming masts. The time and point of application of the brakes are indicated on the recording strip as shown on the plan.

In the figures presented by Mr. Hiley in his paper on the launching brake, the water resistance is assumed to absorb about 20 per cent of the total energy of the vessel. This figure is necessarily quite approximate, for reasons stated at the beginning of this paper, and an attempt has been made at this point to arrive at a more definite value of this quantity. As is well known, the water resistance of the vessel during launching can be represented by the equation $Rw = K_2V^4$, provided the cradle and other fittings are of such shape as to produce wave-making resistance only. This is not exactly the case, however, as the skin friction resistance is a considerable portion of the whole; the water resistance is best represented, therefore, by a simple equation of the form $Rw = K_2V^3$. Although this equation, as it stands, does not conform exactly to the theory of mechanical similitude, it is used here as a means of simplifying the work. To translate model resistances into ship resistances would require an excessive amount of work, if this operation were to be carried out exactly as is done at the model basin.

By substitution and integration of the equation $Rw = K_2V^3$, we find that the velocity-distance curve is represented by the following equation, $V = \frac{M}{K_2S} = \frac{K_1}{S}$. Where V is the velocity and S the distance run, measured from a certain origin, K_1 and K_2 are constants. The value of K_1 for this hyperbolic curve may be found by solving two simultaneous equations representing two points on the velocity curve where the vessel is clear of the ways and running freely.

The curve of velocity thus obtained is only approximate, but it agrees closely with the curve as actually recorded, and it forms a very convenient means of computing the water resistance during the period when the ship is being brought to rest by the brakes. For instance, two points on the curve of Run No. 121 are taken at 19 feet per second and 14 feet per second; the two equations are then $VS = K_1 = 13{,}085$, and $Rw = K_2V^3 = 81.64\ V^3$.

The first equation indicates that the ship, leaving the ways as on Run No. 121, and neglecting the effects of the wind and tide, would still have a velocity of one foot per second at a distance of two and one-half miles.

The second equation enables us to plot the curve of water resistance as shown on the plan, taking values of velocity, of course, from the curve of Run No. 119. When integrated, the curves give the following results:

Total energy absorbed by water resistance, feet-pounds	66,740,000
Total energy absorbed by brake resistance, feet-pounds	138,360,000
Total energy as recorded from curves, feet-pounds	205,100,000
Kinetic energy of vessel traveling at 19.4 feet per second, when brakes are applied, feet-pounds	201,600,000
Difference, feet-pounds	3,500,000

Representing an error or discrepancy of less than 2 per cent.

Converting the Ferris Type Wooden Hulls Into Motorships

By Renwick Z. Dickie

FROM a shipowner's point of view, the value of a vessel is decided by what she can earn as an investment. To analyze this value it is necessary to consider the original cost of the vessel, reliability of the hull and machinery, the maximum economical speed, the largest amount of cargo possible to carry; also the question of easy loading and discharging, and the economical operations with a large cruising radius.

NOTE

In October, 1917, an article appeared in Pacific Marine Review which was based on Mr. Milton L. Towne's ideas of what the future marine power plant would be, and the following article and outline sketches show this type of plant in the wooden hulls of the Ferris type. As the United States government is offering these hulls for sale at an attractive figure, shipping men are considering the possibilities of their usefulness.

In order to obtain the services of the best men for the operation of a ship, especially when long cruises are to be made, it is necessary that the accommodations for officers, engineers and crew be so fitted that the men who operate the ship will look upon her as their home. From the operating engineer's point of view, the engine room should be light and airy for comfortable work.

The Winton Engine Works of Cleveland, in collaboration with Westinghouse, have taken up the matter of a Diesel electric drive and are manufacturing direct-connected stationary engines for this purpose which are light enough to allow the main power plant of the vessel to be placed on deck. As many units are used as are necessary for the power required and engine parts would be interchangeable so that only one set of spares need be carried.

In the Ferris type of hull there is between the top of keelson and the center of propeller shaft a distance of only three feet, and, in order properly to place the driving motor and at the same time reduce its weight by adopting a higher speed, it is proposed to use reduction gears. The illustrated plan shows two motors on a common bedplate with a common reduction gear and an intermediate shaft interposed so as to facilitate removal of tail shaft when necessary. This is a very flexible arrangement and is suggested by the writer in place of a single heavy direct-connected motor.

Alternating current apparatus has generally been adopted for electrical marine propulsion, especially in high-powered vessels, and it has certain very decided advantages. The apparatus is more simple, higher voltage can be used and weights reduced, and first cost would be lower. On the other hand, control is much more difficult, and indeed quite impractical with a speed reduction of only three to one between the generators and the tail shaft, and with both running at the relatively low speeds demanded in this particular problem.

Direct current, on the contrary, offers easy control and there are many advantages in its use for auxiliary machinery. The Westinghouse experts propose its use with a complete electrical installation for all engine room auxiliaries and deck machinery so controlled and wired that anyone of the three main driving units may be used while in port to furnish all the power necessary for the operation of cargo winches and windlasses. For lighting, heating and any other necessary use while in port, auxiliary power is supplied by two twenty-five kilowatt Diesel engine driven generators.

In comparing this electric installation with propulsion by steam, it is assumed that three first-class electricians can properly care for the plant, and that their wages would just offset the wages of the firemen in the steam plant.

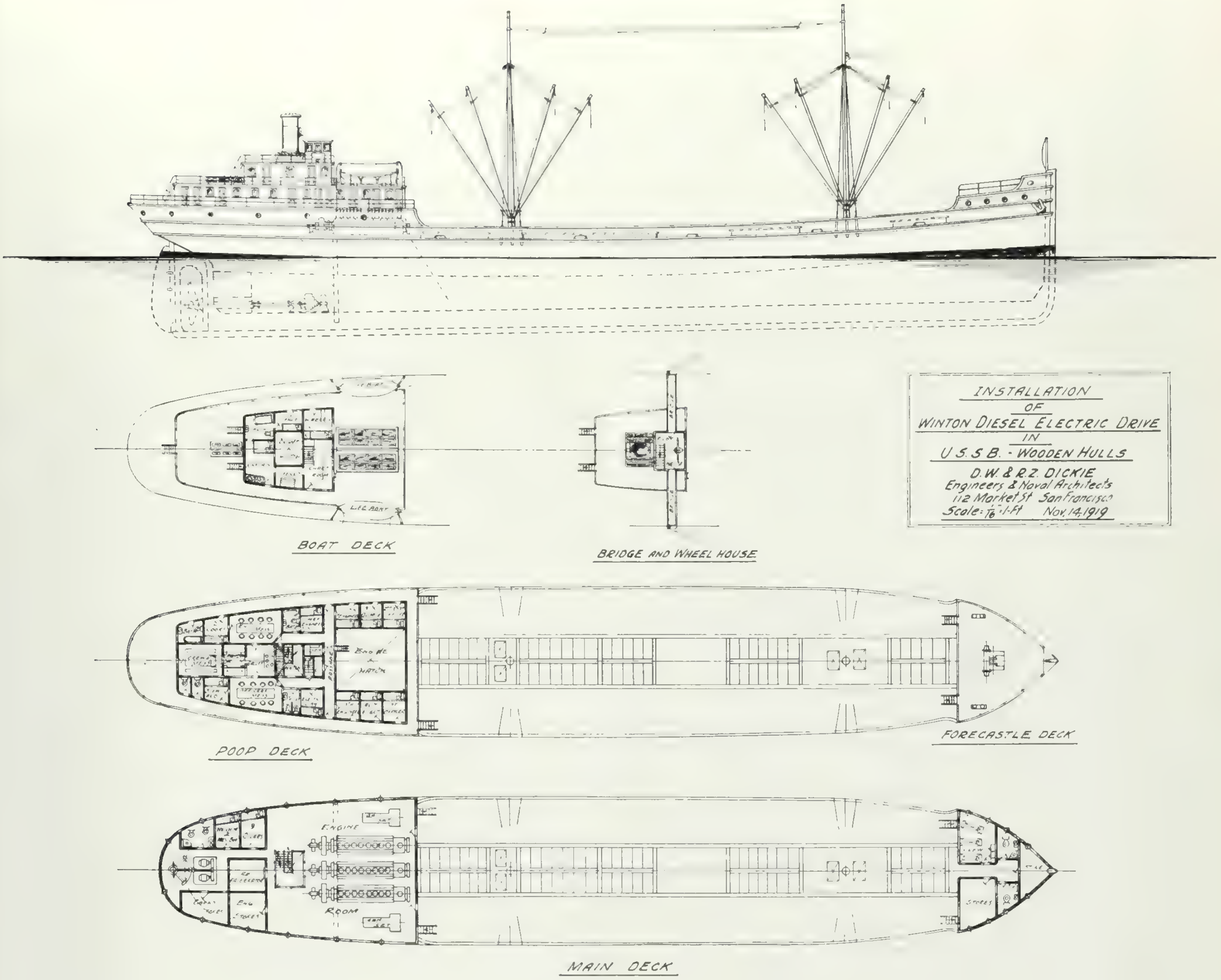
The arrangement plans herewith, illustrate a Ferris hull plant of this type, with the engines placed on deck, supported by a heavy centerline and thwartship bulkhead just forward of the motor compartment, leaving almost the entire under deck space for cargo. The fuel tanks could be placed alongside of the keelson the entire length of the ship, giving a decided advantage in trimming when the ship is running light.

In order to illustrate the commercial gain of a Diesel electric drive, placed in a wooden Ferris hull, a comparison will be given between two ships of this type, operating on the west coast, using available freight rates and charges, one vessel being equipped with a steam oil-burning plant with 1400 indicated horsepower, and one equipped with an electric plant, giving the same effective horsepower at the propeller.

The Ferris ships have a length over all of 281 feet 6 inches, a B. P. length of 268 feet, a beam of 46 feet and a depth of 26 feet. For comparison, we will take the Ferris ship with water tube boilers and a triple expansion engine with cylinders 19 feet by 32¼ inches by 54-inch and 42-inch stroke, operating at 90 r. p. m.

Operators, after careful examination of their books, have made a statement of earnings a deadweight ton for the last year, which is based on the total amount of freight carried, the amount received for this freight and the expense of operating a ship of this size as an oil burner over a period of one year. The following data, compiled from this statement, will show that the proposed electric drive effects a saving of eighty tons in machinery weights, and of 430 tons in fuel weights for same cruising radius, when compared with the triple expansion oil-burning steam plant.

	Diesel Electric Drive	Triple Expansion Plant
Indicated horsepower	1400	1400
Weight of plant installed, tons	220	300
Fuel used per hour per H. P., lbs.	.45	1.25
Fuel used per hour, barrels	1.9	5.4
Fuel used per day in barrels at sea, barrels	42.7	129.6
Fuel used per day in port, barrels	8	26
Cost of fuel oil, per barrel	$1.85	$1.60
Cost of fuel oil per day at sea	$87.32	$207.36



Inboard profile and sections of Ferris type wooden hull arranged for propulsion by Winton Diesel, Westinghouse Electric drive

	Diesel Electric Drive	Triple Expansion Plant
Cost of fuel oil per day in port	$14.80	$41.60
Days at sea	270	270
Days in port	95	95
Water used per day for power plant, tons	00	3.75
Fuel used per day, tons	6.74	18.64
Weight of fuel carried, tons	220	650
Weight of water carried, tons	50	170
Cost of water,, per ton	$1	$1
Cargo carried in deadweight tons, ton	3400	3000
Earnings of ship per deadweight ton, one year	$50	$50
Fuel used in one year, barrels	13,504	37,462
Water used in year for power plant, tons	00	1125
Total cost of fuel and water for one year	$24,983	$61,065
Profits of ship in one year	$170,000	$150,000
Total net profits per year	$145,017	$88,935

Over a period of a year in the operation of the vessel, taking the present cost of fuel and water, she would have an increased carrying capacity of 400 tons, and would net her owners about $56,082 additional, through the saving in fuel, water and weight, or a net gain in the commercial efficiency of the ship of about 38.6 per cent.

S. S. AGAWAM SALVAGES A SHIP

TOWING ability seems to be a strong point of the geared turbine. Not long ago the turbine-equipped steamship Alcona towed a bark from Balboa to Antofagasta, and now it is learned that her sister ship, the steamship Agawam, has duplicated her exploit.

The Agawam, famous for being the first fabricated ship in the world, left Port Eads for Hull on October 13. When in mid ocean a wireless was received from the Norwegian steamship Seypen, which stated she had a broken shaft and was in great danger, as she was wallowing in the trough of the sea with a heavy gale blowing.

Twenty-four hours later the Agawam had a line aboard the Seypen and, proceeding at the rate of six knots an hour, brought her crippled charge into the port of St. Michaels, Azores, by October 31.

The Agawam is equipped with Westinghouse-geared turbines.

European Marine Notes

By Special Correspondent

THERE opened at Olympia, London, on September 25 a shipping exposition, with sidelines, which has proved to be of a very interesting character, although a really comprehensive shipping show is recognized to be at the present time an impossibility. A trade which is concerned with every problem of loading, carrying and unloading of men and goods by sea; every problem of marine construction and propulsion, of ventilation and preservation of cargo in all climates; and of safety and succor for those on the sea, and of economic and technical handling of ships in harbor, and a thousand other things that ought properly to be represented in a shipping exhibition, could not be illustrated in any London enclosed space.

The Shipping Exposition, which was opened by Lord Weir at Olympia, is almost as representative as it could humanly be, and the ordinary Londoner who dimly realized London as a seaport would easily be able to feel something of the immensity and complexity of the shipping industry upon which the life of the nation has depended during the war, and upon which so much of Britain's economic stability is built.

It is a pity, perhaps, that some of the plain and attractive ideas seen in the Dutch section are not carried out on the English side. Their large models showing the ports, the docking facilities, the warehouse system, and the general layout of the work, are attractive to the ordinary visitor, and very interesting to the shipper. British merchant shipping, however, is so old a part of the national business that shipping people probably take these things for granted. There are over 350 exhibitors, and the exhibits include many sides of ship construction, ship equipment, methods of handling cargo, new safety devices in ocean travel, wireless apparatus (including an installation by which visitors can communicate from one end of the building to another), and a great variety of shipyard plant and equipment. The exhibits deal not only with the life of a ship in all its phases, but also with diving tanks and life-saving chambers, and salvage appliances. There is a kinematograph theatre showing forms of shipbuilding, and marine engineering, and dockyard work.

The Dutch Section

The size of the Dutch section at the Shipping Show reflects the closeness of the shipping connection between England and Holland. There may of course still be people who believe that Dutch activities consist mainly in draining a flat, waterlogged country and in following agricultural pursuits. With the idea of focusing attention upon the other departments of Netherlands enterprise, the Dutch section was organized and all kinds of publicity functions arranged and luncheons given. At present the Dutch shipyards are doing very little new construction for British shipowners, but a large amount of repair work on British ships is undertaken in Holland. Dredgers, floating cranes and other equipment have long been specialties of Dutch firms, and much of the dredging done at port and harbor extensions has been carried through by Dutch dredgers. I hear that an order for a large floating crane, similar to the one shown in model at the present exposition, has been placed with a Schiedam firm by the Mersey Docks and Harbor Board, quick delivery having been a factor in deciding the contract. The crane has a lifting capacity of 150 tons, and a great outreach. I hear also that a large coal import and bunkering firm in Amsterdam are in treaty with a famous engineering concern in the north of England for the supply of a number of very powerful transporters with chutes and grabs capable of achieving record bunkering.

Some Famous Models

To interest the general public there are a great number of beautiful models. Denny Brothers of Dumbarton, Scotland, whose ancestral yard launched the first steamship ever seen on the Thames, show a model of the Loch Lomond, a small steamboat built in 1844; the King Edward, the first commercial turbine steamer built for Clyde passenger traffic; the Otaki, a large New Zealander, the first commercial vessel fitted with combined turbines and reciprocating machinery; the destroyer Badger, the first naval vessel ever fitted with geared turbines.

Hawthorn, Leslie & Company have also a fine show of models, including those of many ships built during the war. One is the destroyer Warwick, which was Admiral Key's flagship during the Zeebrugge operations. A very interesting commercial vessel is the Sir Ernest Cassel, built for a Stockholm firm to carry iron ore, with a very remarkable system of discharge compartments and chutes and iron skins, by which the discharge is effected with great economy. Yarrow's have a model of H. M. S. Turquoise, which attained the record speed of 45.5 miles an hour on her official trial. The Clan Line shows some extraordinary models and photos.

There is a big show of steering gear, electric fans, patent marine governors, searchlights, patent davit gear for lifeboats, patent rudders, ship's painting and composition plants, pumps, patent bulkheads, rubber and asbestos goods for ship's use, and hundreds of other important sections of ship work and equipment. The greatest popular novelty is in the Dutch section. It is a floating buoy which automatically releases itself from a sinking ship, and, while floating in the water, sends up a rocket every hour for twelve hours, and emits a loud sound signal. Moreover, it marks the spot with a light continuously for three months. It was devised by an Amsterdam firm of engineers, and has been adopted by the Netherlands government.

Southampton's Big Ships

The transfer of the Vaterland to the American Line and the Imperator to the Cunard Line leaves only one of Germany's leviathans—the Bismarck—undisposed of. Whose flag this big ship will eventually fly is at the moment not very clear, but, however the decision goes, it seems to be certain that, like the others of her class, she will be obliged to use Southampton as a base on this side of the Atlantic. No French port can accommodate her. As a matter of fact, France's biggest ships come regularly to this Hampshire port to dry dock. With the Aquitania, Mauretania, Olympic, Leviathan, Imperator and Bismarck to provide for, Southampton will have it hands pretty full. As a big ship port Southampton has a brilliant future, provided its harbor board rises to the occasion. The docks are owned of course by the railway company.

Shipping Expectations

Although not quite in the forefront of Stock Exchange activity, the market for shipping securities continues to enjoy a considerable measure of popularity. Advances occur almost daily in the case of a number of selected issues; reaction is seldom witnessed, and when it takes place is almost invariably of modest extent. Four securities in particular have been outstanding favorites with the public — namely, the Peninsula and Oriental Deferred, Royal Mail, Furness Withy, and Cunard. Making allowances in some instances for capital adjustment, all these securities at the present time have a record market value, and there is plenty of confidence that the upward movement is not yet at an end. Various amalgamation and other rumors from time to time assisted the advance, and it is certainly striking that, while none of the freely discussed arrangements has so far come about, the strength of the market has been easily sustained. So far as the Cunard and Furness Withy are concerned, capital reorganizations have already taken place in the form of reserve capitalizations providing for new share issues on the basis of share for share, and rumor is persistent that, as regards the latter, some further development is in contemplation following the recent alteration in the chairmanship. The P. & O. and the Royal Mail are also expected to formulate plans for capital rearrangement before proceeding with the still bigger proposals which are so confidently foreshadowed.

British Shipowners Meeting Foreign Competition

Sir Frederick W. Lewis, the new chairman of Furness Withy & Company, has been telling a very interesting story of the way his company is restoring foreign services. During the war most British shipping was confined to home trades, but since the conclusion of the armistice and the partial release of shipping everything has been moving in the direction of restoring the suspended services. The Furness Withy people, for example, are restoring the Johnston Line trade between this country and Greece and Rumania, and the Prince Line services between this country and Egypt and the Levant, between New York and the Far East, between New York and the Argentine, between New York and the Brazils, and between New York and South Africa. The Houlder Line is now running its full South American service. The Prince Line is also developing its United States-France business, with services from New York to Mediterranean and Levant ports. Arrangements have been made with the Canadian Pacific Ocean Steamship services to provide half the tonnage required in their services from Montreal to London and Montreal to Antwerp. These trades are known as the Canadian Pacific Furness Joint Services. The Furness Withy Company has also provided tonnage in the place of the old Hansa Line, which operated the Bombay-Antwerp service prior to the war. A great many other cases of restoration could be quoted not only by this but by other shipping companies here.

Electrical Equipment of Ships

A special committee set up by the British Institution of Electrical Engineers has been engaged for some time in drawing up suitable regulations for the installation and maintenance of electrical equipment on ships, other than vessels of war. The institution is publishing these regulations in the form of a book of convenient size, containing an admirable digest of all the important conditions which insure the efficient and safe use of all kinds of electrical apparatus. Generating plant, switchboards, cables, batteries, lamps and motors are dealt with in a very complete manner, and special attention is paid to the possibility of disturbance of compasses. A short section is devoted to heating and cooking apparatus, and valuable suggestions are made in connection with protection from lightning. The special modifications necessary for work on oil ships are included, and the book concludes with notes on trials.

Japanese Marine Notes

By Special Correspondent

THE first of two sister ships building at the Asano yard, Tsurumi, for the United States Shipping Board was launched on October 6. She was christened by Mrs. J. L. Luckenbach, daughter of J. A. McGregor, special representative in Japan of the Shipping Board, in the presence of the large crowd that always attends an Asano launching. The name is the Eastern Merchant, and the second vessel, the Eastern Trader, will have followed her down the ways prior to the publication of this correspondence. Each will have a deadweight tonnage capacity of about 13,000, which makes them the largest vessels building in the Orient for the States, and they will be, moreover, the only twin-screw vessels of the thirty. After the launching some 800 invited guests were served with luncheon, at which Soichiro Asano, president of the shipbuilding company, and Mr. McGregor spoke. Three vessels for the board have been launched, at this writing—by Uraga, Yokohama Dock, and Asano.

Uhei Matsumoto, who became chief delegate of Japanese employes to the labor conference in Washington when two others declined the post, has sailed for the States with the other members of the delegation. Despite the fact that the salient happenings attending his departure have been cabled to America, it is worth while to recapitulate them briefly. Although Mr. Matsumoto was second alternate delegate, his name appearing on the list below those of two others, he succeeded to the post when his seniors both declined to accept, because, although they probably were acceptable personally to labor, they found the employes' organizations opposed to them because of the method of selection. When Mr. Matsumoto accepted, and it appeared that he had no intention of withdrawing, he immediately became the object of bitter attack. Demonstrations were held as the time of departure drew near and culminated in an assembly of thousands at the Yokohama pier from which the Fushimi Maru sailed.

Steps had been taken by Japanese labor leaders to acquaint the American union officials, particularly Samuel Gompers, with what had happened. Mr. Gompers' name was drawn into the discussion several times, as an appeal, it was said, would be made to him, but this probably reacted upon labor, since it was seized upon by the chauvinistic newspapers as a pretext for asserting the complete independence of Japan. From the standpoint of capital and labor here, it appears unquestionable that the government has driven them farther apart. Whether the government will succeed in its main intention, which is to prevent any action that would affect Japan adversely, especially in regard to labor costs, will be learned better from what transpires at Washington. It is noteworthy that there was little police inteference with the demonstrations held prior to Mr. Matsumoto's sailing, and, from this and other similar instances of tolerance, it is deduced that the government is becoming more lenient toward labor organizations. But Article 17 of the police regulations remains in force and it can be invoked against strikers and demonstrators at any time the authorities choose.

Japan certainly is in a state of unrest (nothing approaching the acute state of other countries, however), and both capital and labor in America will be deeply interested in what transpires within the next few years.

Wages of Japanese merchant officers and seamen have risen appreciably since the beginning of the war, according to figures published in the vernacular press. A master or chief engineer received yen 120 or yen 100 a month, with about yen 30 as extra allowance, as compared with present salaries of about yen 200, with an allowance of about yen 150 in addition. Yen 30 to 50 a day is paid masters and chief engineers for short voyages, it is reported. Other wages and costs also have risen, but it would require a detailed study to determine just what relative effect the war has had on Japan.

Arrivals of Japanese vessels at Bangkok, Siam, for the first half of the year, numbered 119, as compared with twenty-five for the corresponding period of 1918. During the five months, March-July, 1919, Japanese arrivals were eighty-seven, as compared with 136 British, forty-five Norwegian and three American. Prohibition of the export of Siamese rice and the anti-Japanese boycott at Singapore affected the Siamese trade adversely, but these influences scarcely will be permanent.

Japanese charter rates slumped again in mid-October, as a result of the release of many vessels at British ports and the labor unrest in Britain and America. This list shows approximately the rates obtaining at the middle of October and the highest marks reached since the signing of the armistice:

	Mid-October Yen	Post-Armistice Record Yen
Single voyage to Europe	18.50	27.00
World service	14.00	20.00
Mediterranean	13.00	23.00
Australian	11.00	14.50
North American	11.00	14.50
Near-sea	8.50	11.20

Another factor tending to create nervousness and uncertainty is the present difficulty of securing bunker coal at ports on the European routes. Vessels were held up at London, Liverpool, Port Said and Gibraltar; there were restrictions at Colombo, and difficulty was reported by Antwerp, Rotterdam and other continental ports that rely on British fuel. The end of the railway strike would have a beneficial effect, it was naturally anticipated, but the Port Said and Colombo restrictions were announced prior to the strike. Some Japanese shipping men believed that the end of the strike would be followed by an immediate betterment, whereas others held that there would be continued shortages and uncertainty, with a consequent diversion of Japanese vessels from the European trade to home waters.

One of the most disastrous of recent wrecks in Japanese waters was that of the steamship Yoten Maru, which stranded September 19 while bound from Yokohama for New York via Muroran for bunker coal. The Osaka Marine Insurance Company had taken the whole of the hull risk, although it may have reinsured with foreign companies. The cargo risks, as reported by the Japanese newspapers, were: Tokio Marine & Fire Insurance Company, yen 1,000,000; Union Insurance Society of Canton, yen 800,000; Teikoku Marine Insurance Company, yen 500,000; Kobe Marine Insurance Company, yen 500,000; Osaka Marine Insurance Company, yen 450,000; Nihon Marine Insurance Company, yen 300,000; Yokohama Marine & Fire Insurance Company, yen 250,000.

The hull of the steamer broke in two partly down the sides, but, as last reported, the breaking was not complete. Her cargo was about 9000 tons of beans and cereals. There was delay in salvage, which caused some acrimonious discussion in the newspapers.

It is announced that the Italian Trieste Lloyd will operate a monthly service to Japan in the stead of that maintained prior to the war by the Austrian Lloyd. The first steamer was to arrive at Japan ports in November.

Following upon the recent announcement of the decision of the Nippon Yusen Kaisha to build 600,000 tons of new vessels, the Osaka Shosen Kaisha, it is reported, will build 500,000 tons at a cost of yen 150,000,000, which will be raised by calling in unpaid capital, with an increase of total capitalization from yen 50,000,000 to yen 100,000,000 or yen 150,000,000. Details of this building have not been announced.

Eight merchantmen of more than 1000 tons gross, totaling 42,080 tons, were launched in September. Kawasaki and Asano launched two each. To September 30, the launchings for 1919 were ninety-three vessels of 403,594 tons gross, a decrease of twenty-nine in number, as compared with the corresponding period of 1918, but an increase of 50,188 tons. It is noteworthy that Japan is building larger and larger vessels constantly.

The N. Y. K. will open a monthly service to Hamburg, it is announced, but whether this will be a separate line or an extension of the London service is not clear.

The Taiyo Kaiun Kaisha (Ocean Transport Company) of Kobe has won its fight to enter the Australian Freight Conference, which had been composed of the N. Y. K., O. S. K. and Eastern Australian, after a freight war of several months.

With the Importers and Exporters

FREIGHT REPORT

November 20, 1919.

OUR last circular was dated October 20th, and since then we have two barley charters to report, namely, the wooden steamer Beliata to a direct port United Kingdom, orders at Panama, for a lump sum of $90,000 to Westrope & Company, which, on the vessel's cubic capacity, is supposed to be equivalent to about $32 a ton, followed by the charter of the wooden steamer Bethanga for a similar charter to Strauss & Company at $85,000. Both vessels are supposed to be about 150,000 cubic feet capacity.

Chartering has been quite brisk, as is usual in the autumn. The motorboat La Merced was chartered by J. J. Moore & Company at $42.50 a thousand to Melbourne. The same firm chartered the following: Kohala at $37.50, from Eureka to Sydney; the motorboat Malahat on private terms to Melbourne or Adelaide; the Forest Home, $42.50, from the North to Melbourne or Adelaide; the Vigilant, new barkentine, on private terms, Grays Harbor to Sydney; the British steamer Canadian Raider, $37.50, British Columbia to Sydney; the United States Shipping Board vessel Mashula reported at a lump sum of $100,000 to Melbourne.

Comyn, Mackall & Company chartered schooner Eric, lump sum, from Eureka to Sydney, Melbourne or Adelaide, also motorboat Chalamba on private terms, from the North to Alexandria.

Balfour, Guthrie & Company chartered steamer La Primera, lump sum of about $20,000, from Eureka and San Francisco to Talara Bay; also steamer Idaho at $17.50 a ton, nitrate to Portland. The steamer Horace Baxter, private terms, nitrate to San Francisco, was also chartered by Balfour, Guthrie & Company, and they have also chartered schooner Elsie for lumber to Capetown from the North at $53 a thousand, and the motorship Benowa at $55, North to the United Kingdom or Kilindini.

Mohns Commercial Company chartered the Dauntless at $35 from the North to Taltal. A Coos Bay Barkentine was chartered at 95s for coal from Australia to Callao by the American Trading Company. The East Asiatic Company have taken the steamer Fort Bragg to load from the North to Valparaiso and one other port, at $35.

Hind, Rolph & Company have chartered the R. R. Hind at $37.50 from the North to Sydney, followed by the charter of the Levi W. Ostrander from the North to Africa at $53.50.

The steamer Siskiyou was taken by Grace & Company at $14.50 for nitrate to San Francisco or Puget Sound.

A. F. Thane & Company have chartered the Louise from Puget Sound to Melbourne at $42.50.

The Albers Milling Company chartered the steamer Northland for sugar from Salaverry to Vancouver at $15. The steamer Watson A. West chartered for nitrate to Honolulu at $20 from the Hawaiian Fertilizer Company. The Amy Turner and C. D. Bryant were chartered by the Vacuum Oil Company, the former from San Francisco to New Zealand at 80 cents, and the latter from San Francisco to Suva at 70 cents. The C. S. Holmes, at a lump sum, from San Francisco to South Seas and return, was taken by George A Moore & Company.

PAGE BROTHERS,
Brokers.

MESSRS. FRAME, LEAYCRAFT & COMPANY rank among the youngest importing and exporting firms in San Francisco, but their predecessors, Messrs, Leaycraft & Company, were established in New York in 1828.

Their business has grown quite extensively during the past five years and they now have offices in all of the larger commercial centers of the world.

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Mr. George J. Dempsey, San Francisco manager for Messrs. Frame, Leaycraft & Company

Mr. A. McGregor Frame, of New York, one of the partners, while on a trip around the world visiting the various offices of Messrs. Frame, Leaycraft & Company, recently spent almost two months in San Francisco. He was quite enthusiastic over the import and export possibilities, but stated that he could not understand why it was impossible for San Francisco to secure a larger pro rata share of government vessels to handle freight from this port to various trade centers of the world with the immense facilities at hand.

Mr. George J. Dempsey, local manager of Messrs. Frame, Leaycraft & Company, will leave San Francisco the latter part of December for London, where he expects to meet Mr. Frame, in January of next year. Mr. Dempsey goes to London to look after the very large business which Messrs. Frame, Leaycraft & Company have established in California products during the past year and also to look after possibilities of trade for California with Great Britain and Continental Europe during the coming year.

Pacific Coast Ports

DURING the last several months there has been a very decided decrease in imports on the Pacific Coast, and an increase in exports, resulting in a net decrease of $40,000,000 in foreign trade for the first nine months of 1919. Exporters and importers ascribe lack of tonnage as being responsible for this decrease. Detail figures for the various custom districts on the Pacific Coast are given in the following table:

District	IMPORTS		EXPORTS		TOTAL	
	1919	1918	1919	1918	1919	1918
	(000 omitted)		(000 omitted)		(000 omitted)	
San Francisco..	$176,281	$199,036	$175,138	$159,004	$351,419	$358,040
Los Angeles...	7,035	5,502	10,013	6,073	17,048	11,575
Oregon	1,845	2,402	33,160	8,044	35,005	10,446
Washington ...	154,825	237,933	240,826	220,961	395,651	458,894
Total.......	$339,986	$444,873	$459,137	$394,082	$799,123	$838,955

Marine industries have been in a rather unsatisfactory state for the past month principally on account of labor difficulties in the San Francisco and Seattle districts. These difficulties seem to be on the verge of a solution and those who are in a position to know anticipate that all the shipyards will be open for business very shortly. There has been at all the coast ports a resumption of activities by European lines, particularly by the Scandinavian motorship lines, who are now resuming practically their pre-war schedule.

Movements of lumber from the Northwest have been very brisk and the general cargo movement, although somewhat handicapped by the stubborn strikes of the San Francisco longshoremen, are now getting back to normal.

During the last month the long-hoped-for united movement of all Pacific Coast ports for securing allocation of Shipping Board vessels to Pacific Ocean trade has been accomplished. This movement, under the direction of the San Francisco Chamber of Commerce, has resulted in the sending to Washington of a strong committee who will present there the needs of the Pacific Coast and will represent every port from San Diego to Puget Sound.

Rumor, much of it confirmed, suggests great shipbuilding activity on this coast for some years to come. Special mention of new contracts is made under the various port headings.

Victoria

AFTER an investigation of certain co-operative or community shipbuilding plans put forward as a possible means of filling the eleven empty ways in Victoria yards, a special committee of the Board of Trade decided that nothing could be done without government aid. With this idea, representatives of the shipyards and of various public bodies met Sir Henry Drayton, minister of finance for the Dominion of Canada, when he was at Victoria and explained their troubles. He asked for details of the plan to build wooden sailing vessels which would be used to carry British Columbia lumber in export trade. The proposals were submitted to the minister, and after giving very optimistic assurances he left for Ottawa. Some announcement is expected shortly.

The battle cruiser New Zealand arrived at Victoria on November 8 with Admiral Viscount Jellicoe and Lady Jellicoe. The former head of the Grand Fleet is circling the world on a special mission of naval investigation. After a short cruise in British Columbia waters the battle cruiser went to Vancouver, where Admiral Jellicoe stayed a few days before going overland to Ottawa, where he conferred with Canadian government officials. The New Zealand returned to Victoria, and after obtaining stores and coal at the Esquimalt naval base went south to Panama and thence to the Atlantic Coast, where Admiral Jellicoe boarded her again and proceeded to South Africa.

The Dominion government hydrographic survey vessel Lillooet returned to Esquimalt in November. During the past season she was engaged in surveying Hecate Strait and for two months was taking soundings off the Fraser River delta in conjunction with a geodetic, geological and tidal survey of the river mouth, being made for the purpose of learning how to control the Fraser. The work will not be completed until next year.

The Dominion government will build three new wireless stations on the British Columbia Coast. One will be at Vancouver, another at Prince Rupert, and the third half way between these two points in place of the Triangle Island station, which is to be abandoned.

Seattle

SEATTLE Chamber of Commerce reports for the month of August, 1919, show arrivals of 2283 vessels of 883,425 net tonnage and departures of 2277 vessels of 872,007 net tonnage. These vessels brought into Seattle 247,563 passengers and carried outbound 247,847. The domestic imports carried by these ships totaled 236,843 tons of a value of $13,197,902. The domestic exports totaled 73,039 tons, valued at $7,235,307. The foreign imports totaled 80,013 tons, valued at $35,128,087. The foreign exports totaled 87,974 tons, valued at $15,348,619.

Five separate steamship lines are to be established with monthly sailings from Seattle and San Francisco to the United Kingdom, Belgium, Italy and France, and it is understood that operation will begin early in 1920. Two corporations, under the firm name of Gueret, Jacks & Partners, Incorporated, were organized a few months ago by large British corporations as a medium for handling their business in the United States, having head offices in New York and Seattle and agencies all over the world. The Seattle company is now seeking carriers for 45,700,000 feet of lumber from Washington, Oregon and British Columbia.

A direct line of passenger and freight steamships is to be established by Russian interests between Seattle and Vladivostock, Siberia, according to advice received from a reliable source in New York City. So far the identity of the interests involved has not been announced, but there is every reason to believe that the Russian Volunteer Fleet will operate the service.

The Alaska Steamship Company has decided to establish a Seattle-Baltimore service via the Panama Canal the latter part of November. This announcement was made by Mr. R. W. Baxter, vice-president and general manager of the company, and has caused quite a stir among shippers who have been waiting eagerly for the resumption of intercoastal trade. The steamships Valdez and Juneau are the only vessels to be placed in the service for the present.

The Alaska Steamship Company is to establish an agency in Baltimore for the handling of cargo from that port. This service, in conjunction with the great fleet of passenger and freight carriers on the Seattle-Alaska routes, will be in a position to handle cargoes direct from Alaska to the Atlantic seaboard as soon as conditions warrant.

Quite the most spectacular launch in the history of this port was staged at the yard of the Skinner & Eddy Corporation on November 17. Tens of thousands of Mystic Shriners, gaily attired with the colors and regalia of their order, witnessed the ceremony of launching the S. S. Nile. The vessel was christened by Mrs. Kendrick, wife of W. Freeland Kendrick, imperial potentate of the Ancient Arabic Order, Nobles of the Mystic Shrine, in whose honor the name was chosen. Through the gates of a modern shipyard, decorated with a sign of welcome and a replica of the order's emblem, the procession entered the ancient land of Egypt—the Nile, the Pyramids, the desert with trains of camels, strange temples and shrines, had been transported for the occasion. Gay streams of bunting bearing scimitar, the crescent and star mingled with the stars and stripes of "Old Glory." As the sponsor broke the bottle of champagne on her prow the Nile slid down the ways amid the thundering cheers of the spectators.

Seattle's launching record for November comprises four vessels of 9600 and one of 10,000 tons from the yards of the Skinner & Eddy Corporation; one of 8800 tons from the plant of J. F. Duthie & Company; one of 8800 tons at the Ames Shipbuilding & Dry Dock Company's yard; one of 9400 tons at the Seattle North Pacific Shipyard—all steel steamships; and a 3300-ton wooden motorship by the J. H. Price Construction Company on Lake Washington.

The 8800-ton steamship Deuel, built at the plant of J. F. Duthie & Company, one of the Shipping Board freighters assigned to Struthers & Dixon for the trans-Pacific service from Seattle, sailed on the 16th for Yokohama, Kobe and Dalny with capacity cargo of steel, cotton and general freight.

Completing her one hundredth voyage in the Alaska trade and the last she will make to Nome and St. Michael this year, the Alaska Steamship Company's liner Victoria, Captain Fred Warner, arrived in Seattle at 12:45 o'clock this morning, bringing 314 passengers and a shipment of gold bullion valued at $200,000.

A new industrial plant is being established on Lake Union by N. J. Blanchard, formerly one of the partners in the firm of Johnson Brothers & Blanchard. The plant will engage in repair work and in building commercial and pleasure vessels. The construction of the boat shop, a wood-working shop and marine railroad is already completed, and a mechanically operated drydock, capable of lifting boats up to 150 tons, is to be built shortly.

Portland

REPORTS from Portland show that during the month of September, 1919, fifty-seven vessels of 76,201 tons entered the port, and sixty-nine vessels of 102,209 tons cleared. The local shipyards delivered three wooden vessels of 10,500 total tonnage and three steel vessels of 26,400 tons, and they launched four steel vessels of 35,900 tons. Six vessels dry docked for repairs during the month of September and one new connection was made with a foreign shipping line—namely, the Societe Generale de Transports Maritimes à Vapeur. Repairs and alterations to harbor works at Portland consist of an extension to pier No. 1 of the St. John's Terminal and the construction of pier No. 2 and of vegetable oil tanks at St. John's Terminal. Bids for the latter are now being considered.

The steel steamer Coaxet, being operated by the Pacific Steamship Company on their new line to the Orient, is making a fine record on her first round trip across the Pacific, having arrived at her out-bound destination two days ahead of time and making the mouth of the Columbia River on her return trip four days ahead of schedule. She

U. S. S. Birmingham in the stream at Portland went out with a full general cargo and returned bringing 23,000 bales of hemp to Portland. On her second trip out, leaving Portland November 18, she carried 4000 bales of Texas cotton to the Orient. Business and Oriental freights over the St. John's Terminal are increasing very rapidly and when the plans now under way are consummated, Portland will fill a very much larger place in Pacific Coast trade than she has in the past.

Astoria

THE Port of Astoria reports during the month of September eighty vessels of 83,214 tons entered the port and eighty-two vessels clearing with a net tonnage of 94,430. This tonnage was practically all lumber and flour cargoes in the clearances, and canned goods, cement and merchandise in the entrances.

Wooden shipbuilding in both of the yards at the Port of Astoria is at a standstill, the McEachern yard having three and the Wilson Shipbuilding Company one hull on the ways awaiting disposition by the United States Shipping Board.

There has been a great deal of rumor, and latest advice would indicate confirmation, to the effect that Astoria will be selected as a naval base for the United States Navy. The Port of Astoria has performed her part of the preliminary negotiations by offering free the Tongue Point site and the necessary portion of Cathlamet Bay.

Astoria's harbor improvement project is taking on a more definite aspect since the port engineer submitted his plans to the port commission. These plans call for the construction of a channel extending from Tongue Point to the mouth of the river with a minimum width of one-half mile and a depth of thirty-six feet at mean low tide; also for a channel up Young's Bay to the turn above the counter bridge 600 feet in width with a depth of thirty feet. This plan necessitates the removal of 82,750 cubic yards of sand at a cost of approximately $2,500,000. For a complete description of the dock and pier improvements at the Port of Astoria, see page 98 of this issue of Pacific Marine Review.

Tacoma

THE Chamber of Commerce of Tacoma reports that during the month of September, 1919, 1067 vessels arrived at that port with a total net tonnage of 355,315, and 1066 vessels departed having a net tonnage of 345,604. During the same month Tacoma shipyards delivered two steel vessels of 7500 tons each. All government contracts with wooden shipbuilding yards at Tacoma have been cancelled and the Todd Dry Dock & Construction Company has six steel hulls on the ways yet to be finished. No new contracts are reported, nor is any enlargement or alteration contemplated for Tacoma shipyards.

Work has not yet been begun on the contemplated port improvements at Tacoma, but plans are on foot to give the port modern cargo-handling machinery and deck facilities equal to anything on the Pacific Coast.

The Japanese steamers visiting the port have been going away with full cargoes of general merchandise. The Canada Maru, 8000 tonner, went out loaded with a mixed cargo, in which was included a very large consignment of wood pulp and ammonia sulphate, while the Borneo Maru slipped up to the dock at the same time with a full cargo of soya bean and other vegetable oils from China. The Garland Line steamers from the Orient have been making their regular schedule time, carrying full cargoes. The Shipping Board's training ship Brookdale, which it is said has been awarded to the Matson Navigation Company to help clear up the Hawaiian passenger and freight situation, took on a part cargo at this port for the Hawaiian Islands. The ship was handled smartly by her crew of apprentice boys, who are now being given a real chance for life at sea on the long trip to Honolulu. Several of the whaling steamers of the North Pacific Sea Products Company have discharged their catch and their gear at Tacoma. These whalers will lay over for the winter in Lake Union.

Grays Harbor

GRAY'S HARBOR Motorship Corporation is keeping busy on the four wooden barkentines on their own account to be operated by them as the Forest Line. The Forest Pride, the first of these vessels, left the yards October 30 for Cosmopolis, where she took on a cargo of lumber for the United Kingdom.

The motorship Mt. Lassen struck a mud bank near Cow Point, November 17, while shifting from the oil dock to the E. K. Wood Mill, but was floated off at high tide without injury and immediately proceeded to load 750,000 feet of lumber for San Pedro.

The dredge Seattle started filling operations on the east entrance trestle November 18. The dredge will work night and day shifts until the fill, which will require the removal of about 23,000 cubic feet of earth, is completed.

There has been an unprecedented run of chum salmon in the waters adjacent to Gray's Harbor, and the local fishermen, having adjusted their strike difficulty with the packers, are enjoying a record season of prosperity. During the first two weeks of November, records for the daily delivery of fish to the packing floors have been repeatedly broken.

The American schooner Columbia River, owned by Balfour, Guthrie & Company and built to their order at Aberdeen, where she was launched on September 30, 1918, has just finished an exceptionally fast passage of forty-nine days from Sydney to Callao, Peru, where she arrived on November 11. The Columbia River was originally intended to be equipped with auxiliary engines, but at the time when she was ready for the installation, the engines could not be obtained and she was sent to sea with sail power, rigged as an ordinary schooner. On her first trip out, Captain Neil Murchison, her master, conceived the idea of triangular top sails fitted to a square yard, and persuaded the owners so to rig the vessel. His faith in this form of rig as being easily handled and furnishing great sail power, has been amply justified by the performance of the Columbia River since the installation of this rig.

Los Angeles

THE Port of Los Angeles Chamber of Commerce reports the arrival of 249 vessels with a net tonnage of 225,044 and the departure of 250 vessels with a net tonnage of 219,917. These vessels carried into the port 112,391 tons of merchandise with a valuation of $6,593,217, and carried out 163,400 tons valued at $5,054,130. The principal item inbound consisted of 50,594,599 feet of lumber, weighing 82,184 tons, valued at $1,177,195; while the principal outbound item consisted of 792,966 barrels of crude oil and its distillates, weighing 125,511 tons, valued at $1,664,540.

The shipyards of Los Angeles harbor and Long Beach are now operating under open-shop conditions. It is said that several new contracts have been awarded to the Southwestern Company and to the Los Angeles Shipbuilding & Dry Dock Company. The latter is making progress on the installation of their new 10,000-ton dry dock. The harbor commission is busily engaged in deepening the turning basin to thirty feet and in the installation of the cotton compress.

Since the reopening of the Southwestern Ship Yards at Long Beach, two new launches have been put into service between that port and San Pedro—the Dawn, a converted fishing boat with a 30-horsepower Diesel engine, and the Fashion, with a new 125-horsepower oil engine. The Fashion was formerly on the Long Beach-Catalina run.

Two ships, the West Mong and West Montop, now being built by the Los Angeles Shipbuilding & Dry Dock Company, have been allocated to the Los Angeles Pacific Navigation Company for use in direct-to-the-Orient service. The first of these ships has just been completed and turned over to the operating company, and the other boat will be delivered in about one month. The Navigation Company has the assurance that two other vessels will be allocated to it in a reasonable time, and probably a fifth boat will be secured about the first of the year. With four large cargo vessels as its disposition, this company, which is purely a Los Angeles enterprise, will be able to conduct monthly sailings to Shanghai, Hongkong and Singapore. This service was instituted about three months ago by the sailing of the West Cajoot, a Los Angeles-built steamer, which was temporarily allocated to this navigation company. The officials of this new steamship company have given definite assurance to the Shipping Board of cargoes to keep four vessels busy for the next six months.

San Francisco

AS a result of the united work of committees of various Pacific Coast ports, under the leadership of the San Francisco Chamber of Commerce, to procure better allocations of Shipping Board ships for Pacific Coast service, Mr. Harold H. Ebey of San Francisco, assistant director of the operating department of the Shipping Board, has announced that the Shipping Board has definitely decided to allocate probably eight or ten liners to the trans-Pacific route as soon as the ships are completed. The vessels were designed for service as transports, but are being converted into passenger carriers of the most modern and efficient type. They are of 14,000 tons deadweight with a cargo capacity of 9000 tons. The ships will carry only two classes of passengers—250 first-class and from 350 to 500 third-class.

The present enormous demand for coal in Europe is responsible, according to Mr. Ebey, for the delay in placing freighters on the Pacific Ocean. It is proposed to establish in the near future a system of "feeder" ships, operating along the Asiatic Coast, to gather mail and freight for large Shipping Board vessels sailing between Shanghai, Hongkong and other Far Eastern ports and the United States. These vessels will be of 3500 and 3800 tons deadweight, and will gather cargo at the central ports for the trans-Pacific liners.

As we go to press, the shipyards of San Francisco Bay district, which have been closed since October 1, are reopening and inviting the employes to return to work on the same basis under which the strike was started seven weeks ago. In wages alone, this strike has cost the members of the Metal

Two 8800-ton steamers at outfitting wharf, Los Angeles Shipbuilding & Dry Dock Company

Trades Union about $10,500,000 loss. The employers, in extending the invitation to return to work, are guaranteeing to hold wages up to the present scale until October, 1920, and certainly it is to be hoped that labor will avail itself of this opportunity to get back on a production basis. All of the larger shipyards report much new work in sight and there is a tremendous amount of repair and alteration work waiting to be done. The Union Iron Works plant of the Bethlehem Shipbuilding Corporation has several new contracts for large tankers—two for the Standard Oil Company of California and the others for Eastern corporations. The Moore Shipbuilding Company has contracts for two fine new freighters for the Matson Navigation Company; these vessels to carry 14,000 deadweight tons, to have a length over all of 497 feet, 62-foot beam and 42-foot molded depth to the shelter deck. They are for a sea speed of 12½ knots fully loaded and will be powered with geared turbines of 6000 horsepower, four masts, with six cargo holds. Twelve sets of deck winches will enable them to economically and efficiently handle large cargoes. The Matson Navigation Company is also working on the plans of a passenger liner of 20-knot speed, 20,000 horsepower and over 600 feet long, equipped to carry 700 cabin passengers. This liner is to be exclusively for first-class trade, and will be more luxuriously fitted out than any liner now on the Pacific.

U. S. S. California starting on her ways

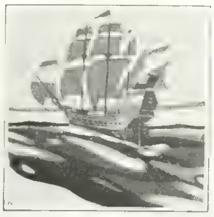
Much comment and interest has been caused by the visit to San Francisco Bay of the giant United States transport Mount Vernon, the former German liner Kronprinzessin Cecilie. This vessel is the largest steamer that has ever entered San Francisco Bay. While we are glad to see this huge transport and welcome her to port, we believe that old-timers along the waterfront are even more pleased in welcoming back to their home port the Maui, Matsonia, the Nile and other passenger liners engaged in San Francisco regular waterfront business, and also to welcome those old friends from other ports, the Scandinavian motorships of the Johnson and Norway Pacific lines.

The settlement of the strike of the Stevedores' Union seems as far away as when the strike started two months ago, but the steamship and operating companies are gradually getting the movement of freight on the waterfront onto a normal basis, notwithstanding interference of the strikers. San Francisco's Chamber of Commerce is to be congratulated upon the firm stand taken by it in relation to this strike in the face of heavy pressure from organized labor. There can be no doubt that the sentiment of the great majority of San Francisco's citizens is against the lawless conduct and anarchistic policy of the present union of waterfront employes.

The most spectacular event in shipbuilding in the San Francisco Bay region during the last month was the launch of the United States dreadnaught California at Mare Island. A great deal of experiment and engineering skill had been expended in preparing for this launch, detailed account of which will be found in the paper, "The Launching of Ships in Restricted Waters," on page 99 of this issue. The launch was successful in every way, and the brakes used functioned perfectly, but the chains used in making connection to the hull of the ship all broke at defective welds. Before this break occurred, the ship had been sufficiently retarded so that in striking the Vallejo shore the damage to the hull and to the crib along the shore was practically nil, and in less than an hour the big hull was alongside the sea wall at the outfitting crane ready for the installation of machinery. The California launching weight was approximately 15,000 tons, which makes this event the largest single launching ever staged on waters tributary to the Pacific Ocean.

The American steamer Santa Cruz has just arrived with about 80,000 feet of teak timbers and 175,000 feet of teak planks consigned to the well-known importing house, J. Henry Dieckmann, Jr. Some of this stock has already been booked for immediate delivery.

Owing to the competition in ocean carrying becoming so keen with English, Japanese and Norwegian vessels, Mr. Dieckmann believes that if the American merchant marine is to be developed, import and export merchants should co-operate in every way possible with American ship owners and even in the face of an advanced freight rate the American ship should be used.



Marine Insurance

RECENT DEVELOPMENTS IN MARINE INSURANCE

By Charles F. Howell

EXCELLENT work is being done by the Congressional Committee on Merchant Marine and Fisheries, based upon findings developed through exhaustive public hearings that have brought out the views of men prominent in every phase of American foreign trade. Among others, marine underwriters have had a chance to give their side of the situation and they have availed themselves of the opportunity. Both the House and the Senate committees have reported out bills that provide for a great variety of fostering aid to our shippers, shipowners, underwriters, and producers. In the measure now before Congress provision is made for the repeal of all emergency shipping legislation and cancellation of extraordinary powers conferred upon the President for requisition; and also repeal is arranged as regards the power to control ocean freights and charters. Further extension of the building program of the United States Shipping Board is eliminated. It is planned that at the earliest date possible the government is to retire from the field of building, owning and operating commercial vessels, in order that our shipping interests may have the benefit of competitive service and private capital be encouraged to enter this form of investment. It is essential that our ships have adequate American registry, and to this end the extension of the service and equipment of the American Bureau of Shipping will undoubtedly be fostered through the cooperation of the shipowners and shipping interests of the country. Such an inspiring program as this warrants a belief that substantial amounts of capital will shortly be ventured into marine insurance companies here. There are about sixty American institutions of this nature at the present time, but when the national proposition gets under way there will be need for many more. The latest word from Washington is that the Committee on Merchant Marine and Fisheries has in hand a plan of pooling the liability of the Shipping Board, as at present represented in its insurance fund, among all American marine insurance companies, the liability assumed by each to be net. Details have not, as yet, been fully worked out, but it is understood that our underwriters stand ready to undertake their part of the bargain, on either an agreed rate or a cost plus basis. This is certainly tremendous news, and of a nature to encourage and inspire not American marine underwriters only but our countrymen of every walk and condition.

English Naiveté

The lowness of rates on American hulls still engages attention in England, where it is argued that the trouble arises out of a lack of cohesion on the part of their market and ours and among American underwriters as well. The London critics maintain that any upward movement will have to be originated from within, on the ground that so long as low rates are to be had shippers and owners will seek them wherever they may be current. The way to overcome all difficulties, according to English comment, would be to reinstate the Rating Committee of the American Hull Underwriters' Association and reopen relations between that body and the London Institute. A London expert naively inquires, "Is this too much to hope for? Or are the differences between the two markets of so acute a nature as to make such relations impossible?" The answer is that the London Institute itself terminated its arrangements with the American Hull Underwriters' Association, and the reason for its summary action is known in this country to be the English belief that by so doing London might hold its American business. Since England broke relations, should she not make the first official advances toward their resumption?

Inland Marine

It is improbable that the premium volume of inland marine business will this year exceed that of last. As in ocean marine, the hull end promises to be next to profitless, while the cargo outlook is only fairly indicative of even a slight gain. That inland hull underwriting conditions must be bad is evidenced in the fact that the cost of repairs has gone up 300 per cent, while the premium rates have not increased more than 60 per cent. Add to this the retention for insurance valuation of the pre-war price of floating property, now worth two and three times that much to replace, and the consequent probability of a partial loss reaching more than total loss figures, and it will readily be seen that this class of insurance is far from attractive to those selling it. With cargo it is different, because the premium rate automatically advances with the valuation of the various commodities, and an equalization is effected thereby. Better hull rates are inevitable.

Prevailing Conditions

The various effects of the war upon marine underwriting conditions, not only here but all over the world, are too numerous and involved to be calculated as yet. There has been a decided lowering of the standards upon which marine rates were based, and numerous additional requirements are being laid upon underwriters which should not properly fall to them, because they are not so much insurance undertakings as natural trade hazards that lie within the control of the shippers. It may be seen to what degree a change has come in the handling of business when an expert assures us that before the war about 80 per cent of an underwriter's transactions came in to him through the mails or over his counter, but that today the condition is almost entirely reversed, with 80 per cent

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of his risks requiring negotiation one by one, with the accompanying constant chance for sharp practice and the concealment of vital information by brokers and placers. Mr. William H. McGee, the well-known New York marine underwriter, in a recent address before the New York Insurance Club, reviewed prevailing conditions, pointing out that the question of rates was the supreme consideration of the hour. Recent trade engraftments will have to be lopped off, and there will have to be an understanding as to proper terms of average. "Unless adequate rates are obtainable," said he, "underwriters must retire altogether or else seriously curtail the classes of business undertaken; and a curtailment in the size of the American market, I believe, would be a sad thing for American commerce. . . . By the rates at which business seems freely written in America and in England, and by the conditions of average which are granted, it would seem as if underwriters and brokers considered the business super-normal today. Lower rates and more liberal conditions appear to be obtainable upon low-grade vessels of untried or unknown management, and upon experimental routes, than were obtainable in pre-war days by regular line steamers. Unless underwriters and brokers are ready and willing to meet unitedly and to cooperate upon three paramount issues — adequate rates, proper terms of average, and the elimination of trade losses from marine insurance—and to decide those issues fairly and wisely, there is only disaster ahead for underwriters and woe for brokers. . . . Should a battle for survival of the fittest take place between American marine insurance companies, I believe we shall be faced with a government-run insurance bureau."

Strike and Riot Cover

A considerable demand has developed for coverage against the consequences of riots and civil commotions growing out of the upset condition of labor in all parts of the country, especially in the several ports where strikes have been in effect for weeks. In New York harbor the situation has been most acute, involving serious inconveniences and suffering to the public as well as to operators and longshoremen. These hazards are covered by marine insurance, the inclusion embracing "strikes, riots, civil commotions and explosions." The protection is effective while the commodities are on railroads, steamers, lighters, docks, in warehouses and elsewhere. Frequently the period of cover is short, and then the rate is usually one-eighth of one per cent for fifteen days. An annual basis is also employed, the coverage being on goods while on steamers in harbor awaiting discharge, while being loaded, and on docks after discharge. Annual transit floaters are issued at a flat rate based upon the maximum amount at risk at one time, covering from warehouse to warehouse on railroads, auto trucks, or horse-drawn vehicles. This protection is also granted at a rate based on the estimated annual shipments of the assured, with a limit in any one place at one time, and subject to readjustment of the premium at the expiration of the policy. There is little naming of rates in advance, on account of the continual change in labor conditions, and rates have to be governed by the conditions that exist at the time the insurance is applied for.

Cotton Operations Criticised

There is in London a freely-expressed doubt of the success of the new American combination for the writing of cotton, not entirely unbiased, perhaps, as English companies dominated the former arrangement. They construe it as "a direct challenge on a national basis." The new pool is to carry the inland risk, and that is the chief reason for English pessimism as to the outcome, as the old combination used to get rid of this through reinsurance. London is convinced that the inland risk is inevitably a source of loss, and that the assumption of this hazard is sure to prove enough of a handicap to cut to nothing the slender marine profit. Rate cutting, in the English judgment, is the only means for the new combine to wrest the business from the established pool. There is quite another side to this. In the first place, there will be no rate cutting of any character whatever, the group of American companies in the new pool having no need to resort to it and being on record as having no such intention. They are powerful institutions of writers of both fire and marine business, and have had a long experience in cotton coverage. Through the up-to-date rating of compresses and warehouses, now existing throughout the South, there is a substantial profit, instead of a loss, in the reinsurance of the inland risks. Owners of warehouses at all concentration points have found it impossible to avoid the improvements demanded by the fire underwriters, on the pain of losing what business they now have; and properly safeguarded compresses and warehouses are far from being the worst risks in the world. These are some of the reasons why the members of the new pool are tranquil under the gloomy forecasts of London.

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Causes of Recent Losses

Now that most of the returns are in, it is clear that those two unusual disturbances, the West Indian hurricane and the Galveston flood, bore with them an ill harvest for marine underwriters. In the case of the former, the shore losses will exceed those at sea; with the latter the great bulk of the losses will be shore, and their total will easily eclipse that of the West Indian storm. Had it not been for the new seawall, Galveston would undoubtedly have experienced as frightful a disaster as when she was all but destroyed a few years back. As it was, nearly six feet of water entered the lower part of the city, damaging cotton on the docks and in the ginneries. To obviate the expense of picking over the wet cotton, the marine underwriters have decided to forward it to its destination and adjust the loss there. It is anticipated that there will be a considerable loss on cottonseed oil and cake in storage at Galveston. In addition, claims will undoubtedly be made for damage to cargo that was awaiting shipment at Corpus Christi, as also for the loss of or damage to small craft like tugs, lighters, barges, etc., that were roughly handled by the storm. Two other sources of loss have been disturbing the insurance people during the last few weeks—motor schooners and fires at sea. In the latter category fall two fine steamers of the Lamport & Holt line, both engaged in the South American trade.

Concrete Ships Classed

It is very interesting to note that the American Bureau of Shipping has decided to give the "experimental" classification to concrete vessels; London Lloyds had already done so. Full classification is, for the present, denied, but may come later, if experience warrants. In the judgment of the technical committee of the American Bureau of Shipping, which grants the experimental classification, it is still too early to pass definitely upon the concreter's value as an ocean-going cargo carrier, but her usefulness as harbor craft is established. Now that England and America have officially endorsed the concrete vessel, through their recognized classification, ships of this construction will be surveyed and checked up every year. It was the celebrated Faith, of California design and build, that was most closely observed as a good example of the class, and her performances, trans-Atlantic and coastwise, have been of a character to win praise and endorsement from the experts. It is felt, however, that the Faith is too small to satisfy every test requirement, and larger concreters are being watched for further conclusions. The technical committee of the American Bureau was informed by Commander Acherson, of the Emergency Fleet Corporation, that the government has twelve concrete ocean-going vessels under constuction, several of which are more than twice the size of the Faith. They also contain some decided improvements over the famous Californian.

A Friendly Boost

American marine underwriters are greatly pleased with the action of the ocean transportation committee of the Chamber of Commerce of the United States in submitting to that organization's 1236 member bodies a report embodying its views as to what our government should do to aid American shipping interests and its allied factors, because among the nine definite recommendations offered are the following: "That preference be shown for American underwriters, and that the underwriting market of the world be used for insurance not covered by American underwriters, without intervention by government insurance." Also, "That encouragement be given to an American classification society."

State Marine Tax Illegal?

Several of the strongest marine insurance offices of the country have determined to resist the payment to the states of taxes on marine premiums, and to force, if necessary, a definite declaration of the courts on the question. They base their position on a contention that marine insurance is interstate and foreign commerce, and as such is expressly excluded from state taxation by the terms of the Federal constitution. This interpretation of the constitution is endorsed in the opinion of the United States Supreme Court, in the case of the Thames & Mersey versus the United States, as handed down by former Justice Hughes in 1915. In that strong precedent it was held that under section nine of article one of the Federal constitution, Congress could not tax insurance premiums on exports, as that would be an indirect tax on exports; the reasoning seems entirely logical that, consequently, the different states cannot tax insurance premiums on either imports or exports, as coming under the constitutional prohibition, both as regards inter-state or foreign commerce. Underwriting students of the shipping legislative problems of the hour are anxious to have marine insurance placed under the supervision of the Department of Commerce, or of the Shipping Board, or else of the Bureau of Foreign Trade. That is to say, they regard marine insurance as closely allied with shipping and foreign commerce, and would like to see it rid of the supervision of forty-eight state commissioners. When this sentiment was presented to Acting Chairman Edmonds, of the congressional sub-committee on Merchant Marine and Fisheries, it is said that he hesitated to propose such a law on the ground that several states are deriving considerable revenue from marine insurance taxation and might fight the proposition in order to retain these taxes. In substantiation of the conviction that state department interest in marine insurance is largely one of revenue from taxes, it is pointed out that in the list of committees recently announced for the National Convention of Insurance Commissioners there is no word of marine insurance, although every other branch of underwriting is named. The drift of this contention is clear: If the Thames & Mersey opinion is applicable to the states, then the latter are not entitled to marine insurance taxes; and if they have little else than that interest in the business, they might not be averse to relinquishing their supervision of it to the Federal government, and so clearing the way for an unhandicapped condition that all experts agree is absoltuely essential to the fostering of an American marine underwriting market adequate to take care of our prospective world-trade expansion.

LOCAL PLANT OF MARINE INSURANCE BROKER

WILLCOX, PECK & HUGHES, of New York, one of the oldest and largest firms of insurance brokers and average adjusters, have shown their faith in the development of Pacific business, particularly export trade, by the establishment of a large plant on the Pacific Coast with headquarters in San Francisco.

The accompanying illustrations show their San Francisco office, which is now the largest insurance brokerage office west of Chicago.

Mr. Bates was elected a director of the corporation and given the title of resident director for the Pacific Coast and the corporation of Willcox, Peck & Hughes duly entered in the State of California for the transaction of its Pacific Coast business.

There are three departments in the organization, each separate and distinct from the other and operated by a manager under the direction of the resident director.

The marine department is under the management of Mr. G. W. Cortelyou, who has been with the firm for many years and under whose management the marine business has developed tremendously in the last year.

The average adjusting department, through which all marine claims and losses are handled, is under the management of Mr. D. C. Anderson, who has come to San Francisco from New York, where he had sixteen years' experience in this particular work, and already Mr. Anderson is considered one of the greatest authorities on maritime matters on the Pacific Coast.

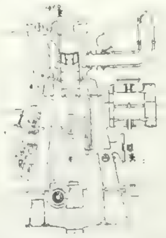
The non-marine department handles fire, liability and similar lines and is under the management of Mr. John G. Johnston. The fire insurance department of Willcox, Peck & Hughes handles all of the firm's business in the territory under the jurisdiction of the Board of Fire Underwriters of the Pacific, which covers interests from cotton in the Imperial Valley to the copper mines of Montana.

Willcox, Peck & Hughes have announced their intention of opening similar establishments in Portland, Oregon, and Los Angeles, and in order to knit the Pacific Coast business of the corporation together, Mr. E. F. Lenihan has been appointed Pacific Coast manager with headquarters in San Francisco. Mr. Lenihan will have charge of the business as a whole, but will devote his time principally to the agencies under the direction of the resident director. Mr. Lenihan comes to San Francisco from the Cleveland office of Willcox, Peck & Hughes, with whom he has been associated for some seventeen years.

Mr. Townsend was very enthusiastic regarding the future of the business and decided to open two further departments to facilitate the handling of the firm's business. One of these, and the most needed, is an automobile insurance department, which will be established on January 1, 1920; the second is a re-insurance department, whereby the firm's facilities on this coast, in Chicago, New York, London and Christiania, through its own offices, will be afforded the various insurance companies seeking re-insurance.

All the Oriental business of Willcox, Peck & Hughes originating in China, Japan and the Philippines, which has formerly been handled through the New York office, will be turned over to the San Francisco office on January 1, very much to the benefit of the various insurance companies who will receive the business in San Francisco instead of its being handled in the East, as formerly.

Oil Engines and Motorships



Motor Shipbuilding in Europe

If any lingering doubt still exists in the minds of shipowners as to the advisability of building motor vessels, the present policy of the East Asiatic Company may be cited. This firm, which was the pioneer motor shipowning company, and has sold all its steamers and is now relying upon motor vessels, has a program for the construction of no fewer than seventeen new motor ships, which will give them a total fleet of twenty-nine large motor vessels. All these ships are now actually on order, to be constructed in Denmark, the large majority by Burmeister & Wain of Copenhagen. A large proportion will be vessels capable of carrying about 13,000 tons deadweight, fitted with two Diesel motors each of 2250 H. P. Incidentally it may be mentioned that these engines are of exactly the same type as two which were ordered by the United States Shipping Board from Burmeister & Wain for installation in one of the Shipping Board's vessels.

Motor shipowning firms have found that there is a great economy in ordering a number of sister ships of the same size, since standardization can be effected on a large scale with internal combustion motors and the cost of production reduced to a marked extent. Another indication of this is the fact that fifteen vessels of exactly similar size have been ordered in Scandinavia, nine for Norwegian shipowners and six for Swedish owners, the hulls being built at two or three different yards, while the machinery is also constructed by various firms. It is, however, identical in each case, all manufactured from the one design of Burmeister & Wain. These ships, which are considered by Scandinavian shipowners to be a particularly economical class of vessel for general trade on long voyages, have a deadweight carrying capacity of 6500 tons. They are 367 feet in length, have a beam of 51 feet and are fitted with two 1300 H. P. six-cylinder motors, giving a speed at sea of about twelve knots. It may now roughly be taken that in Europe there are three standard types of motor vessels most commonly adopted, one of 13,000 tons deadweight capacity, the second of 9600 tons and the third of 6500 tons, the machinery installation consisting in the larger ships either of 6400 H. P. or 5000 H. P., in the intermediate class of about 3200 H. P. and in the small vessels of 2600 H. P.

These figures may perhaps be of interest to American shipowners who are considering the advisability of ordering motor ships and who have not decided which type of vessel is the most suitable for general service.

Submarine's Diesel Engines for Merchant Ships

The British Admiralty are now disposing of a large number of submarine Diesel engines, some of which have been taken out of the German submarines and others from British underwater craft which are being broken up, mainly from the point of view of economy and not because they are obsolete.

The German engines develop about 1000 B. H. P. and are of the four-cycle type, which the Germans considered to be their most satisfactory engine during the war, and which undoubtedly gave extremely good service. Some British shipowners are therefore debating the question of employing these engins in merchant ships since they can be purchased at a relatively low price, while they are economical motors, having a consumption of not more than 0.45 pounds per B. H. P. hour. The difficulty is, however, that their speed of operation is high, being in the neighborhood of 400 R. P. M., which is considered in excess of that required for any type of cargo ships. Two alternatives offer themselves; first, the engines may be run at a very much lower speed, say about 250 to 300 R. P. M., when of course they would develop a much reduced power, or a reduction gear may be fitted as has been adopted in some American motor vessels, reducing the speed of the propeller to about 100 R. P. M. or even less. This seems to offer a much more satisfactory solution and it is understood that several installations of this type will be made, while it is also possible that a number of the engines will be bought up by one concern for installation in about a dozen hulls which are now under construction. This will be one of the most interesting developments in connection with motor cargo vessels and although it can hardly be expected that quite as good service will be obtained as with slow speed motors, nevertheless, with proper attention, these engines which have proved their reliability during the war, should give very successful results from the financial standpoint. They are, of course, extremely light and occupy little space so that a cargo vessel fitted with such motors would have a relatively larger deadweight carrying capacity for its size than any other vessel afloat.

Progress in Motor Shipbuilding in Italy

The Italians are so hard hit by the coal shortage that they are making strenuous efforts to increase their motor ship fleet as quickly as possible. This may be readily understood when coal at Italian ports costs anywhere up to £7 or £8 per ton, and it is not surprising to learn that there are some 40 or 50 motor ships of different sizes under construction in Italian yards. The first of these was the "Ansaldo San Giorgia I," an 8100 ton cargo vessel fitted with two two-cycle Ansaldo Diesel engines of 1100 B. H. P. each. Three further vessels of exactly the same size, named "Ansaldo San Giorgio 2, 3 and 4," have just been launched, and several other sister ships are under construction. These boats will trade mainly between Italian ports and America and as the fleet increases it is intended to open new routes which are thought to be specially advantageous to the motor ships. The engines are of a novel type, having port scavenging with a valve controlling the admission of air through the ports, and the consumption is remarkably good for two-cycle motors, being 0.43 pounds per B. H. P. hour.

The Motorship San Francisco

OF THE many motorships calling at Pacific Coast ports, we hear no complaint either from the operators or owners, due no doubt to the continued service and reliability shown by most of these vessels. The motorship San Francisco was recently inspected by the writer while lying in the harbor for which she was named. This vessel is of 6500 tons deadweight and is engined by a pair of six-cylinder 540 by 730 Burmeister & Wain full Diesel engines.

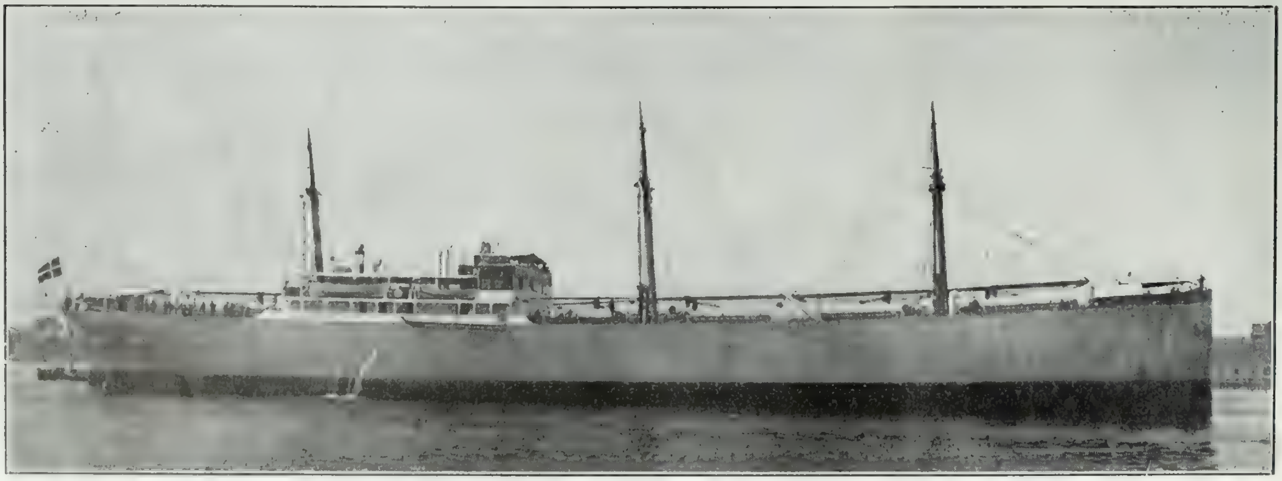
It is now about four years since this vessel was placed in service, and during that time it has cost practically nothing for repairs due to breakdowns either in the driving or auxiliary machinery. When running at a speed of 140 r. p. m. the ship will make from ten to twelve knots loaded. Being comparatively an old ship, in the motorship class, the engines of this vessel are not as modern as some more recently built. The controlling mechanism with fuel pump reverse levers is not radically different from that of the latest engines turned out by Burmeister & Wain. In the compressor, however, numerous improvements have been made since these engines were built. A single stage compressor connected to a crank on the main crankshaft is used for injection purposes, taking its supply of air from the main tanks at 25 kilograms (355 pounds) and raising it to 60 kilograms (910 pounds). This feature makes the motorship a little unhandy in that the auxiliary engines must be operated continually for providing air at 25 kilograms. The auxiliaries consist of two 100 horsepower, four-cylinder, non-reversible Diesel engines built by Burmeister & Wain, direct connected to a direct current generator and a two-stage vertical compressor capable of furnishing maneuvering air at a maximum of 25 kilograms, the motor being set on a bed plate between the compressor and generator. In addition to this, provision is made, by means of a coupling, to drive a three-stage vertical compressor capable of compressing to 60 kilograms. Both the 100 horsepower auxiliary engine units are identical, the electric current being used for lights when at sea, and for operating the auxiliary machinery, such as pumps, when in port. In addition to this, the entire deck machinery, which is electrically driven, can be handled by one or both of these units.

A small hot surface ignition engine, direct connected to a generator, is provided and intended for lighting use only. However, it is very infrequent that this unit alone can be used, as it is necessary to operate the 100 horsepower units when loading or unloading cargo and in supplying low pressure air to the booster pumps when the main engines are running.

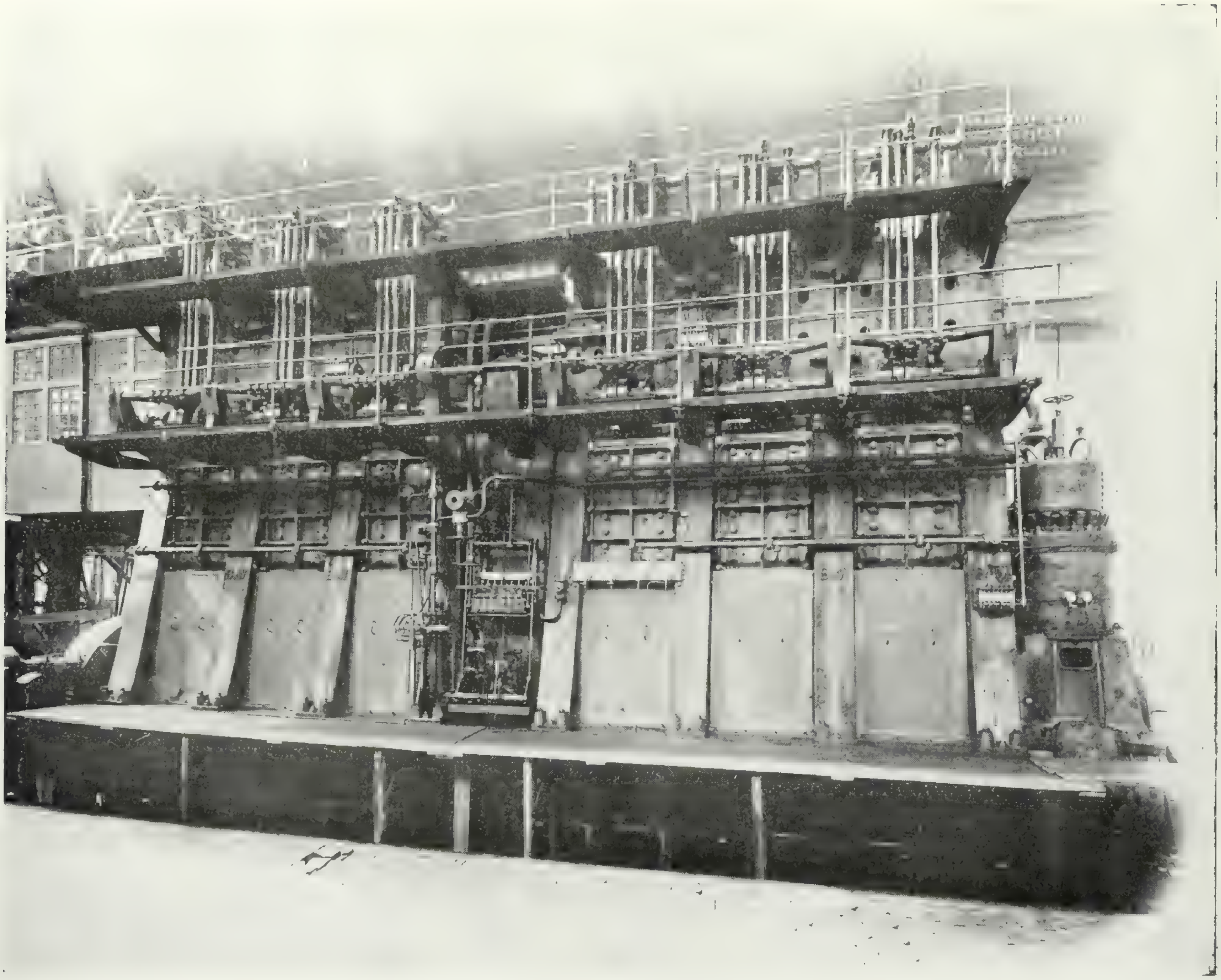
Later installations of Burmeister & Wain engines have been provided with three-stage compressors, direct connected to the main engines so as to make them independent of auxiliary machinery for injection air except in emergencies. In this way small motors have been installed for operating the light generators which makes a much more flexible and satisfactory installation.

Lubrication

Standard Burmeister & Wain practice of lubrication has been followed. This consists of a large lubricating main under pressure from rotary pumps being run along the bed of each engine with leads leading to the main bearings, whence oil is carried through crankshafts and connecting rods to the lower end bearings and also to the cross head and slides. Lubrication of the piston and cylinder walls is accomplished by means of an exceedingly slow operating plunger pump which forces the oil into the cylinder when the piston is at or near the bottom center. The system has been retained by the ship's engineers for the main engines, but practice on this ship has shown that there is sufficient splash in the



Motorship San Francisco



Burmeister & Wain Engines Installed in Many Successful Motorships. This Photograph is a Later Design than Engines in the Motorship San Francisco

auxiliary engines from the cranks to thoroughly lubricate the cylinder walls; therefore on these units the plunger pump has not been used.

Electrical Auxiliaries

All the electrical equipment is electrically driven except that which has been previously described. Circulating pumps are located between the two main engines and slightly aft thereof. They are of the vertical centrifugal type with closed type motors and independently driven. By a system of piping connections and by-passes, it is possible to draw the circulating water, using either pump from either side of the ship. Lubricating oil pumps are also provided in duplicate. These are of the rotary, positive displacement type drawing the oil from the filters and forcing it into the main lubricating lines for each engine. Separate pumps are provided to draw the oil from the crank base and pump it to the filters which are located on an upper deck.

Ballast, bunker and bilge pumps are also electrically driven and are conveniently located.

Performance

The engine room crew consists of ten men: the chief engineer, three assistants and six oilers and wipers; and it is claimed that runs of six weeks and two months can be made before it is necessary to give attention to the exhaust valves. It is also stated by the chief engineer that all work on the engines is taken care of by the engine room crew.

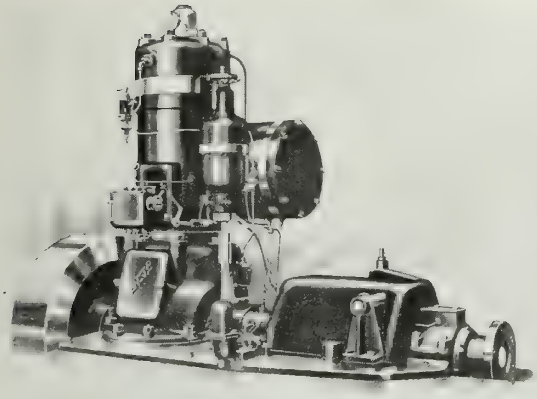
ENTERPRISE PLANT BUSY

As an indication of the heavy demand for marine gas engines, we note recent shipments from the Enterprise plant at San Francisco, which include two 60-horsepower engines, one 35-horsepower, two 16-horsepower and a number of smaller engines to H. W. Starrett of Seattle. The Alaska Cod Fish Company have just taken delivery of a 40-horsepower, 3-cylinder engine, which is to be installed in a 50-foot boat at Madden Brothers' yard at Sausalito. The Alaska Cod Fish Company have only recently received a number of smaller engines of 8 and 16 horsepower, while larger engines have been shipped to the Reed Engineering Company at Vancouver, Washington, and a 35-horsepower to the Tongass Trading Company of Ketchikan, Alaska. Since the interruption of manufacturing due to the strike in the San Francisco Bay district, orders have been continually received, so that on the resumption of activities the Enterprise plant will have work ahead for many months.

NOTICE

Mr. Herbert Putnam, librarian of Congress, informs us that the Library of Congress needs a copy of Pacific Marine Review for January and July, 1918, which are now out of stock, to complete its files. On Mr. Putnam's suggestion we are calling the attention of our readers to the Library's needs in the hope that copies may be forwarded to us for this purpose.

A New Danish Oil Engine



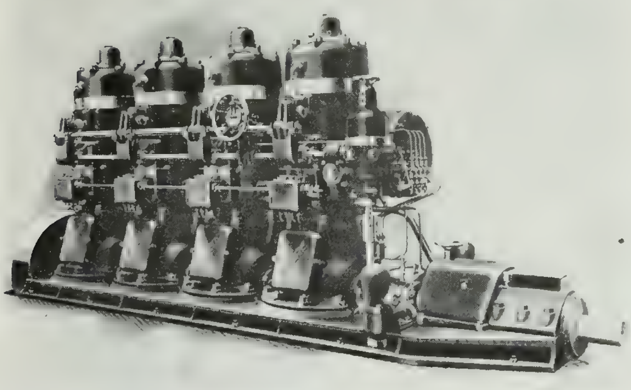


Figure 1. Above: Single Cylinder Type M 1 Densil Marine Engine. Figure 2. Below: Four Cylinder 200 B. H. P. Densil Engine, Direct Reversible by Compressed Air

THAT the low pressure surface ignition oil engine has met with success in the Scandinavian countries is evidenced from time to time by the appearance on that market of new engines. One of the latest to appear is the Densil motor.

As late as 1916 the Densil Motor Works, Ltd., of Aalborg, Denmark, was formed for the purpose of manufacturing this type of engine and we are able at this time to publish photographs of engines as large as 200 brake H. P. The company building this engine claims to be turning out at the present time about 4000 brake H. P. per year and that extensions are now under way that will double the present output. The company is specializing on one, two, three and four-cylinder, crank case compression, surface ignition engines. In the single cylinder size, the units vary from 10 to 50 H. P. and in the multi-cylinder size up to four cylinders of 240 brake H. P.

The multi-cylinder 100 brake H. P. and upwards are equipped with compressed air starting and reversing systems, mechanically operated from lay shafts synchronized with the crank shaft. The air starting valves are located on the front, or inboard side in the case of marine motors, and are of the mushroom type, balanced and operated by rocker arms. A double set of arms is provided for each cylinder, one for each direction of rotation, each arm being provided with an independent cam for its respective direction of rotation, the rocker arms being fulcrumed at their mid section on eccentric cams by means of which either set of cams may be thrown into or out of engagement.

The fuel pump on the Densil motor consists of a hard bronze body fitted with hardened steel plungers. One of the features claimed by the manufacturers for a good portion of the motor's success is the great care taken in fitting the pump plungers into the body. The plunger being ground to exact size and lapped into the body to practically a metal to metal fit, avoiding in this manner the necessity of packing.

Governing is on the quantity principle and it is claimed that the operation of the governor is so sensative that a variation of only 5 per cent in the speed is recorded between sudden changes of from no load to full load. Great care is exercised in the manufacture and fitting of the governor, which is necessary if close regulation is desired. The governor is of the centrifugal type, operating within an oil tight case, and is located at the top end of a vertical shaft communicating between the crank shaft or starting lay shaft by means of spiral gears.

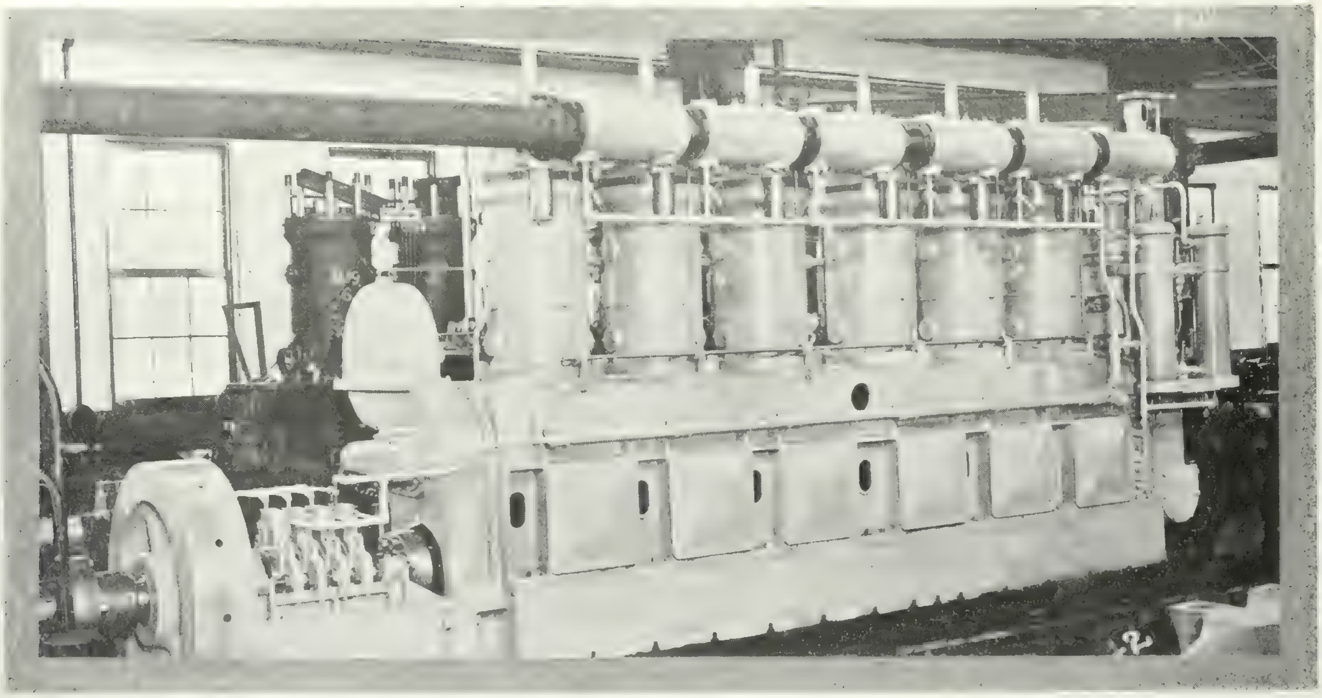
In the major details of the Densil engine, such as crank shaft, main bearings, connecting rods, crank case cylinders and muffler, also the bed plate, one is unable to see anything in the nature of a radical change from other European oil engines; however, it is claimed by the manufacturers that a special small hot ball has been designed which absolutely retains a sufficient amount of heat to insure the ignition of the charge when running light. This seems to have been one of the main objections to the use of the semi-Diesel engines by American users, as many engines have been found unable to operate under light or no load conditions without the help of the blow torch to maintain sufficient amount of heat to insure ignition.

The circulating and bilge pumps are driven by an eccentric directly off the crank shaft, as is the case in many other European semi-Diesel engines. The compressor, however, has been designed to be driven independently by power from other sources, which will no doubt add materially to the success of the engine by the avoidance of the complication of this unit with the main engines.

It is claimed that the lubricating system of the Densil engines together with the proportionment of the bearing surfaces guarantee freedom from bearing troubles.

Equipped with Enterprise Marine Gas Engines

See page 121



Outboard side McIntosh & Seymour Engines in Motorship Cethana

Performance of the Motorship Cethana

An Interview With the Chief Engineer

By G. N. Somerville

THE motorship Cethana, a 3000-ton wooden ship, was built by Sloan Shipyards and is engined with a pair of 500 horsepower McIntosh & Seymour full Diesel engines with a bore of 16-inch by 24-inch stroke and has been in service since July, 1918, during which time she has been constantly operating without delays due to the driving or auxiliary machinery. Mr. H. R. Leffler, the chief engineer, has been with the vessel since she was placed in commission and the magnificent showing of this vessel, together with the fact that Mr. Leffler had no previous Diesel engine experience, should prove conclusively that Diesel ships can be operated economically and that steam engineers properly trained can successfully handle them.

The motorship Cethana is under the Australian flag. At Mr. Leffler's invitation the writer visited him and spent a delightful afternoon talking over the various points of operation and construction which were of mutual interest. We are producing herewith the conversation:

Mr. Leffler, what do you think of the McIntosh & Seymour engines—that is, how do they meet your idea of what you would consider the proper performance of a Diesel engine in a marine installation?

Really, it is hard to find any fault with these engines, as they have given no trouble whatever. In the year and more that she has been in service, the only repair work that we have had done was the replacement of a small collar which was carried away, due, we discovered later, to an internal flaw in the material which was invisible from the surface.

Do you find that the engine operates on various grades of fuel?

We have operated as long as six weeks at a time on the heavy oils which we get in Australia, about 18 or 19 degrees Baume, and clear through the entire range of the refined petroleum to kerosene.

Do you find any injurious effects occasioned by the operation on heavy fuel oil?

No, not with proper handling of the engine. You see, there is always more or less "fluff," we call it, or solid matter in the oil which is only partly combustible. This, in burning, deposits on the burner plates a sediment which has to be blown off, and then we catch a good portion of this in the fuel oil strainers. It is sometimes necessary to clean the strainers once every twenty-four hours, but as we are equipped with duplex strainers, this does not cause us to stop the engines. When burning heavy oils which we think may probably cause us trouble by choking up the fuel valve, we switch over and run on solar oil or kerosene for about a half hour occasionally, which softens up the deposits on the fuel valves and after thoroughly softening we are able to blow out the deposits by cutting off the fuel one cylinder at a time and allowing the injection air to thoroughly clean out the orifices. We make it a practice to periodically clean the valves in this manner, but if the fuel valves should become clogged between cleanings we have one or two indications to warn us. Either the injection air pressure will build up due to a stoppage in the fuel valve, or the combustion will become imperfect, as is evidenced by the black color of the exhaust.

You spoke a moment ago about cutting out the fuel oil from one cylinder at a time. What effect does this have upon the governor and the speed of the engine?

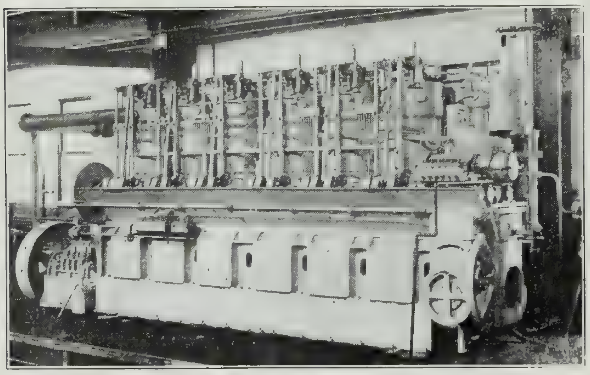
None whatever. You see, according to the construction of these engines, the governor operates by cutting out two cylinders at a time. This is accomplished by raising the section valves off their seats and holding them off continually until the speed of the engine is reduced. The governor is of the non-adjustable type. It is loaded by means of a helical spring at the factory and set to operate at about 15 per cent over the normal engine speed of 185 r. p. m. So by cutting out the fuel to one cylinder, which we do for about a minute, we simply reduce the engine speed and power.

This governor, then, does not operate by changing the stroke of the fuel pump?

No. The stroke of the fuel pump is controlled mechanically by hand lever. A fuel pump is provided for each cylinder with a maximum stroke of about three-eighths of an inch, each pump being driven by means of an eccentric with an adjustable stroke. By means of a drag link, the hand lever can be moved to quite a distance beyond the position corresponding to the full stroke of the fuel pump.

How about the injection pump? How do you regulate this, and what pressure do you carry?

You will notice that on the forward end of each engine there is provided a three-stage compressor driven off the crankshaft. You will notice that there is a fourth cylinder provided with a piston which is moved up and down by means of two gears and hand wheel located at forward end of the engine. This chamber below the piston is in connection with the clearance space of the low-pressure cylinder, and by moving its piston up or down we are able to control the pressure very nicely for injection by varying the volume; this volume can be varied to suit the requirements of one or both engines. As regards the proper pressure that depends upon the oil and other variable factors, we maintain only that injection air pressure necessary to avoid smoke from the exhaust. It is really surprising, but it is possible to operate under quite a wide range of injection air pressure without any apparent effect on the consumption of the motors.



Inboard Side McIntosh & Seymour Engines in Motorship Cethana

I notice, Mr. Leffler, that this job is equipped with all steam auxiliaries.

Yes, but it is rather unfortunate, as the steam auxiliary requires a donkey boiler, which must be kept steaming constantly. The daily consumption of fuel oil for the boiler is as much as one of the main engines. Our deck machinery is all steam operated, as well as one of our auxiliary compressors. The small auxiliary compressor is operated electrically from the small lighting set.

How often do you have to change or give attention to your exhaust valves?

Well, now, that brings up a question of a little history. When the engines were being installed, I came aboard and became familiar with the construction and operation of the various mechanisms. The engines were installed under the supervision of a factory representative, and we went to sea with a guarantee man who went as far as Australia. At the end of that trip, the guarantee man recommended the withdrawal of all exhaust valves for examination, and they were all retouched and put in their original condition, but seemingly could have run a good deal longer without requiring any grinding. Subsequently, for a number of trips, I removed the valves every time we reached port, but have found them to be in excellent condition, and inasmuch as no attention was required I have continued to leave well alone, so that I have found it to be perfectly practical to operate up to 12,000 miles without a bit of attention to the exhaust valves, and if we are favored with a good grade of fuel oil, there is no doubt in my mind whatever but what we could get the same service out of our fuel valves. As it is, we find in low-grade oils a tendency to deposit a gummy substance that seems to resemble asphaltum which occasionally requires us to change fuel valves, but as this is a matter of a few moments' labor, it is right and proper to say that we have never been stopped at sea because of engine trouble, or, for that matter, any trouble in the engine room.

ANNOUNCEMENT

The Acme Engine Company of San Francisco have recently completed negotiations whereby they are to represent exclusively the Midwest Engine Company of Indianapolis for the sale of their Diesel type oil engines on the Pacific Coast. The Midwest engine has been manufactured for a number of years and is built in both marine and stationary types. In the marine type both direct reversible and clutch reversible gear installations are available. The engines are of the four-stroke cycle provided with a fuel pump plunger for each cylinder. The valves are overhead at an angle of sixty degrees, operated by means of an overhead camshaft driven through helical gears. The reciprocating parts of the engines are entirely enclosed and each unit is provided with a compressor for furnishing the injection air.

CHESAPEAKE CRANES

The Chesapeake Iron Works of Baltimore, Maryland, manufacturers of the Chesapeake electric traveling cranes, have recently announced the opening of a New York office in the Woolworth building. The office will be in charge of Mr. H. L. Mode.

The Chesapeake is known as "the most rugged crane built" because of the structural strength, ruggedness and rigidity of its wearing parts. While the Chesapeake crane is standardized, it is made in all types and sizes, in any capacity, to meet every service condition. Chesapeake cranes were selected by the United States government and over forty-five were used by the base ordnance department in France during the war. The invaluable service rendered to the government by the Chesapeake cranes speaks for itself.

PACIFIC MACHINERY

Modern Manufacture of Heavy Duty Engines

By G. N. Somerville

THE inland waterways of the Pacific Coast and their demand for tow-boat service, together with the local supply of distillate, probably accounts in a great measure for the rapid growth and development of the heavy-duty gas engine on the Pacific Coast. This type of engine first made its appearance more than thirty years ago, and today, in the San Francisco Bay district alone, there are about six manufacturing concerns devoting their entire energies to meeting the demand for heavy-duty marine engines in the towing and fishing industries.

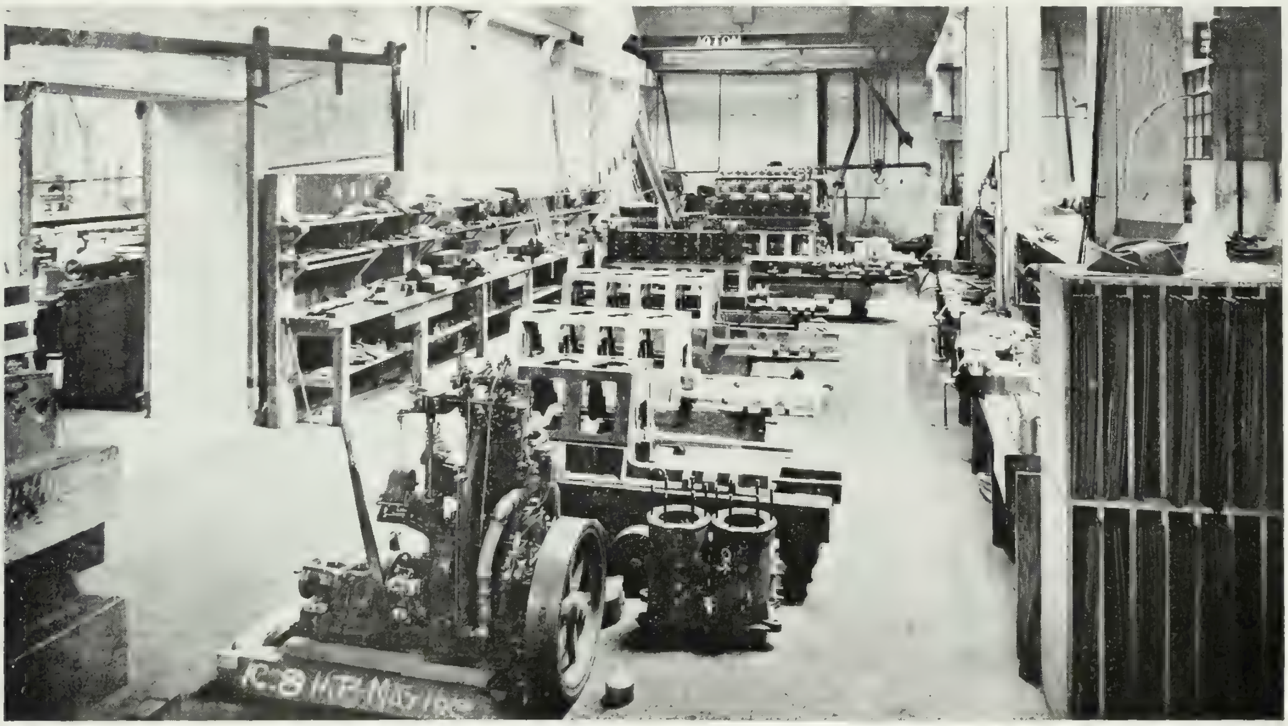


Figure 1. View on the Erecting and Testing Floor, Acme Engine Company

This article is a resumé of some of the methods used by the modern factories in an effort to produce a highly efficient and reliable motor. The photographs and processes shown and described are from the shops of the Acme Engine Company of San Francisco, who have developed and are building seventeen different power units, using but four sizes of cylinders. In designing the Acme engine it was the intention to so proportion the various parts that the smallest number of detail units could be used on the greatest number of power units. For instance, ultimately to jig up all details, bearing in mind the expense of jigs and fixtures, it became imperative that the engines be simplified to avoid a high cost of tools and fixtures. Figure 1 is a photograph taken in the erecting and testing department, and it will be noted that the engines shown, from one to six cylinder types, are all similar in design.

Detail Construction

Connecting rod lower ends: Figure 2 shows the method used for manufacturing connecting rod lower ends to insure interchangeability. The first operation consists in facing off both halves of the boxes on their parting line, after which the top half is faced, turned and bored to receive a register turned on the lower end of the connecting rod. At this point in the work, both halves are assembled and set up, as shown in the figure, for drilling and reaming the bolt holes. A simple plate jig with a projecting register ring similar to that on the connecting rod is used and is located from the rough sides of the pad against which the connecting rod is bolted. After this operation both halves are fitted with bolts and assembled on an angle plate fastened to the face plate of an Acme hand screw

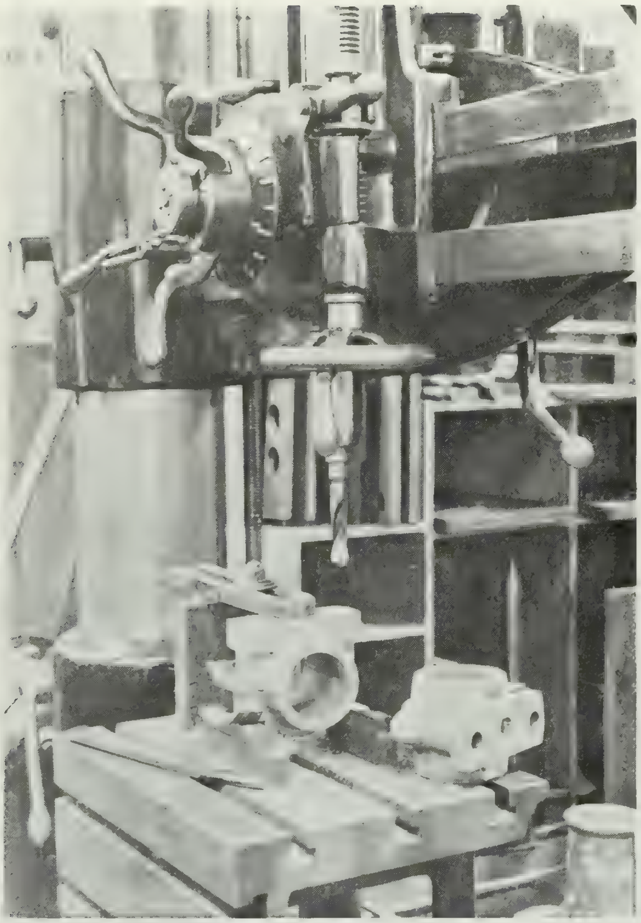


Figure 2. Drilling Jig for Lower End Connecting Rod Brasses

machine when the boxes are bored and faced on both ends at one setting.

Cylinder Heads

Figure 3 is a simple drilling fixture designed to hold the cylinder heads for drilling all holes. The first operation on cylinder heads after the hydraulic test is the facing of the under side and turning a projection which fits into the counter bore, after which the cylinders are mounted up in gangs on the planer for finishing the pads, onto which the camshaft brackets are bolted, at the same time finishing the facing spots for the hold-down bolts. They are then placed in the jig shown in the figure on the drill press with the top plate removed, the rough casting being located by means of the projection previously turned which fits into a corresponding counter bore in the lower plate of the jig. The first drilling operation consists of drilling one of the holes for the water discharge flange, after which a dowel pin in inserted before proceeding with the balance of the drilling. This dowel pin remains until the drilling is completed, and prevents relative movement between the work and fixture. In the top plate bushings are provided for drilling tap holes for the discharge water flange and for two cam shaft brackets; also the cored holes into which the valve stem guides are pressed are reamed out as well as the opening for the "make and brake" ignitor. The work and jig is then turned over on the drill press and ten holes for the hold-down studs and exhaust manifold bolts are drilled. This completes the work with the exception of facing the seats for the valves, which is done on a drill press with a piloted reamer without a jig or fixture.

Cylinders

Figure 4 shows the simple and effective jigging for handling the drilling of cylinders. Before this operation, the cylinders have been bored and faced and counter-bored on the top face for receiving the cylinder head and have been faced on the lower flange and turned on the skirt for bolting and registering into the house crank frame. The holes to be drilled consist of hold-down bolts on the lower face for bolting to the frame and also the six-cylinder head hold-down bolts. The jig for this is shown in the cut and the methods adopted are similar to those utilized for the cylinder head. In addition to this, pads can be seen on the side of the cylinder for taking the air pump and governor gear housing. These holes are drilled through plate jigs which are fastened to the side of main drilling jig and located by means of dowel pins, one of which can be seen in the photograph. In the design of the Acme engine, the cylinders are held to the base plate by means of long steel studs screwed into the latter, passing up through the frame and threaded on top for a nut which holds down the cylinders. In order to make for interchangeability, all cylinder castings are received from the foundry with all necessary pads cast thereon so that it is not necessary to have separate castings for different cylinders on a multicylinder engine. When ready to assemble or ship out as repairs, the sides of the lower flange are planed off on one or both sides through the center of the hold-down bolts if they are to occupy a position in the middle of the engine. This will be readily understood by considering that one cylinder hold-down bolt passes through a hole, half of which is in each adjacent cylinder.

Bed Plate

Figure 5 shows the drilling jig used for drilling the hold-down bolt holes for the line bearings on a three-cylinder bed plate. This same jig is used for the two, four and six-cylinder bed plates by

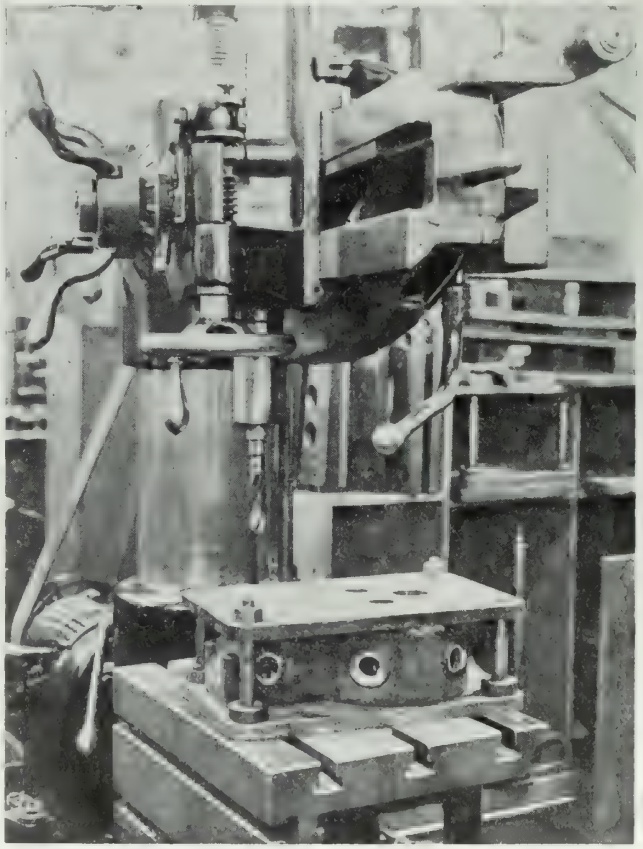


Figure 3. Holding Fixture and Drilling Jig for Cylinder Heads

simply moving it along and placing dowels in holes previously drilled to prevent longitudinal motion of the jig. Side motion of the jig is prevented by means of projections on the under side of the jig which fit into the planed grooves for the bearing cap. In the photograph, the jig has been placed on the bed plate all studded up simply to show the relation between bed and jig. This jig is also provided with holes and bushings for drilling the holes for the cylinder hold-down bolts, which can be seen tapped in the illustration.

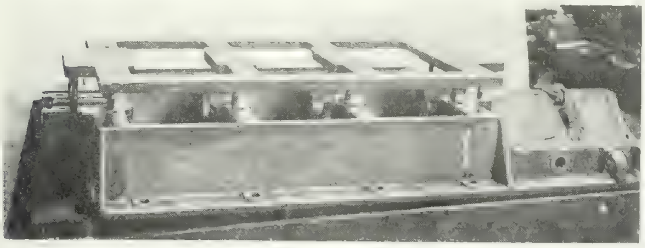


Figure 5. Plate Jig for Main Bearing and Cylinder Hold-down Studs

Figure 6 shows two plate jigs in place for drilling the top and side on the crank house frame. For lightness and convenience in handling, these jigs are made in sections, each section suitable for a single cylinder frame, being located after the first position by means of inserted dowels. The top plate is provided with drill bushings for drilling for the magneto bracket on one end. This is drilled only on the after end of the frame.

Conclusion

The processes here described are but a very few selected at random to show the convenient methods adopted in machining. In assembling more economy is utilized by the simplification of the governor magneto drive and sparker arrangement. There is but one size of ignitor for the entire line of engines and two different sizes of governor and sparker drive, so that the workmen become quickly familiar with the work when it is remembered that the small governor always accompanies the lighter sparker drive.

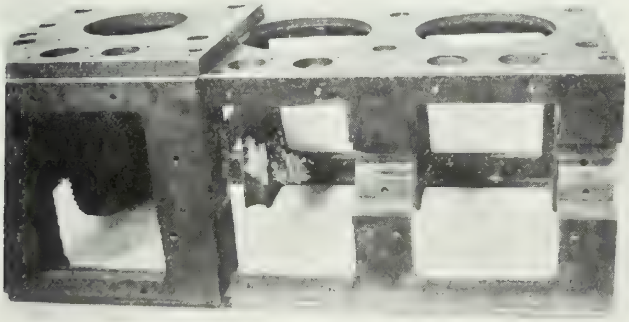


Figure 6. Plate Jigs for Top and Sides, Crankhouse Frame

The demand for marine engines and products of Pacific Coast shops has not reached anything like the proportions of the automobile trade, and manufacturers are not in a position to jig up as they would be if units were turned out at the rate of hundreds a day, so that the problems before the Western manufacturer in the matter of tools, jigs and fixtures are presented from an entirely different viewpoint, but nevertheless will bear careful study and pay good dividends on any investment made.

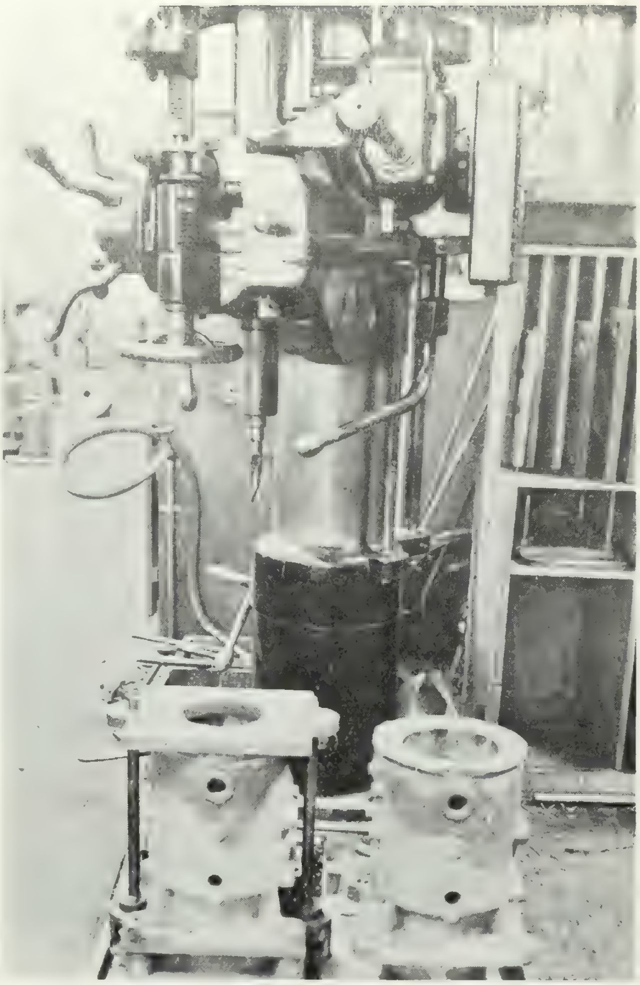


Figure 4. Holding Fixture and Drilling Jig for Cylinders

NEW BUSCH-SULZER AGENCY

The H. F. Lyon Company, with offices at 24 California street, San Francisco, announce having just completed arrangements with the Busch-Sulzer Company of St. Louis to handle on this coast the Diesel engines manufactured by this well known firm, an engine, by the way, which is generally looked upon as the best of its type manufactured in this country.

Mr. Lyon states his company will only handle the marine type of this engine and are in a position to quote prompt delivery of 650 horsepower sizes, a type particularly suited for installation in the size and type of wooden hulls constructed on this coast.

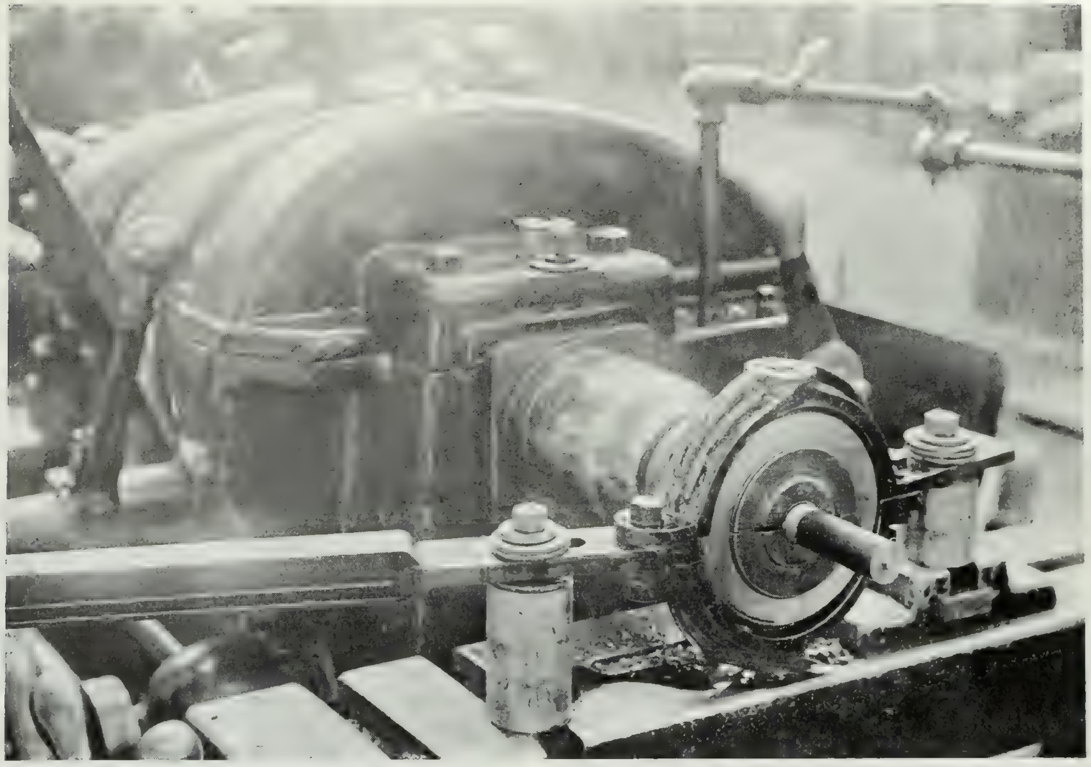


Figure 1. Hold-on Attachment Fitted to Warner-Swasey Hand Screw Machine, showing Work in Place Ready for Threading

An Improved Holder-On Attachment for Studs

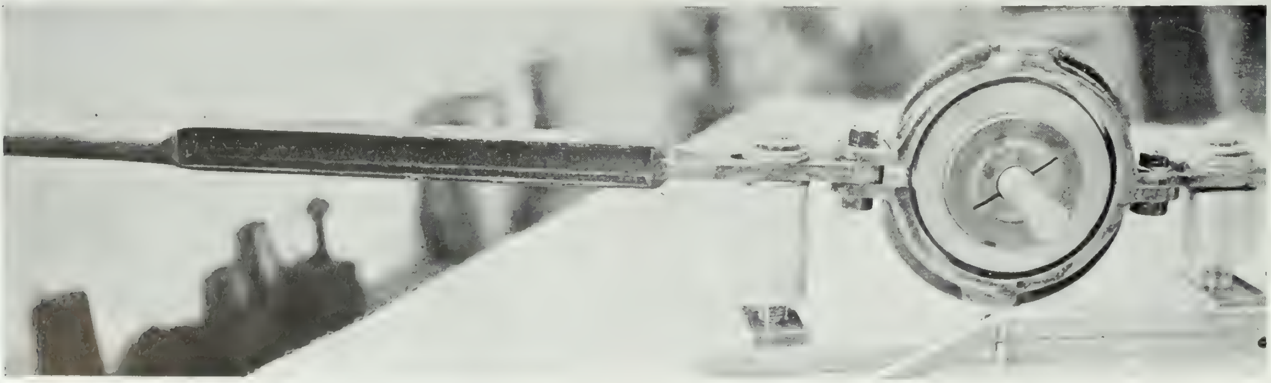
A RECENT invention for the rapid production of studs, called by its inventor the "Improved Holder-on Attachment," is in reality a quick operating chuck so designed to hold the threaded end of a stud without in any way marring the threads.

Figure 1 shows the attachment set up on a Warner-Swasey hand-screw machine, but it is claimed by the inventor that this attachment can be fitted to any make of screw machine or turret lathe by the use of a few special fittings which are furnished with the attachment when it is known on what machine it will be employed.

Figure 2 is a close-up view of the jaws with the sliding collar removed, showing the position of a finished stud just as it is being released. It will be noted that the extreme end of the jaws are turned on a slight taper to correspond with the taper bore of the sliding collar, which, when moved outward, tightens the jaws. Fastened to the jaws by means of a loose joint is an ejector pin which is automatically drawn in as the jaws close and forced out, ejecting the stud, as the jaws are opened. This ejector pin can be seen just back of the inner end of the stud in Figure 2. The sliding collar is provided with an annular groove on its circumference turned to receive a pair of bronze shoes which are pivoted in a steel split yoke, the split yoke being attached to the cross slide through projecting arms and columns. The movement of the yoke, and, in turn, that of the sliding collar, is accomplished by means of a toggle joint so designed that it is self-locking in the closed position.

As shown in the illustrations the attachment is provided with separate jaws for each size of stud within the range of the machine. This range is from one and a quarter inches down to the smallest stud. The mechanic need only supply himself with jaw sizes corresponding to the size of studs he will be called upon to manufacture.

Upon first notice it might appear that this device would be detrimental because of damage done to the threaded end of studs, but after a period of experimentation extending over many months, during which time the attachment has been in con-



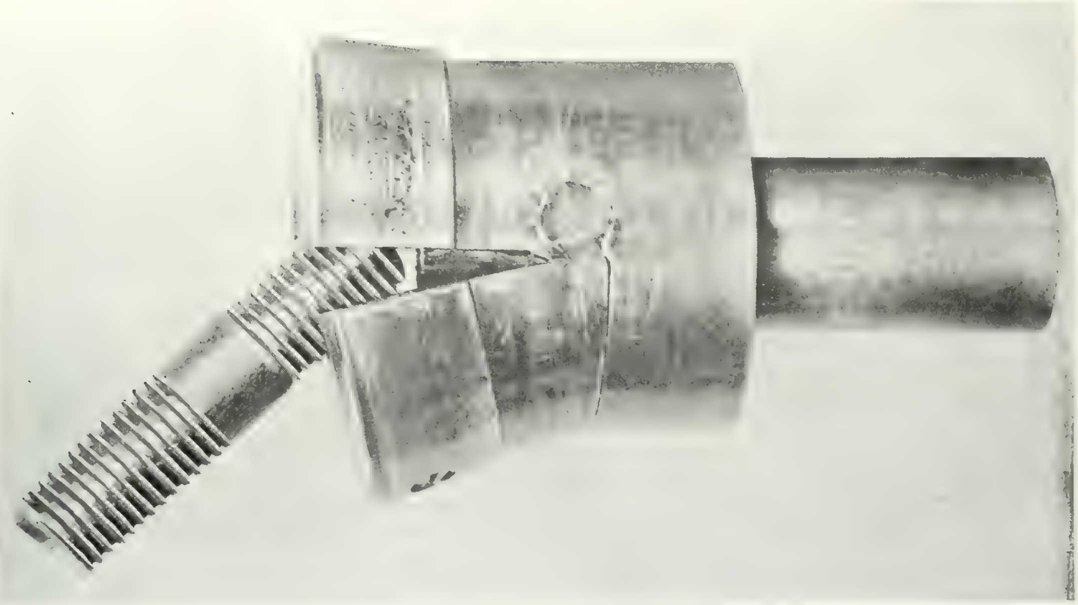


Figure 2

Detail of Hold-on Jaws, showing Ejector Pin and Stud being Ejected

tinual operation in the hands of unskilled labor, not a single stud has been rejected on account of defective threads spoiled by the jaws of this attachment.

Operation

In operation the studs are threaded, formed slightly round on their outer end and cut off in the usual manner prevailing in the shop, usually on a hand-screw machine with bar feed. After the desired number of studs have been cut off and threaded on one end the attachment is then set up ready for threading on the blank end.

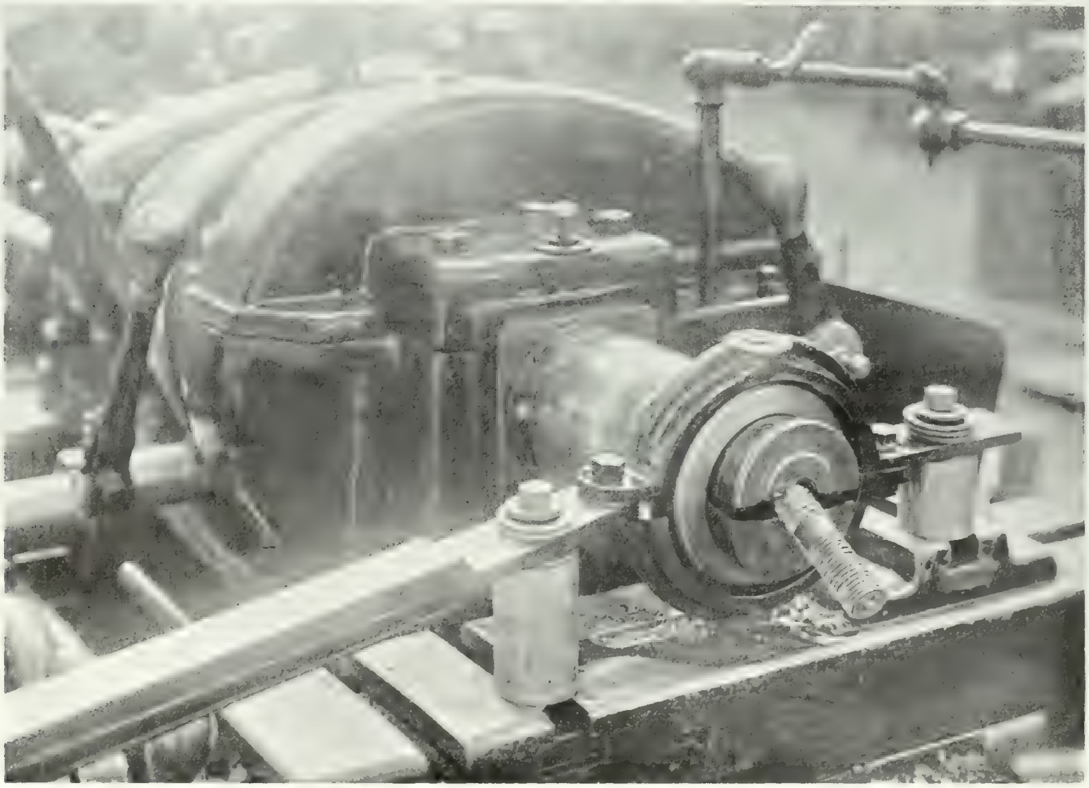
As mentioned before, the machine can accomplish wonderful results in the hands of unskilled labor. In the shops of a local shipbuilding company, where this attachment has been developed by its inventor, Mr. W. G. McGee, an average hourly production extending over a number of hours has been maintained at the rate of twelve ¾-inch studs per minute in the hands of an apprentice boy.

Probably one of the chief reasons for this good record when using the attachment is the fact that it is not necessary to stop the machine either for charging or unloading the attachment. The stud is automatically threaded into the attachment due to the pressure when forcing the stud against the die. When it is screwed in against the ejector pin the die starts cutting. After the thread is cut the die automatically releases, at which point the operator releases the holder-on attachment, the ejector pin ejecting the stud. The operator then closes the die, starts a new stud, and repeats the operation.

The various illustrations show the relative position of the attachment and stud at different points in the progress of the work.

Figure 3

Showing Work being Ejected



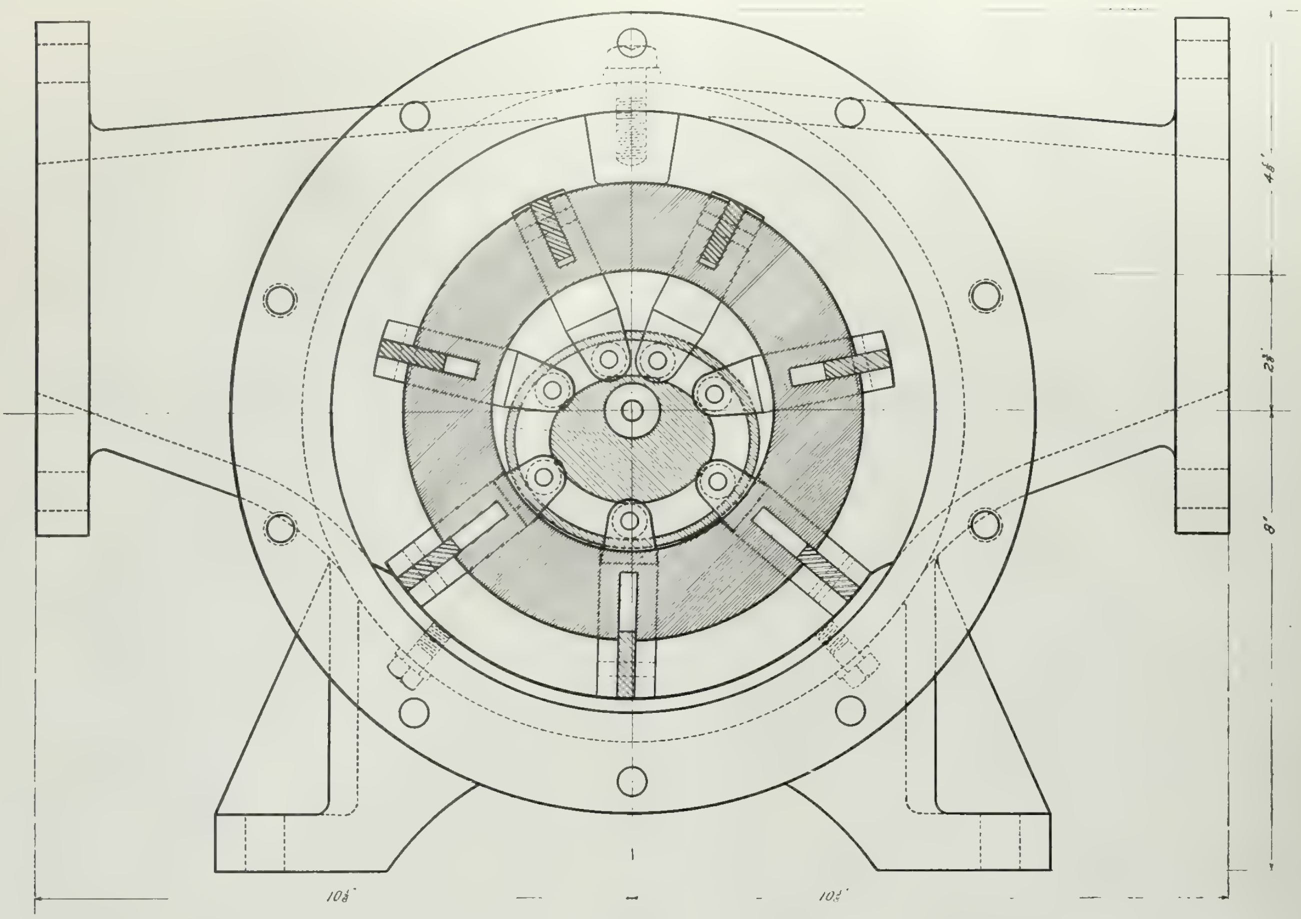


Figure 1. Cross Section, Monarch Rotary Pump, showing Vanes and Plungers

Modern Jigs and Fixtures in a Small Shop

AN example of well designed and efficient tooling is here shown in the jigs and fixtures for machining the rotor of the Monarch rotary pump.

In Figure 1 is shown a longitudinal section of the Monarch pump. It will be noted from the line drawing that the rotor is provided with a number of milled slots across the face of the rotor, each slot passing through the center of a drilled and reamed hole radio to the rotor. These reamed holes serve as guides for plungers which actuate the pump vanes. Both the vanes and plungers, as well as the slots, are machined to very close tolerances and hence the necessity for great accuracy in locating and indexing. The vanes are actuated mechanically, as will be noted from the cut, by means of a peculiarly shaped cam and rollers on the inner ends of the vane plungers..

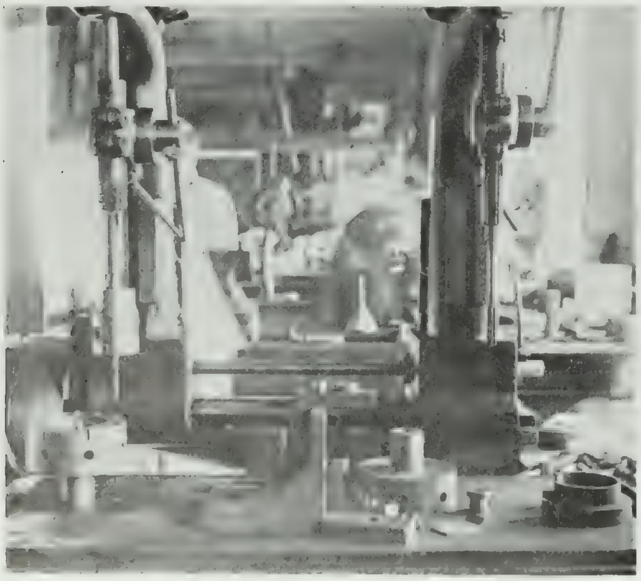


Figure 2. Drilling Operation, from which Work in Following Operations is Located

Figure 2 shows a rotor and drilling jig on the drill press for the first drilling operation. It is to be noted that the rotors are of mild forged steel and before coming to the drill press are turned and faced on the body and on the arbor, as well as being bored and counter-bored concentric with the body.

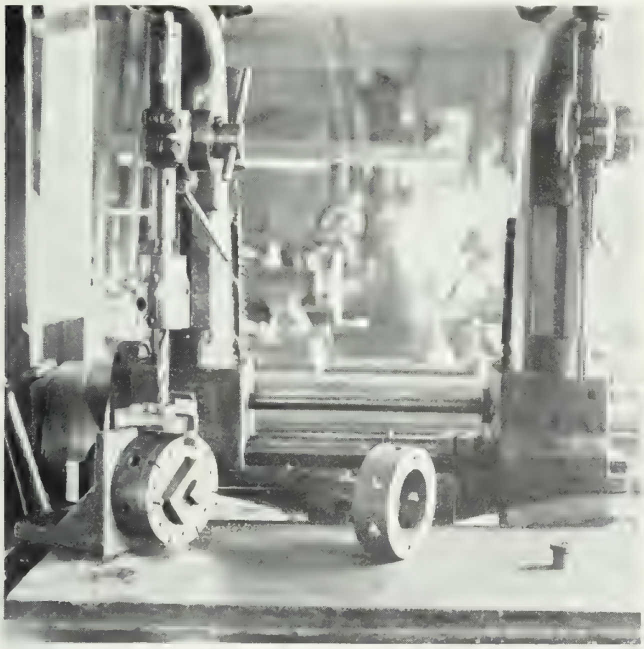
In Figure 1 the rotors are shown with the hole for the guide vanes already drilled. This operation, however, is now performed after the operation shown. The counter-boring provides a machine locating space into which a register ring on the jig plate is fitted. The first hole is drilled for the tap size of the screw and a dowel pin is slipped in this first drilled hole. The other holes are then drilled, the dowel pin preventing any relative movement between the jig and work. This same jig is later used as an indexing plate for milling the guide vanes and slots.

After drilling the holes in this operation the work is fitted in the fixture and it will be noted that the dowel pin still locates the index plate and work. This fixture, it will be noted, is provided with a slot and removable bar which extends through into the slots in the index plate which is used for locating each of the radial holes for the guide vane plungers. This angle plate fixture is so designed that it is nicely balanced, avoiding the tendency to tip when loaded with the work for this operation. A double head drill press is used and by means of a removable bushing the work is first drilled, then slid across to the second head, which, it is noted, is provided with a reamer.

After the drilling operation shown in Figure 2 the work is mounted between centers on a plain milling machine and the slots milled to correspond with the slots on the index plate.

Figure 3 shows the cover and extended shaft of the rotor which is turned from a mild steel forging and the plate jig is used again in almost an identical manner for drilling the corresponding holes. In this case bushings for a clearance size drill somewhat larger than the body diameter of the studs is used and the position of the plate relative to the work is reversed, the underside of the jig being counter-bored to receive the register ring projecting from the cover plate. Dowel pins are used in the same manner as previously described to prevent movement after the first hole is drilled.

Figure 1, in addition to showing the drilling operation, also shows the whole fixture and work disassembled, which will give a good idea of the design of this fixture.



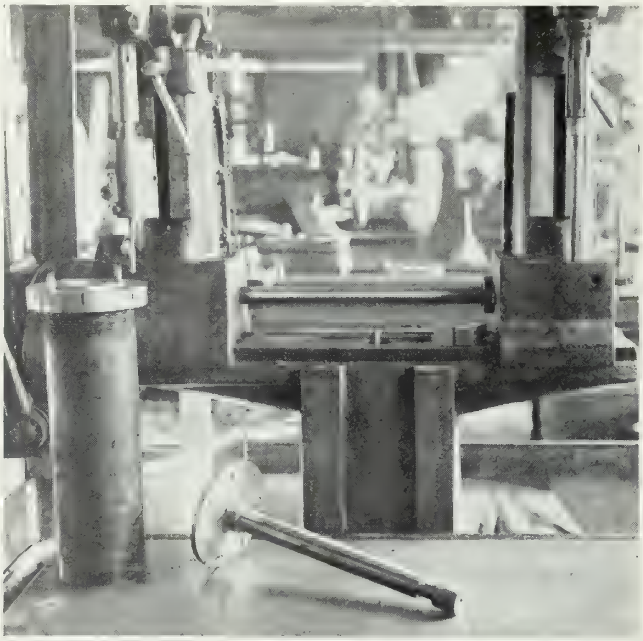
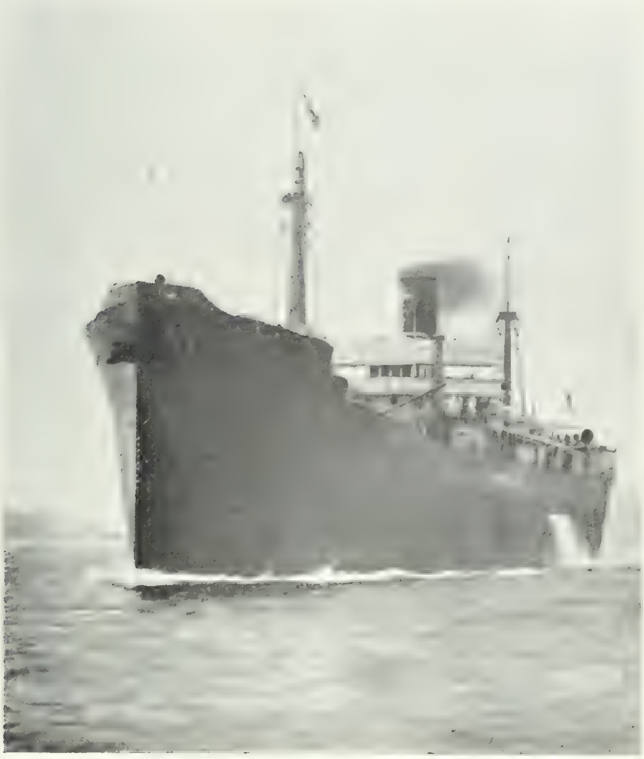
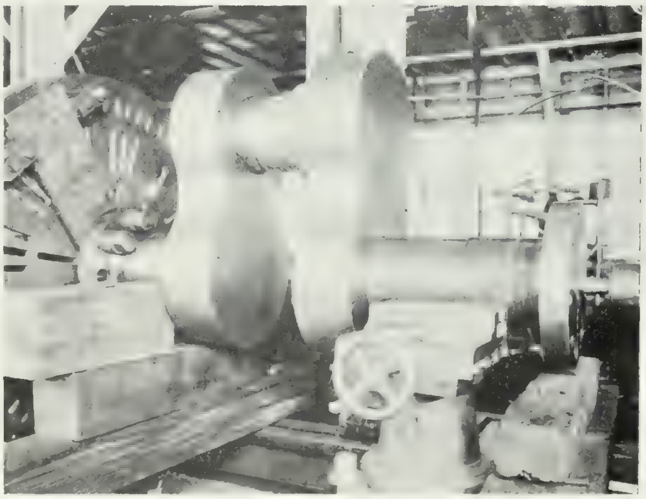
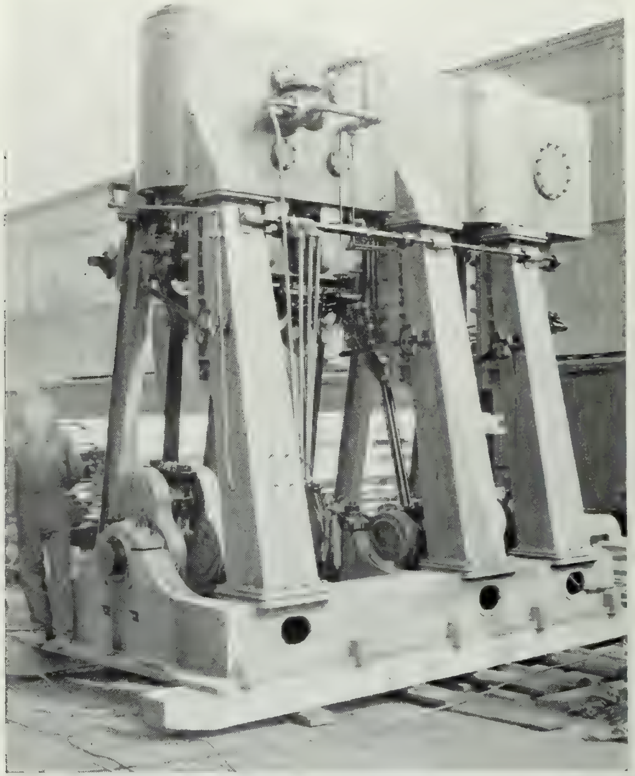


Figure 3. Left: Work and Fixture for Drilling and Reaming Guide Plunger Holes. Figure 4. Right: Drilling Operation on Rotor Cover and Shaft Extension





Above: Large marine engine crankshaft set up in lathe at the machine shop of the Seattle Machine Works. See page 130b. At the left: United States Shipping Board Steamship Chicomico on her endurance trial. The Chicomico was built at the yard of the Seattle North Pacific Shipbuilding Company, and was launched on October 25 without propelling machinery or boilers. She was outfitted in five days, and endurance trials were held on October 31, showing a speed of 12.46 knots. Her builders claim a world's record for outfitting on this job.



Above: Triple expansion engine built by the Seattle Machine Works.
Left: Mr. Eric Johnson, president and general manager, Seattle Machine Works

Seattle Machine Works

THE war record of the Seattle Machine Works is one of which they may be justly proud, having turned out a large number of marine engines and auxiliary machinery, including shaftings, bearings and propellers for the Shipping Board and privately owned ships. It is no small task, especially under the stress of war time, to assume the responsibility for the prompt delivery and high class workmanship required for a large order of marine engines. The work turned out for this company during the war has been such as to gain for them official commendation from the production division of the United States Shipping Board Emergency Fleet Corporation. Not only was the work finished on time, but the material and workmanship met the very high demands for marine construction.

The Seattle Machine Works was organized in 1899 and following a successful start was incorporated in 1900, starting on the century mark for what has proved to be a successful and enviable career. Their first location was in Seattle on Jackson and Occidental avenue and after three years of well earned prosperity their quarters were no longer able to house the growing business. In 1903, larger accommodations having been acquired at the foot of King street, a new plant was erected, into which they moved, but these quarters in a short time proved to be much too small to house the growing concern, which under able and efficient management was growing by leaps and bounds, so that in 1908 a lease was negotiated for a portion of the Westerman-Timmerman property on Lander street and East Waterway, where they erected their own machine shop building, into which they moved the latter part of the same year. In this machine shop, which was intended to be the only home of the Seattle Machine Works for many years, grew up a business that has been favored with fortune and good management. With the advent of the world war, the business expanded and in the latter part of 1917 an additional plant was erected, designated as plant No. 2, which occupies a site on the Duwamish water way in Georgetown in the King County Industrial Tracts. The No. 2 plant is exceptionally well situated for marine work, covering an area of about three acres and having a private slip and fitting out wharf on the Duwamish river with a wharf of over 500 feet in length for laying up vessels and a railroad spur track extending to the outer end of the wharf. Their facilities for handling this class of work is second to none in the Seattle district. With the combination of plants No. 1 and No. 2, and the facilities existing, it is claimed to be the largest and most completely equipped shop for repair or manufacture of marine machinery in the Northwest, as is readily evident from the partial list of machine tools herewith:

Lathes

1—36″x20′ 0″ Lodge & Shipley Lathe
1—27″x27′ 0″ Lodge-Davis
1—31″x14′ 0″ Bradford Lathe
1—20″x14′ 0″ Lodge & Shipley Lathe
1—18″x12′ 0″ Lodge & Shipley Lathe
1—14″x 8′ 0″ Lodge & Shipley Lathe
1—16″x 8′ 0″ Flather Engine Lathe
1—86″x30′ 0″ McCabe Engine Lathe (raised to 102″)
1—16″x10′ 0″ Carrol Jamieson Lathe
1—18″x12′ 0″ Lodge & Shipley Lathe
1—16″x 8′ 0″ Hendey Tool Room Lathe
1—36″x14′ 0″ American Lathe
1—24″x14′ 0″ Lodge & Shipley Patent Geared Head Engine Lathe
1— 2″x24″ Jones & Lamson Geared Head Turret Lathe
1—42″x30′ 0″ American Tool Works Triple Geared Lathe
1— 3″x36″ Jones & Lamson Flat Turret Lathe
1— 24″ Gisholt Turret Lathe
1—18″x12′ 0″ Axelson Quick Change Lathe

Planers

1—36″x36″x9′ 0″ L. W. Pond Planer
1—48″x48″x12′ 0″ D. & H. Open Side Planer
1—24″x12′ 0″ D. & H. Open Side Planer
1—72″x72″x14′ 0″ Cleveland Open Side Planer
1—24″x24″x6′ 0″ Whitcomb Planer

Boring Machines

1—Pond Ridgway Boring, Drilling and Tapping Machine
1—Niles 2 Spindle Boring Mill
1—45″ Bridgeport 2 Head Vertical Boring Mill
1—Farrell Horizontal Boring Mill

Radial Drills and Drill Presses:

1—28″ Barnes Back Geared Drill Press
1—20″ Hamilton Drill Press
1—20″ Barnes Drill Press

1— Hamilton Drill Press
1—20″ Barnes Back Geared Drill Press
1—No. 0, 3 feet Bickford Plain Radial Drill
1—4½ ft. Dreses Plain Radial Drill
1—5 ft. American Tool Works Plain Radial Drill
1—36″ Gang Radial Drill
1—Sipp Ball Bearing Drill Press
1—24″ Foote Burt High Duty Drill Press
1—6′ 0″ New Model Radial Drill

Milling Machines

1—No. 11 Brainard Milling Machine
1—No. 1 Kempsmith Universal Milling Machine

Slotters

1—12″ Ferris-Miles Slotter

Shapers

1—24″ Gould & Eberhardt Shaper
1—16″ Steptoe Shaper
1—Norton Draw Cut Shaper
1—16″ American Tool Works Shaper

Hydraulic Press

1—150 Ton Hydraulic Press.

As an example of the high class work of the Seattle Machine Works, the performance of the steamers Oakwood and Hollywood of the Pacific American Fisheries' stand out as bright lights. Both of these vessels made initial trips of over 18,000 miles without a single stop on account of machinery or a single item of expense for repairs at the end of their trips.

In passing it must be said that the remarkable growth of the Seattle Machine Works is due to the indomitable spirit of its founders and its present management. Mr. Eric Johnson, president and general manager, has been with the firm constantly since its founding in 1899, when he was general superintendent. Mr. Eugene L. McAllaster is vice-president and engineer and was formerly with the well known engineering firm of McAllaster & Bennett.

ENGINES BUILT BY SEATTLE MACHINE WORKS DURING THE WAR AND VESSELS IN WHICH THEY WERE INSTALLED

VESSEL	CLASS	HULL BUILT BY	FOR	ENGINES
Redwood ...	Wood	Pac. American Fisheries.	Their Account	Twin 500 H. P. Triple Expansion
Firwood ...	Wood	Pac. American Fisheries.	Their Account	Twin 500 H. P. Triple Expansion
....	......	....	U. S. Shipping Board	Twin 500 H. P. Triple Expansion
Rosewood ..	Wood	Pac. American Fisheries.	Their Account	Twin 500 H. P. Triple Expansion
Hollywood .	Wood	Pac. American Fisheries.	Their Account	Twin 500 H. P. Triple Expansion
Absaroka ...	Steel	Skinner & Eddy Corp'n.	U. S. Shipping Board	Single 2700 H. P. Triple Expansion
West Alsek.	Steel	Skinner & Eddy Corp'n.	U. S. Shipping Board	Single 2700 H. P. Triple Expansion
West Apaum	Steel	Skinner & Eddy Corp'n.	U. S. Shipping Board	Single 2700 H. P. Triple Expansion
Catherine D.	Wood	Pac. American Fisheries.	Their Account	Twin 500 H. P. Triple Expansion
Oakwood ...	Wood	Pac. American Fisheries.	Their Account	Twin 500 H. P. Triple Expansion
Cruso	Wood	Pac. American Fisheries.	U. S. Shipping Board	Twin 750 H. P. Triple Expansion
Bobring ...	Wood	Pac. American Fisheries.	U. S. Shipping Board	Twin 750 H. P. Triple Expansion
Bockonoff...	Wood	Pac. American Fisheries.	U. S. Shipping Board	Twin 750 H. P. Triple Expansion
Bonneterre..	Wood	Pac. American Fisheries.	U. S. Shipping Board	Twin 750 H. P. Triple Expansion
Bon Secour.	Wood	Pac. American Fisheries.	U. S. Shipping Board	Twin 750 H. P. Triple Expansion
....	Steel	McAteer Shipbuild'g Co.	U. S. Quartermaster	Single 500 H. P. Triple Expansion
Jacona	Steel	Skinner & Eddy Corp'n.	U. S. Shipping Board	Single 2800 H. P. Triple Expansion
Elderon	Steel	Skinner & Eddy Corp'n.	U. S. Shipping Board	Single 2800 H. P. Triple Expansion
Clodia	Wood	Pac. American Fisheries.	U. S. Shipping Board	Twin 750 H. P. Triple Expansion
Clio	Wood	Pac. American Fisheries.	U. S. Shipping Board	Twin 750 H. P. Triple Expansion
Hull No. 21.	Steel	Ames S. & D. D. Co...	U. S. Shipping Board	Single 2800 H. P. Triple Expansion
Hull No. 22.	Steel	Ames S. & D. D. Co....	U. S. Shipping Board	Single 2800 H. P. Triple Expansion
Hull	Steel	Skinner & Eddy Corp'n.	U. S. Shipping Board	Single 2700 H. P. Triple Expansion
Hull	Steel	Skinner & Eddy Corp'n.	U. S. Shipping Board	Single 2700 H. P. Triple Expansion (bldg.)
Hull	Steel	Skinner & Eddy Corp'n.	U. S. Shipping Board	Single 2700 H. P. Triple Expansion (bldg.)

VEHISOTE—THE MODERN PANELING MATERIAL

THE fundamental requirements of a material for interior paneling and vehicle body building are: sufficient strength to withstand ordinary service, absolute resistance to the penetration of moisture, minimum contraction and expansion due to changes in temperature, a closely knit fibrous tough material which could not by any possibility split as does wood, nor rust as does metal, a material which will take and hold paint and varnish and which will be economical to repair in case of accidental damage.

All these fundamental requirements are embodied in vehisote, a paneling material produced by the Pantasote Company of New York and distributed through the Scovel Iron Store Company of San Francisco. Vehisote eliminates all the disadvantages of previously used materials. Any first-class painting system may be used in finishing and a very fine finish can be obtained. This material is distributed in very large sized sheets which tend toward elimination of waste and make for economy in time and labor because of the ease with which it may be applied. This material adapts itself wonderfully to paneling work for ceilings and side walls, particularly for marine interiors. It is not a laminated material, but is constructed by a distinctive and special process, producing a fibrous, homogeneous material of great unit strength and of great toughness. Like steel, it is made by a fluxing and molding process which interweaves and interlaces the fibers into one complete fabric into which every part is thoroughly welded to every other particle. Vehisote is not a substitute for wood or steel, but a distinct improvement in paneling material. It has been used extensively by such well known firms as New York Shipbuilding Company, William Cramp & Sons Ship & Engine Company, Newport News Shipbuilding & Dry Dock Company, Robbins Dry Dock & Repair Company, Morse Dry Dock & Repair Company, C. M. Englis, W. & A. Fletcher & Company, and others. William Cramp & Sons use vehisote exclusively and for paneling recommend it always, as they have found a distinct advantage in its use.

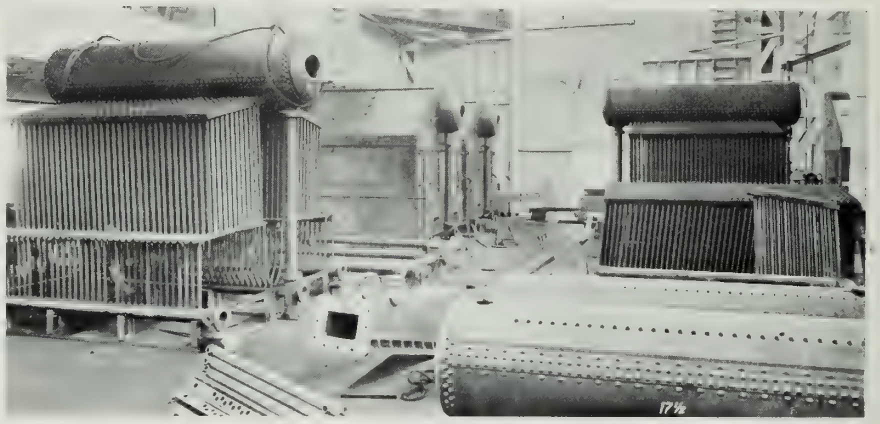
Practically every high-class passenger boat built on the Eastern coast during the last few years has been fitted with vehisote. These include the two Great Northern Steamship Company's vessels, Great Northern and Northern Pacific; the Merchants & Miners' boats Suwanee and Somerset; the Clyde Line steamers Lenepe and Henry R. Mallory. The Old Dominion Steamship Company's Madison is wonderfully fitted out with vehisote and, as we all know, China Mail Steamship Company's Nanking, formerly Pacific Steamship Company's Congress, with her magnificent interior, is paneled throughout with vehisote.

THE COLTON-DETROIT FACTORY

To say this plant is modern hardly covers the situation. It is a little ahead of the times, particularly as to the arrangement of machinery and the scientific manner of handling the work. Both floors are almost as light and airy in the very center as they are at the side walls. These walls, you might say, are one vast window. Floors are of perfectly laid wood on concrete—the easiest floor for men's feet. By a special lighting arrangement there are no shadows to speak of and men may work without bending their backs and therefore leave for home at night almost as fresh and unfatigued as when they came in the morning. Every possible sanitary condition has been thought of. Sanitary iced drinking fountains are placed in numerous convenient places on each floor. Steel lockers are provided for each workman, where he may keep his clothes and carry his own key, so that there is never any argument about lost clothing or lost articles of personal possession. Sanitary wash rooms, clean and well ventilated, are provided for every department and they are so perfectly spick and span that the men are encouraged to keep themselves clean, and men who are clean about their persons are clean about their work.

These facts are responsible to a great extent for the high quality and efficiency of the "Colton-Detroit" high speed twist drill.

PACIFIC MARINE IRON WORKS



THIS important outfitting and repair plant was organized in July, 1917, to handle war activities. It had contracts for building and installing marine machinery for the Standifer, Supple-Ballin, St. Helens Shipbuilding Company and Sommarstrom Brothers, all in the Columbia River district.

It has been the headquarters of the United States Shipping Board Emergency Fleet Corporation for the installation of the machinery in wood ships.

The company built all of the propelling machinery, boilers, tanks, etc., for seventeen Emergency Fleet vessels and handled the installation of machinery for twenty others.

Throughout the war it was one of the busiest places in all Portland and experienced a most remarkable development, so that it is now a very important factor in the business of the Columbia River district.

At the present time, the company is engaged in manufacturing engines, boilers and installation for San Francisco interests.

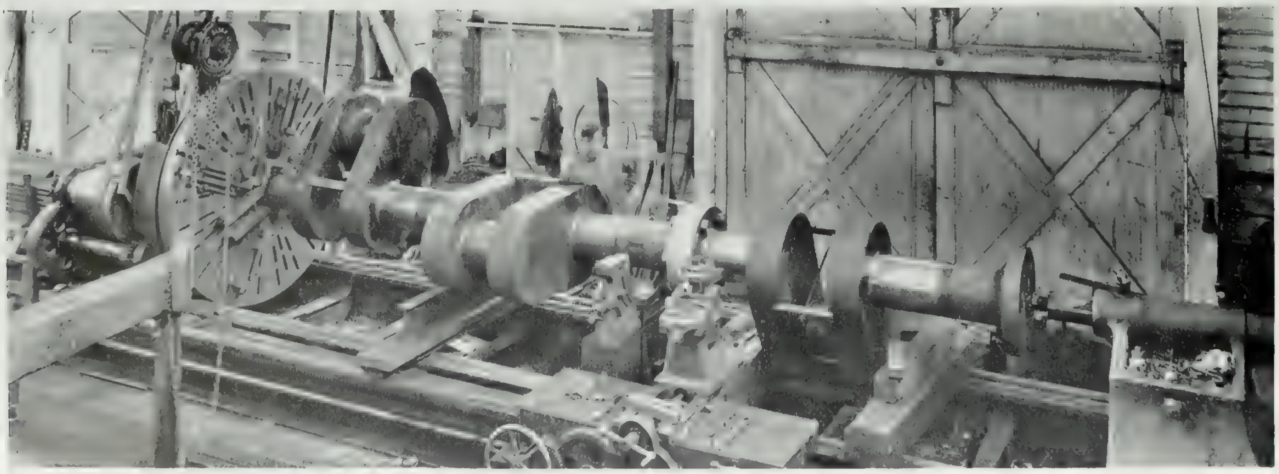
The plant covers several acres in extent and is prepared to handle anything in the marine machinery line, regardless of size or type of ship.

One feature of the plant that is noteworthy is the fact that it has a distinct advantage by having a large floating marine repair shop, fully equipped for handling engine and boiler repairs, including air compressors, oxy-acetylene welding and cutting equipment.

The company built and installed the machinery of the eleven Ballin type composite steamers which have made such a wonderful record.

It controls the manufacture of Ballin water tube boilers which have proved so efficient.

Section continued in page 130h



Outfitting yard, and views in the shops of the Pacific Marine Iron Works, Portland, Oregon

Staybolt Manufacture at the American Flexible Bolt Company Plant, Pittsburgh

A corner in the machine department of the American Flexible Bolt Company, showing drilling and threading machinery

The above company was organized in 1913 for development and production of the American Staybolt, used in locomotive boilers more particularly at the present time and in use on a large number of railroads in this country and abroad.

The theory of its design was to make the body of the bolt relatively flexible as compared with rigid bolts in order to increase staybolt life and locomotive service ability. This has been proven up by extended use on all classes of railroad service.

During the development of the water tube type boilers by the Emergency Fleet Corporation engineers in the latter part of 1917, it became evident that a hollow staybolt would be desirable on account of the adoption of the box header type boilers, and that means of cleaning flues from front and rear would be desirable. This necessitated the plan of hollow bolts and while at first the use of having bolts made of steel tubing was considered, it was found that by the use of an American Flexible Bolt Company product an economical design and desirable materiable was available. This company had by reason of experience in manufacture of American Staybolt equipped their shop with special machinery and methods for economical production of the reduced body solid bolts, and it merely remained to produce the hole in order to add reduced body hollow bolts to the number of their products.

Briefly the method of manufacture of bolts for the Emergency Fleet Corporation type of boiler is as follows:

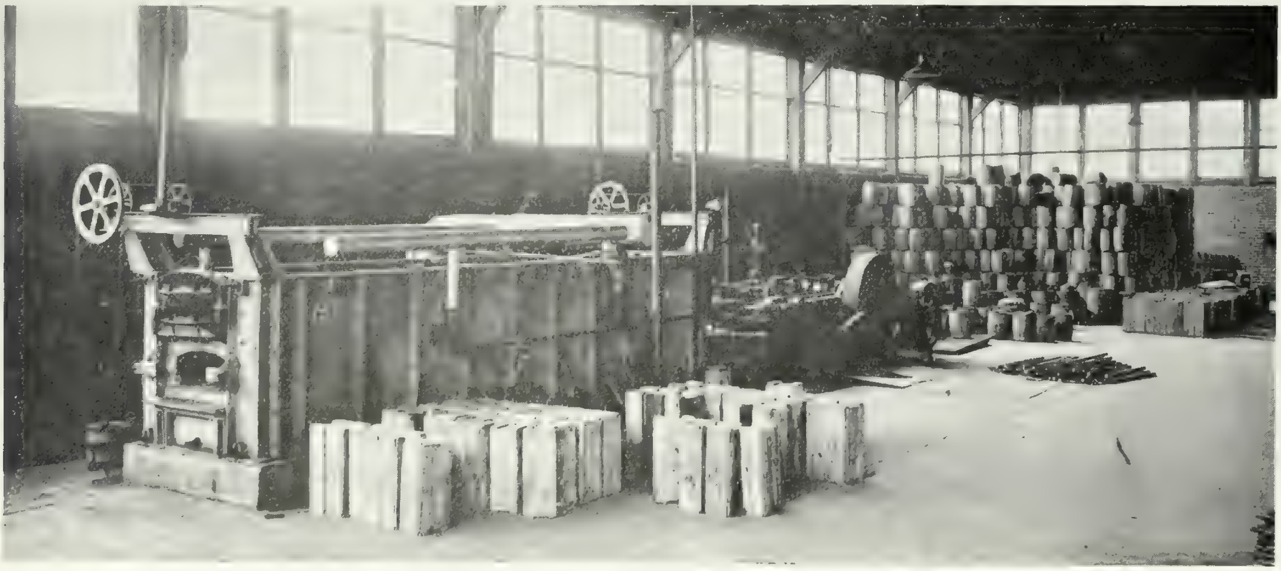
Bars of first-class staybolt iron are sheared to blanks of the proper length; these are heated in gas furnaces and the body portion of the staybolt rolled to the proper diameter, leaving the ends of the full size and length desired for threading. This rolling in no way deteriorates the peculiar qualities of staybolt iron but rather improves them as additional working is a refining process. No material is wasted as would be the case if the body of the bolt was turned down, as is done in some cases in order to have a smooth body between threads, which involves a waste of time and material.

After the rolling the ends are squared, which completes the forging operations. This leaves a portion on each end which is threaded, and as the diameter of the rolled body is below that of the bottom of the threads, the application of the bolt is facilitated as only the short length has to be screwed through the outer sheet, then passed into the water space and entered into the other sheet and a few turns puts the bolt into its proper place for heading over.

After the threading comes the drilling. In hollow bolts the hole is made throughout the entire length, and in the particular case of the Emergency Fleet Corporation bolts the hole was three-fourths inch diameter. The company has made a large quantity of bolts of similar general design but with various sizes and holes as the occasion may require.

Many boiler designs do not need hollow bolts but do require a telltale hole being drilled in either one or both ends, and whatever is needed for such design is readily accomplished by the facilities of this company.

Their work has not been confined to production of staybolts of iron, as in some cases steel is required and furnished. This factory may, therefore, be considered as special-



One of the automatic units showing Tate-Jones furnace and Ajax rivet machine, American Flexible Bolt Company

Corner of the forge shop showing production of the hollow body stay bolt, American Flexible Bolt Company

izing in the matter of staybolts for economical production of standardized bolts.

It is believed that boiler manufacturers who give close consideration to their manufacturing expense find that it is desirable to limit their work to that of assembly as much as possible. They do not manufacture sheets, shapes, rivets, bolts, many forms of braces, boiler fittings, but purchase them, and there seems no good reason where there is a standardized production of boilers that the staybolts should not be standardized as well.

The ordinary method of making staybolts for boilers is rather extravagant as the waste begins from the time the bars of material are sheared up, as there are generally some crop ends. There is waste more or less at the threading machines in defective threads or from seamy or defective spots in the iron bars, so that the amount of the finished bolts actually produced from the bars is a considerable reduction of the tonnage of bars purchased. If the practice is followed of threading long bars, applying these for staybolt length, cutting off and repointing, there are several items of expense involved in taking the cutoff portion probably some distance from where the bolt was applied to be repointed and returned, and the chances are that the piece is never entirely used up, but a considerable portion beyond a strict requirement of a minimum waste is largely exceeded. In other words, the loss of staybolt iron, which is expensive material, amounts to over 10 per cent as a rule, and how much over is a serious question. By the use of the reduced body standardized bolt this loss is at a minimum.

Many boiler makers believe that standardized bolts are very difficult to consider, on account of the variation of boiler work in the shop, which is more or less true, but need not necessarily entirely defeat the advantages to be gained. Boiler makers have seen the evident improvements in other lines of mechanical endeavor, while their own, being so close to their own view as to perhaps not attract the same attention, has suffered from lack of development in the improved methods in many cases.

MODERN MILLING AND GEAR CUTTERS

By J. C. Terrace

THE discovery of high speed steel, with the demand for increased production, compelled the machine tool manufacturer to design and build machines known today as the "high-duty type."

The high speed cutter had much to do with the development of the latest milling machines, and gear cutting machinery. But it was necessary to improve the cutter to keep pace with the continued advancement along the "high power" lines of these machine tools. This the cutter manufacturer realized, and it is no longer a question of will the cutter "stand up," but will the machine "pull the cutter."

The old style cutter, known as "standard," has been replaced by the "high power" type or coarse tooth milling cutter, to meet the requirements of high speed milling. This cutter has less number of teeth, widely spaced, allowing about four times the chip room of standard cutters. The teeth are undercut, this being the latest development in cutters. This style of tooth effects a shearing rather than a scraping cut.

Many improvements in gears, and increased manufacture, the result of the automobile industry, has induced the cutter maker to specialize on gear cutters, and the gear roughing cutter is now extensively used by large manufacturers of gears. The gear roughing cutter, or step stocking cutter, is a valuable asset to the finishing gear cutter.

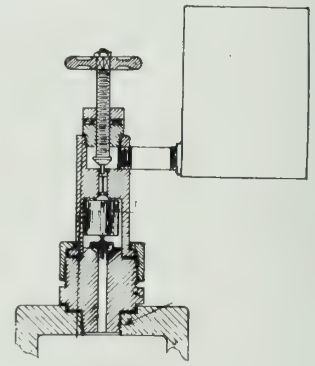
The large user of milling and gear cutters has been taught by experience that it pays to buy the best cutter obtainable, for not only is his original investment in the machine tool large, but cutters are expensive, so it is essential to select not only the best design, but cutters of high grade material, workmanship and extreme accuracy, to insure maximum production.

The Union cutters, made by the Union Twist Drill Company of Athol, Massachusetts, comprise all these qualities, made possible by the most up-to-date cutter plant in the world, equipped with the latest machinery, designed and made in their own factory.

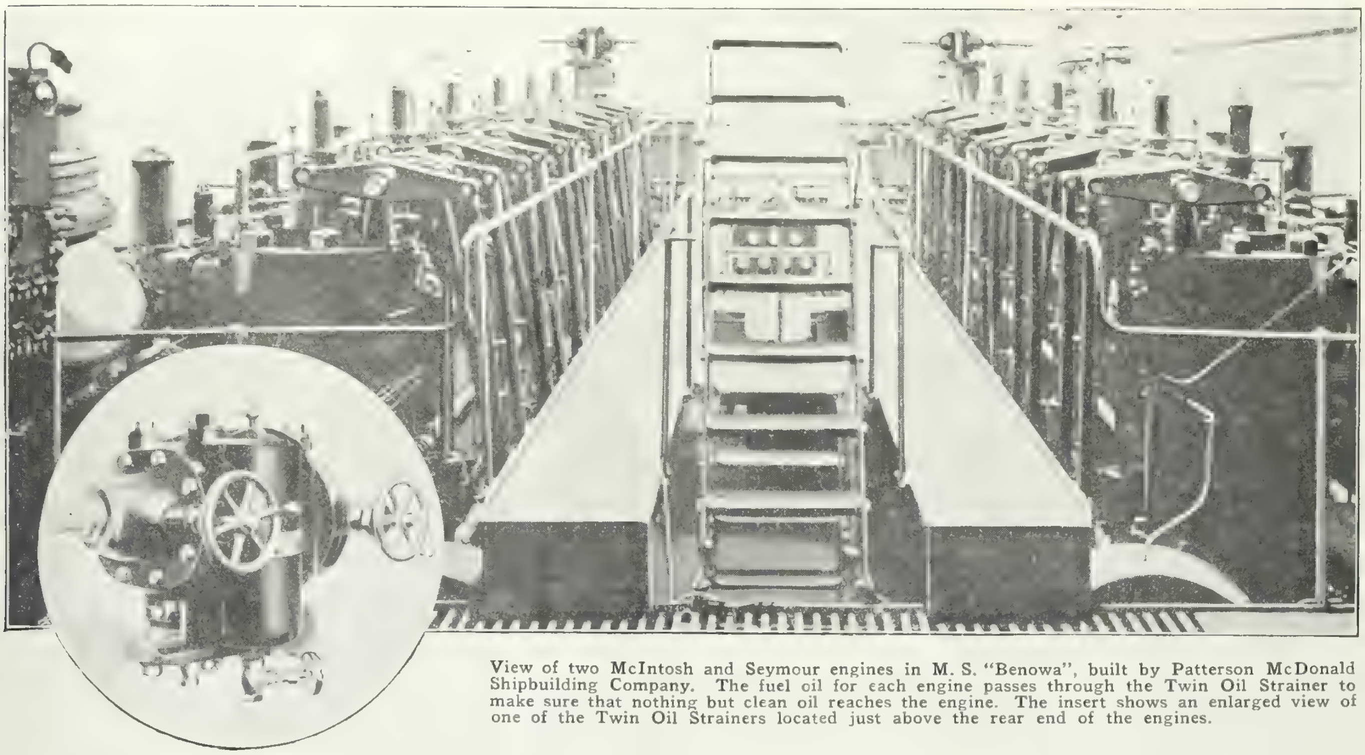
Fred Ward & Son of San Francisco are to be congratulated on recently having their Union twist drill agency increased to the whole State of California.

THE DAVIS AUTOMATIC AIR VENT FOR TELEMOTOR

A novel device now being offered on the market which has been tried out by installations on many ships in the last few years is the Davis Automatic Air Vent Valve. This device, as will be seen from the cut, is simply a valve actuated by a small copper float, which is intended to be inserted into the highest point in the liquid line controlling the telemotor. As all air in the system will collect at the highest point it is evident that when a sufficient amount of air collects in and around the float the valve will be allowed to drop, which will allow the escape of air and at the same time admit a sufficient amount of liquid from a small makeup tank situated close by. The usual method of removing the air has been to pump up the system until the liquid flows out of the plug holes at the top point of the system, but on long trips the gradual accumulation of air causes the steering to be sluggish. It is claimed that with the Davis Air Vent valve better steering is realized.


The Davis automatic air vent valve

This simple and effective little invention is the work of Frank J. Davis of 100 Haight street, San Francisco, California.



View of two McIntosh and Seymour engines in M. S. "Benowa", built by Patterson McDonald Shipbuilding Company. The fuel oil for each engine passes through the Twin Oil Strainer to make sure that nothing but clean oil reaches the engine. The insert shows an enlarged view of one of the Twin Oil Strainers located just above the rear end of the engines.

The Twin Oil Strainer

USE TWIN OIL STRAINERS AND INSURE A CONTINUOUS SUPPLY OF CLEAN OIL.

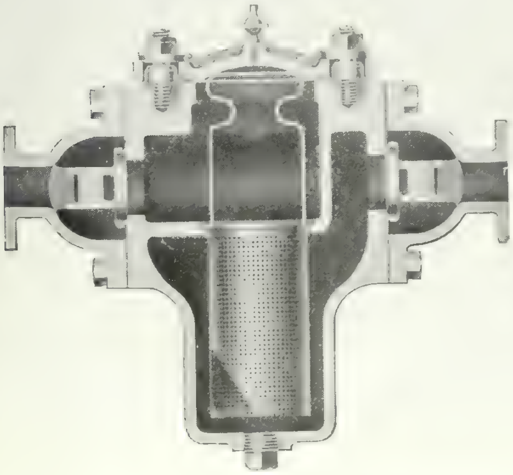
gives the same service as two single strainers, but it is more convenient to operate, requires less space for installation and does away with the extra valves and piping necessary to connect up. These are the features that lead to its being used in submarines and destroyers for the United States Navy, and in cargo boats for the United States Merchant Marine.

Twin Oil Strainers are furnished in sizes from 1 to 5 inch. (2½ inch and larger sizes have flanged connections). Basket mesh 1/64 inch or larger. Complete information in bulletin "AA" which will be sent on request.

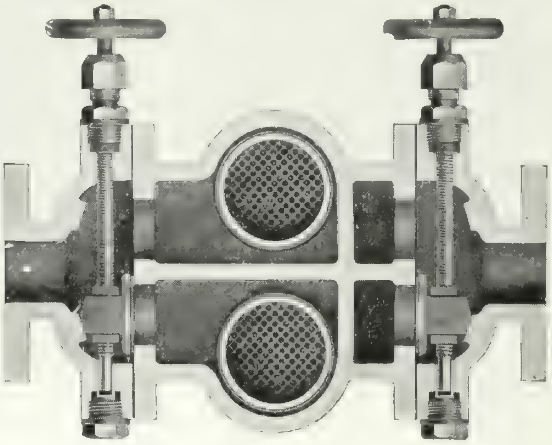
ELLIOTT COMPANY

443 Grant St., Pittsburgh, Pa.

The oil enters the Strainer at the left and empties into and passes through the straining basket, then up and out at the right. All solid impurities are retained in the straining basket.



When a basket is clogged, the valves are shifted to direct the flow of oil into the clean basket, which is in reserve. The compartment containing the dirty basket is then opened up, the basket removed, cleaned and replaced, and held in reserve until the basket then in service needs cleaning.



Electric Rivet Heating

IN an effort to overcome the many difficulties involved in heating rivets previous to their being driven and riveted, the General Electric Company has designed an electric rivet heater which embodies low first cost with simplicity of operation, fool-proofness of construction and maximum efficiency. This is accomplished in the following design:

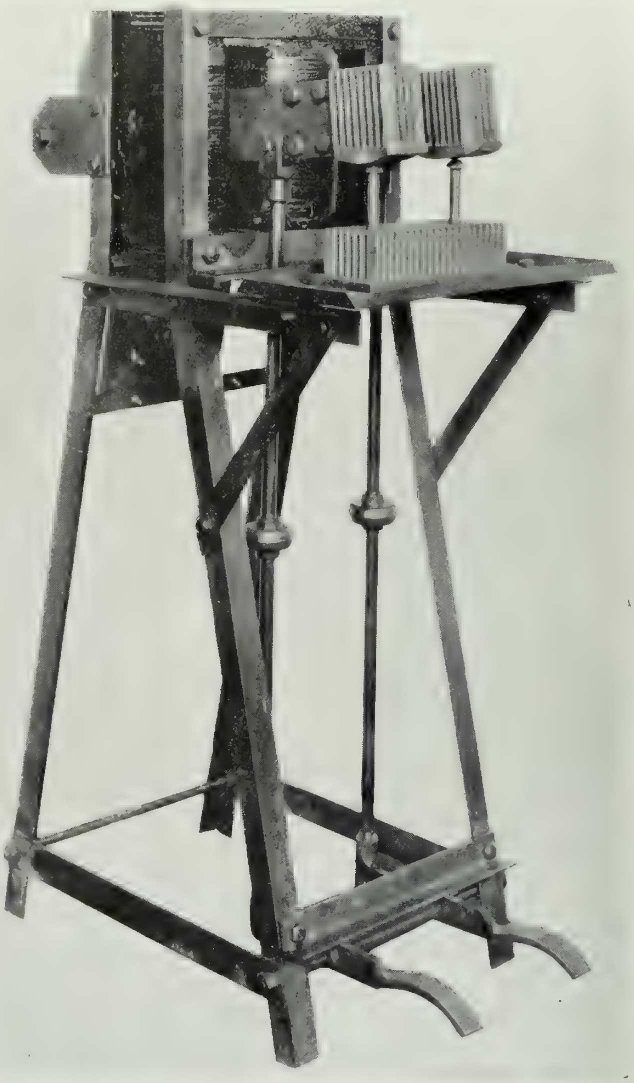
A transformer, rated at 15 kilowatts, is mounted on angle iron legs, which may be fitted with wheels. At the front of the transformer, two copper bars are fitted with heavy air-cooled electrode blocks of cast copper, and under these is another copper block which acts as a support and electrical connection for two rivets in series. When the rivets are stood up on the block and the electrodes are allowed to drop on the head of the rivet, the circuit is completed and heating begins. The two electrodes may be raised independently by two foot pedals, gravity being sufficient to lower the electrodes when the foot is removed. A primary tap switch mounted on the back legs of the machine gives all the variation needed for different lengths and diameters of rivets and rate of heating desired.

The advantages of the General Electric Company's rivet heater are:

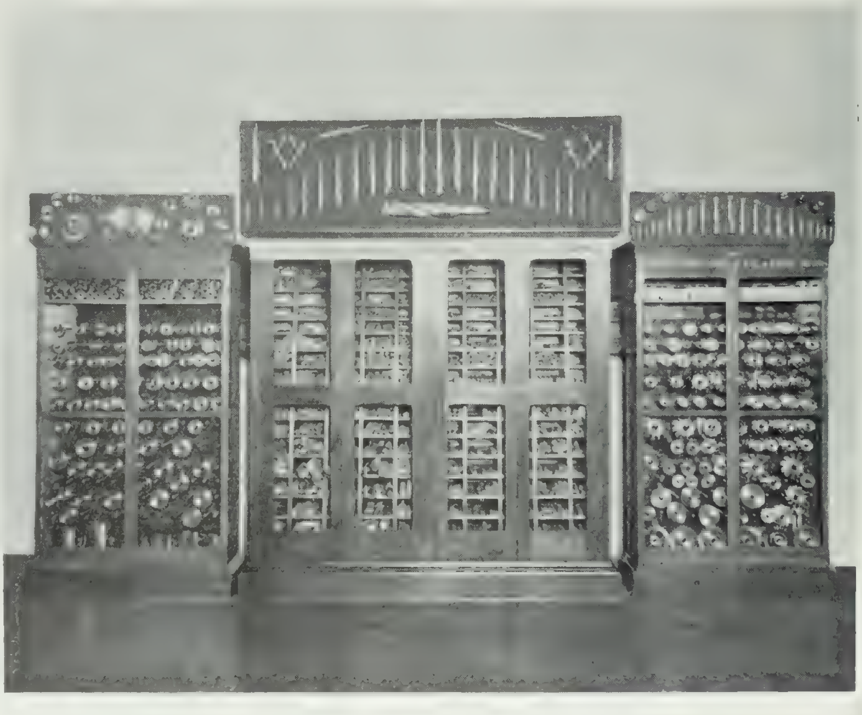
1. The higher efficiency of localizing the heat energy in the rivet, resulting in less heat radiation.
2. Better heat regulation in proportion to quantity of rivets used, and energy is used only when heating rivets, giving high economy.
3. Production of heated rivets, 5 pounds per k. w. hour.
4. Cleanliness—no smoke or gases formed.
5. No time wasted in starting production.
6. Quality of heat is better and minimum of scale forms. Rivet heats from inside out, giving more uniformity of heat and better upsetting conditions in shank.
7. Wastage of rivets reduced to minimum.
8. Heater is portable; takes any rivet up to ⅞ by 5 inches without adjustment, but two power lines are required to each heater, eliminating piping for oil, air or gas.

The sizes of heaters so far developed are a 5-kilowatt 2-jaw for rivets up to ½ inch, and a 15-kilowatt 2-jaw for rivets up ⅞ inch diameter. The two jaw heaters are intended for one gang use; however, in actual test that 15-kilowatt machine heated 500 ½-inch by 1¼-inch rivets in one hour, which is ordinarily enough for two gangs of gun riveters.

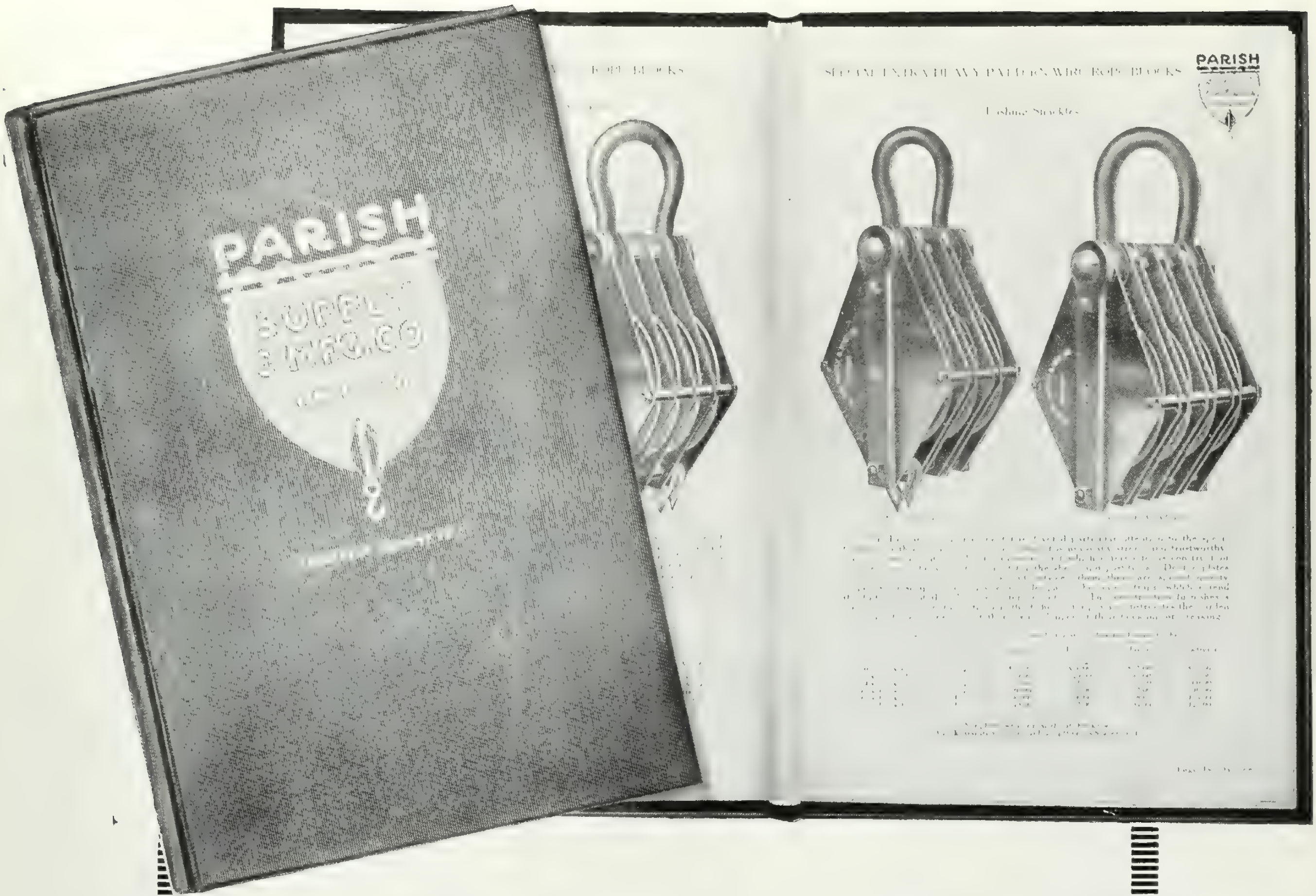
During a careful survey of present methods of heating rivets, it was found that large quantities of rivets were lost after having been driven, due to uneven heating and consequently failure to upset in the hole, causing a leaky rivet hole. Attendance was large, requiring a man to handle the forge blower as well as a passer; auxiliary equipment of the oil-burning rivet heater was expensive, requiring in many cases as high as 10 horsepower per oil burner to supply the air blast necessary. The equipment was not flexible. The burners could not be moved easily from place to place, and small forges could not be utilized in many places, due to the inability to get fuel to the forge as well as handle the ashes, and rebuild the fire daily. This was particularly true in shipbuilding yards where the forge was used down in the holds of the ships to heat rivets used in riveting bulkheads, partitions, floor plates, etc. Here the atmospheric conditions were bad and in some cases it was found that the laborers have instituted severe complaints against the methods of heating rivets. All of this led to the adoption of the electric rivet heater which has overcome many of these difficulties.



General Electric Company electric rivet heater



Some of the Union Twist Drill Company milling cutters, gear cutters and twist drills on exhibition at Fred Ward & Sons



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PARISH SUPPLY & MFG. CO.
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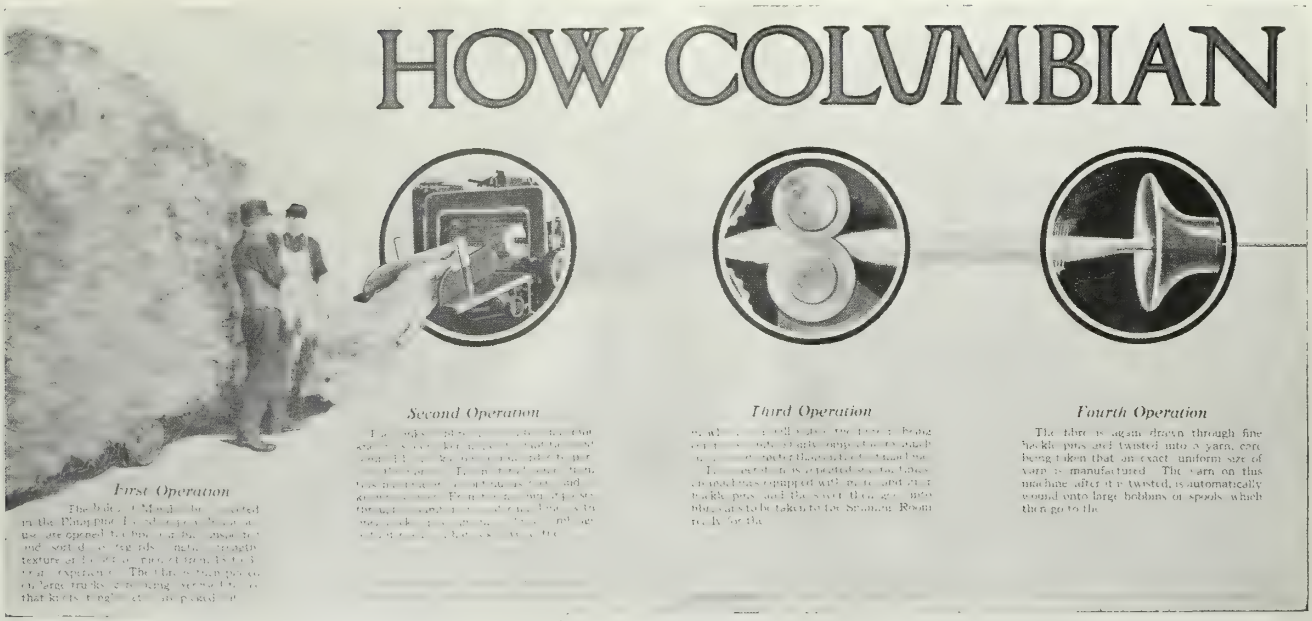
Construction Tools



The fibre is again drawn through fine heckle pins and twisted into a yarn, care being taken that an exact uniform size of yarn is manufactured. The yarn on this machine after it is twisted, is automatically wound onto large bobbins or spools which then go to the

A graphic explanation of modern rope manufacture,

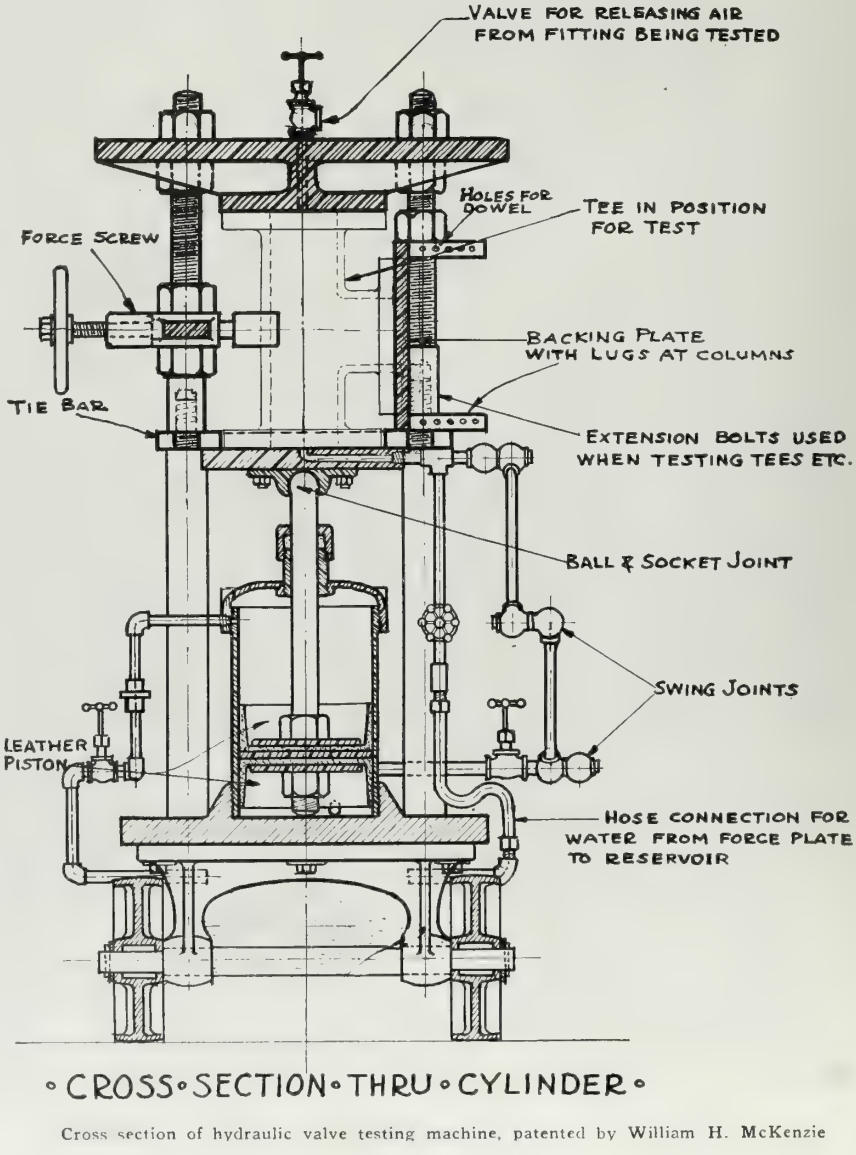
Shipbuilding Efficiency Methods

IN the building of hulls and machinery in accordance with the rules and requirements of the various classification societies, it becomes necessary to test many valves and fittings for the fuel, steam and other pipe lines aboard a steam or motor vessel.

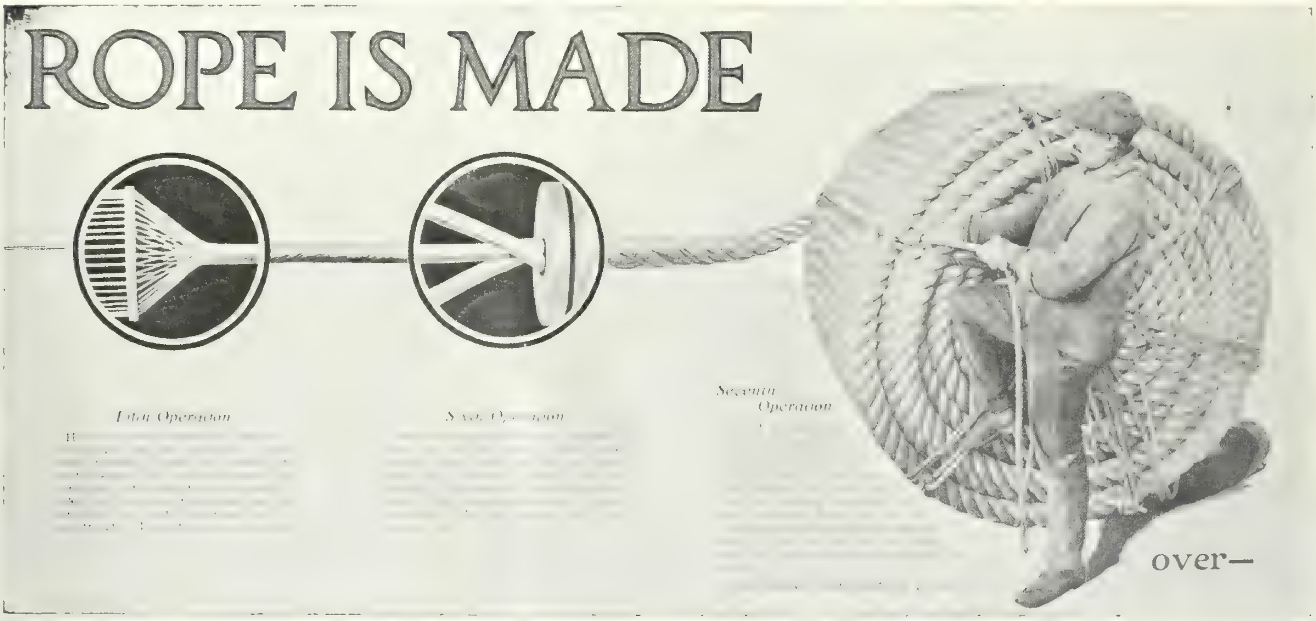
This testing, usually by hydraulic pressure, is an item of expense that, if not properly done, quickly mounts up to a large sum. The usual method of testing such equipment is by means of bolts and nuts, gaskets and blind flanges. A small high-pressure plunger pump produces the desired pressure through the medium of water which may be anywhere from 400 to 1000 pounds a square inch.

The testing of 6-inch valving or fittings by such methods consumes usually from twenty-five to thirty minutes and it is easily seen that this time multiplied by the hundreds of fittings used on a single hull is quite an item of expense, to say nothing of the delay in production caused by this consumption of time.

To expedite the testing of valves, fittings, expansion joints, bulk head nozzles and other similar articles, the McKenzie hydraulic valve testing device has been developed and patented by William H. McKenzie, a device which has been in use at the Moore Shipbuilding plant in Oakland, as shown in Figure 1. This particular machine has a capacity up to 6-inch nominal diameter. On the right hand side of the cut is shown a standard flanged tee. It will be noted from the section that water pressure from the hand pump is first delivered under the plunger, which, through its piston rod, transmits the pressure to a force plate connected to the piston rod with a ball and socket joint. This force plate is provided with a gasket on to which the fitting is placed without any bolts. Other faces of the fittings are provided with gaskets, also a force screw is shown on the left which is utilized for placing the side outlet flange up against the backing plate. When the forcing screw is tightened up, with a pressure under


VALVE FOR RELEASING AIR FROM FITTING BEING TESTED
HOLES FOR DOWEL
TEE IN POSITION FOR TEST
FORCE SCREW
BACKING PLATE WITH LUGS AT COLUMNS
TIE BAR
EXTENSION BOLTS USED WHEN TESTING TEES ETC.
BALL & SOCKET JOINT
SWING JOINTS
LEATHER PISTON
HOSE CONNECTION FOR WATER FROM FORCE PLATE TO RESERVOIR
CROSS SECTION THRU CYLINDER

Cross section of hydraulic valve testing machine, patented by William H. McKenzie



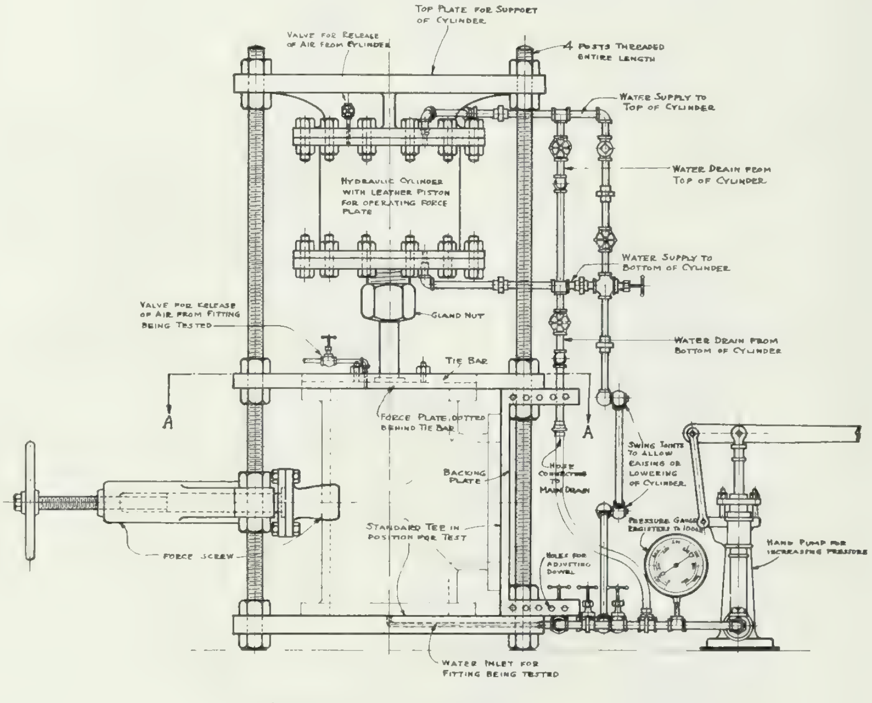
reproduced from the catalog of the Columbian Rope Company

the ram plunger, the valve or fitting in the machine is ready for testing, and by simply opening a valve the water under pressure is communicated through flexible pipes to the force plate and into the fitting.

A vent pipe with a shut-off valve for releasing the air is provided at the top plate of the machine. By this method it is possible to test an average sized fitting (6-inch) in from two to three minutes in the hands of unskilled labor. The left hand side of the cut shows a side view of the machine with the hand pump gauge and control valve fitted up for the testing of angle or straight-way valves. In this case two top clamp plates are provided with slots for quickly removing the valve or fitting. In testing valves it is common practice to have the valve closed and test in two operations above and below the seat. Average sized valves (6-inch) can be tested in this way in about three minutes, as against twenty-five or thirty minutes usually consumed in other methods.

The machine shown in Figure 1 is intended for portable work, and for this reason the pump ram and so forth are mounted together with a crane on a small hand truck. For larger work the machine as shown in Figure 2 has been designed. In this case the positions of the ram and work have been reversed. The operation of the machine is similar to that shown in Figure 1, and it will be noted that Figure 2 shows the method of clamping when testing elbows. It is possible to build these machines for the testing of pipe lines, gas engine cylinders and a wide variety of work.

The machines have received the approval and recommendation of the Shipping Board, as well as the officials of the Moore Shipbuilding Company, and are being offered on the market by the McKenzie Valve & Fitting Testing Machine Company, 437 Sixty-third street, Oakland, California.


TOP PLATE FOR SUPPORT OF CYLINDER
VALVE FOR RELEASE OF AIR FROM CYLINDER
4 POSTS THREADED ENTIRE LENGTH
WATER SUPPLY TO TOP OF CYLINDER
WATER DRAIN FROM TOP OF CYLINDER
HYDRAULIC CYLINDER WITH LEATHER PISTON FOR OPERATING FORCE PLATE
WATER SUPPLY TO BOTTOM OF CYLINDER
VALVE FOR RELEASE OF AIR FROM FITTING BEING TESTED
GLAND NUT
WATER DRAIN FROM BOTTOM OF CYLINDER
TIE BAR
A
A
FORCE PLATE, DOTTED BEHIND TIE BAR
SWING JOINTS TO ALLOW RAISING OR LOWERING OF CYLINDER
BACKING PLATE
HOSE CONNECTING TO MAIN DRAIN
STANDARD TEE IN POSITION FOR TEST
PRESSURE GAUGE REGISTERS TO 1000#
HAND PUMP FOR INCREASING PRESSURE
FORCE SCREW
HOLES FOR ADJUSTING DOWEL
WATER INLET FOR FITTING BEING TESTED

· ELEVATION · OF · MACHINE ·
Elevation of hydraulic valve testing machine, patented by William H. McKenzie

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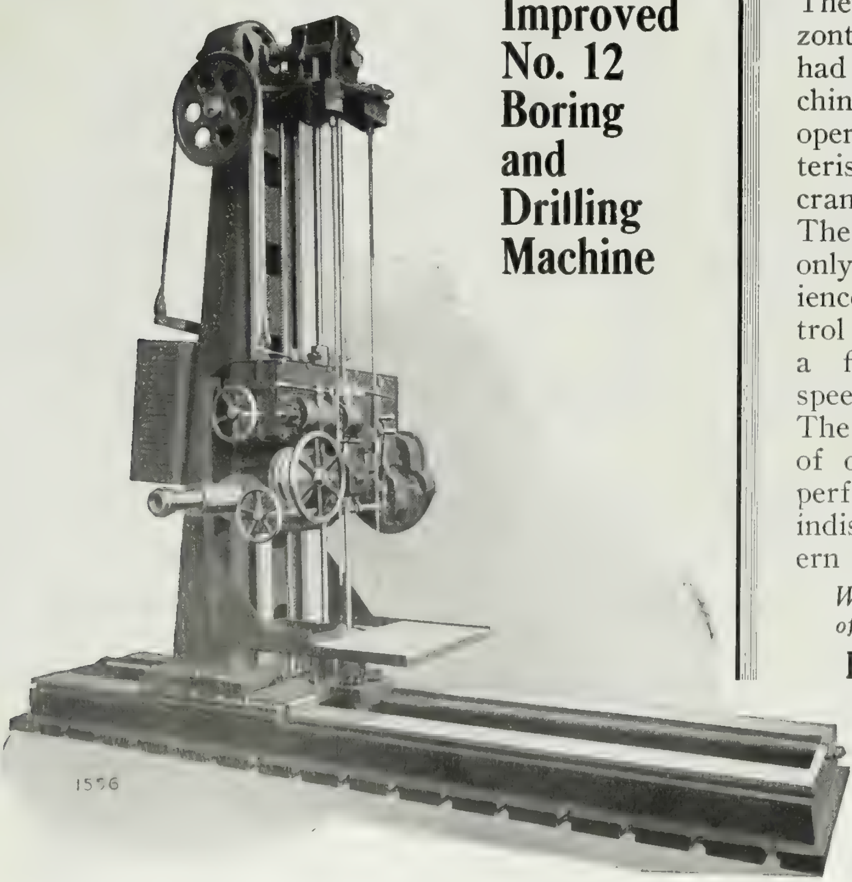

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